See pag. 14 ABSTRACTS OF PAPERS AMERICAN SOCIETY OF ICHTHYOLOGISTS AND HERPETOLOGISTS 39th Annual National Meeting San Diego, California June 17-21, 1959 WEDNESDAY MORNING, JUNE 17 JOINT SESSION 1. Origin of hybrid swarms in the Mexican viviparous fish genus Poeciliopsis. Robert R. Miller. Hybrid swarms between two species of Poeciliopsis occur commonly in certain streams of northwestern Mexico. Their relative abundance is associated with an allfemale strain and with scarcity of males of one of the species. Under certain conditions the presumed hybrids may even outnumber the parental species; in such places an occasional male hybrid is produced which appears to maintain the hybrid swarm. Interpretation of the intermediates as hybrids is being tested experimentally not only to verify their origin but to determine also how the hybrid swarms are maintained. 2. Effects of venoms on neuromuscular transmission. Findlay E. Russell and Truman E. Long. Venoms are complex mixtures, chiefly proteins, many of which have enzymatic activity. The lethal effects of venoms are probably due to the non-enzymatic proteins, although the enzymes and enzymatic combinations certainly contribute to the over-all toxicity of the poison. The present study was initiated to determine the effects of the following venoms on neuromuscular transmission: Agkistrodon piscivorous, A. mokeson, Crotalus adamanteus, C. atrox, C. horridus, Latrodectus hassellti, L. mactans, Vejovis spinigerus, Centruroides sculpturatus, Urolophus halleri, and Trachinus vipera. The investigation indicates that there is a considerable variation in both the quantitative responses of the nerve-muscle preparation to these venoms. 3. Instrumental conditioning of sharks. Eugenie Clark. A male and a female Lemon Shark, Negaprion brevirostris, each about 9 feet long, were conditioned to associate pushing a target with food-getting. The sharks were trained to take food off an underwater target rigged so that the shark had to press the target with its snout. This pressure automatically rang a bell. The sharks rang the bell 617 times during a 6-week conditioning period. The target was then presented without food. Within 3 days both sharks learned to press the target for food dropped to them when the bell rang. This reward food, tied on a string, was removed in 10 seconds if not taken by a shark. In the next 6 weeks the sharks pressed the empty target 561 times and got the reward food 324 times. The place where food was dropped was moved farther from the target each week. The sharks learned to "steal" the reward food from each other. Head-on collisions resulted when the sharks raced to get the food. Details of the scores kept show individual differences in various aspects of the behavior of these sharks. They remembered to associate target with food after a 10-week "hibernation" period in mid-winter.

CONCURRENT SESSION I, HERPETOLOGY

(JOINT SESSION WITH HERPETOLOGISTS LEAGUE)

SYMPOSIUM: Adaptations of reptiles and amphibians to desert environments, I.

1. Reproductive adaptations of amphibians for desert life. W. Frank Blair Detailed observation of the times of reproductive activity of the species of anurans that breed in one pool near the arid-moist boundary in central Texas were made over a period of more than 3 years. The species that breed in this situation are a mixture of moist-adapted and xeric-adapted ones, and species that appear adapted to the variable moisture conditions of the arid-land border. Patterns of

seasonal variation in reproductive effort in relation to the geographic distribution of these taxons are considered. Additional evidence is available from road logs of breeding choruses that have been made over a period of several years in an extensive area of the Southwest. Desert adaptations at one level of specialization are shown by the "opportunistic breeders." Adaptations at a more extreme level are shown by those species that breed in permanent water and without the stimulus of rainfall. In the genus Scaphiopus, e.g., S. hurteri shows the non-opportunistic annual periodicity of a mesic-adapted species; S. couchi, S. hammondi, and S. bombifrons are largely opportunistic breeders; S. intermontanus has gone to the habit of breeding in permanent water.

2. The ecology of a desert population of Rana pipiens. Rudolfo Ruibal.

A population of Rana pipiens in the Colorado Desert of California has been studied for 3 years. The frogs inhabit a permanent brackish stream that drains into the Salton Sea. The distribution of the frogs, mating season, embryonic developmental rates, temperature tolerances, and salinity tolerances, as well as the physical characteristics of the habitat have been studied. The relation of this population to the other populations of Rana pipiens has been studied by an analysis of the morphology and by hybridization experiments.

3. Embryonic adaptation to temperature in desert anurans. Richard G. Zweifel. A preliminary survey of temperature tolerance and embryonic development rate of several species of anurans found in the deserts of Arizona and Sonora discloses no unique adaptations. The lower limiting temperature for embryonic development in Bufo cognatus and B. debilis approximates 160-17°C., and in Scaphiopus bombifrons, S. couchi, and S. hammondi is at or below 15°C. The upper limiting temperature in both genera is between 32° and 34° C. The desert environment has not resulted in adaptations to high temperatures in these species, in contrast to the situation in the southeastern U.S., where species of Bufo and Rana can tolerate 35° C. The situation is similar with respect to embryonic development rate. Rates in some species of Bufo in more humid regions exceed those in desert regions; rates in eastern Scaphiopus probably equal those of species in the arid southwest. Most anuran species living in desert regions also occur outside the deserts. Paleobotanical evidence suggests that the American deserts are of comparatively recent origin, probably dating from late Pliocene. Hence some species of anurans may antedate the deserts they inhabit. The desert is not unique in terms of water temperatures and the temporary nature of breeding sites. The ability of many species to exist in the desert may result from adaptation to non-desert habitats paralleling conditions met in the desert.

4. Adaptations and adjustments of desert reptiles and amphibians to environmental stress. Charles H. Lowe, Jr.

The General Adaptation Syndrome provides a theoretical basis for the integration and interpretation of investigations of environmental stress in natural populations. Stressors and the G-A-S are discussed in relation to studies on the behavioral and physiological ecology of desert reptiles and amphibians.

5. <u>Physiological adaptations of reptiles and ampbibians to desert life</u>. Bayard H. Brattstrom.

The major physiological adaptations of reptiles and amphibians to desert life that have been at all studied concern temperature regulation, metabolism, acclimation, water regulation, nitrogen secretion, and color change. Metabolism and acclimation studies are currently underway at several institutions. The full ecological significance of these studies is not yet well understood. Several recent

4 studies on water regulation (evaporative cooling) and nitrogen excretion carried out in our laboratory will be discussed. The role of thermoregulatory physiology in desert reptiles and amphibians will be discussed, using examples of daily activities of representative forms. WEDNESDAY AFTERNOON CONCURRENT SESSION II, ICHTHYOLOGY SYMPOSIUM: Fisheries oceanography, I. (See program of American Society of Limnology and Oceanography, Pacific Division). THURSDAY MORNING, JUNE 18 CONCURRENT SESSION I, HERPETOLOGY (JOINT SESSION WITH HERPETOLOGISTS LEAGUE) SYMPOSIUM: Adaptations of reptiles and amphibians to desert environments, II. 1. Relict populations of the Chihuahuan desert. William W. Milstead. Factors in the development of the present-day Chihuahuan Desert and the physicgraphy of surrounding areas have permitted the existence of a number of relict species on the desert. Some species exist in scattered populations throughout the area. Others are concentrated into 2 local populations: Calamity Creek and Independence Creek. All have become adapted to their peculiar mode of desert existence. The recent drought, which allowed an eastward extension of the desert, has extirpated or seriously inhibited the Calamity Creek population and the scattered populations of individual species. A flood coupled with the drought has virtually destroyed the Independence Creek population. 2. Reptile denning adaptation to desert life. Angus M. Woodbury Since 1935 the writer has studied many snake and tortoise dens in the intermountain region, mainly in Utah and Colorado, and has found that in our temperate zonal climate the dens represent winter hibernation quarters, from which the reptiles fan out over the surrounding range during the summer and to which they return in the fall. This seasonal pattern is correlated primarily with temperature. Ordinarily it is the dominant behavior cycle in the lives of reptiles, and all other behavioral and physiological rhythms are subordinate to it. Reptiles must have shelter from summer heat as well as from winter cold, and hence usually make similar daily patterns to avoid cold of night or heat of midday. Food-getting, reproduction, and avoidance

of enemy activities must all be adjusted to the dominant rhythm, when environmental temperatures permit them to be active at all. These conclusions have been derived from studies of some 285 marked tortoises inhabiting 95 winter dens in southwestern Utah over a 10-year period (1936-1946), approximate; y 1000 marked snakes inhabiting a large den in Tooele Co., Utah, over a 12-year period (1940-1952), and about 25 other snake dens in Utah and Colorado at which lesser studies have been made. In addition, many other reputed dens have been investigated. More detailed information about

3. The interaction of structure, physiology, and behavior in the thermoregulatory adaptations of lizards. C. M. Bogert.

these studies will be given in the paper.

Modifications adapting lizards to more or less restricted habitats entail the integration of behavior, structure, and physiological characteristics, primarily at the species level, although localized populations may be adaptively specialized

for local environments. Exceptions may occur, but various lines of evidence suggest stabilization of physiological processes within a relatively narrow zone of temperatures early in the evolution of individual genera. Thermoregulatory adaptations of species evolving subsequently, presumably with cumulative modifications over relatively long periods of time, have affected such characters as size, nature of the scutellation, pigmentary systems, and behavioral traits. In horned lizards (Phrynosoma) pigmentary changes compensate with astonishing precision for differences in bulk in regulating the intake of radiant energy converted into heat. Augmented by pigmentary changes, behavioral thermoregulation is accomplished in much the same manner in lizards of the same species, regardless of their size or age. Pigmentary changes compensating for size account for the maintenance of similar if not identical means for the normal activity range in juveniles and adults of each species. Proof is lacking, but circumstantial evidence indicates that behavioral, physiological, and structural characteristics are not only fixed by heredity (within limits subject to minor modifications with compensations resulting from acclimation or acclimatization) but also are integrated through differentials in survival rates reflecting the effects of specialized environments. The shape and bulk of the body impose limitations on the efficiency of thermoregulatory devices employed by lizards, and may account for the restriction of larger species to ttopical regions or to areas approximating those of lower elevations within the tropics, where they are not subjected to the extreme seasonal fluctuations in environmental temperatures characterizing most areas within the zones inaptly called "temperate."

The zoogeographic histories of desert reptiles. Kenneth S. Norris.

The zoogeographic histories of desert reptiles and those species in peripheral habitats are intimately tied to the development and interaction of 2 fossil floras; the mesic-moist Arctotertiary flora, and the xeric Madrotertiary flora. Most species in the true lowland desert areas probably arose in association with the Madrotertiary flora, in the areas now desert or occupied by arid-subtropical scrub. The most recent post-Pleistocene fluctuations in climate are reflected in the disjunct distributions of both of these groups of animals. The high degree of adaptation of most desert species to desert conditions is remarkable in view of the recency of the habitat and its fluctuations in the Pleistocene. Closer inspection of the types of adaptations that prevail shows that most are behavioral and not physiological. Many reptiles seem to be selecting "partial environments" from the total climate which approximate to some degree primordial habitats, perhaps occupied more fully with regard to total activity in pre-Pleistocene times. These adaptations and their significance will be discussed.

THURSDAY MORNING

CONCURRENT SESSION II. ICHTHYOLOGY

SYMPOSIUM: Fisheries oceanography, II. (See program of American Society of Limnology and Oceanography, Pacific Division).

THURSDAY AFTERNOON

CONCURRENT SESSION I, HERPETOLOGY

1. <u>Multiple nesting and clumped emergence to nest by Atlantic loggerhead sea turtles.</u>

David K. Caldwell and Frederick H. Berry

Tagging Studies on nesting rookeries in South Carolina, Georgia, and

The function of the stirnorgan (frontal organ) was studied in tadpoles of the African frog, Pyxicephalus delalandi. The experiment used 240 tadpoles, of which 120 were stirnorganectomized and the remainder sham-operated. All were placed in the same pool but the 2 groups were separated by a nylon net partition. As a measure of activity, frequency of locomotor movements and bubbling (release of gas, presumably chiefly CO₂) was recorded. After an initial period of depression, the stirnorganectomized tadpoles were more active than the controls, a result which parallels that obtained upon removal of the "third eye" in lizards. The stirnorgan in tadpoles and the third eye (parietal eye) are both pineal derivatives and are thought to be sensory structures influencing pineal function. Stirnorganectomy had no appreciable effect on pigmentation, growth rate, or time of metamorphosis.

3. Remarks on the biology of Ambystoma tigrinum nebulosum with especial reference to neoteny. Frederick R. Gehlbach.

The biology of the tiger salamander, Ambystoma tigrinum nebulosum, was studied in the Zuni mountains, New Mexico, at altitudes of 6800-8200 feet. Prior to heavy rains during July and August, 1957, a single active adult was dug from the ground at a depth of 6 feet. Thereafter, larvae, neotenic adults, and transformed adults were found throughout the summer in canyon pools and potholes. Larvae were never taken in the same ponds with Bufo woodhousei or Hyla arenicolor tadpoles, nor were larvae of different size groups taken together. Food habits of small Ambystoma larvae indicated heavy predation on anuran eggs. Larvae of all sizes kept in the laboratory usually transformed within 28 days. However, if provided with artificial oxygen supply they remained in larval condition. In the field metamorphosis was effected by crowding and shrinkage of the pool environment, and occurred in larvae larger than 50 mm. total length. Complete development in some individuals took at least 2 years. Adult males had proportionately longer tails than females; neotenic adults were generally smaller than transformed adults, but also had relatively longer tails. Not all specimens acquired the characteristic color pattern at metamorphosis. This pattern consisted of 11-50 dorsal and 8-37 caudal yellow or white spots on a brownish to black background.

4. Vine snake feeding with Anolis as prey. Robert Snedigar and George B. Rabb Complete preliminary feeding behavior of captive American vine snakes (Oxybelis) involves recognition of prey, swaying of body, protrusion of tongue, and movement of tips of tongue. A very gradual approach is made to the prey, with a final fast rush and bite. If a favorable grip is obtained, the lizard is held for 10-15 minutes until the poison takes effect. Swallowing is effected with the lizard dangling. The lizard may react to the snake's approach by wagging the tail and slinking off in an apparent defensive maneuver. Somewhat similar feeding behavior is found in the African twig snake (Theletornis) and the Asian tree snake (Dryophis).

The lizard genus Eumecoides Taylor (with 2 species) was described from fossil dentaries recovered from the Rexroad Formation (Upper Pliocene) of southwestern Kansas. In a study based on newly acquired fossil material from the type locality, consisting of dentaries and many other cranial elements, the dentaries of Eumecoides have been compared with those of all Recent North American lizard genera.

Eumecoides dentaries are found to be identical with those of Phrynosoma cornutum. The characteristics of the 2 species of Eumecoides fall within the total range of variation of P. cornutum. 6. The chromosome number of Proteus anguineus: a correction. James Kezer. No abstract received. 7. Oxidative metabolism in lizards. Velma J. Vance. Oxygen consumption has been determined for several species of southern California lizards at 4 experimental temperatures. Temperature coefficients and regression coefficients will be reported and the possible significance of these measurements in lizards will be discussed. 8. The critical thermal maxima of western ambystomids and salamandrids. James D. Anderson. The critical thermal maximum was determined for the following species: Rhyacotriton olympicus, Dicamptodon ensatus, Ambystoma gracile, A tigrinum californiense, A. macrodactylum, Taricha granulosa, T. rivularis, and T. torosa. All animals were acclimated st 12°C. for 10-14 days prior to experimentation. At least 6 individuals were used for each species. The apparatus consisted of glass containers submerged in a large water bath and provided with a snorkel vent to minimize the effect of pressure changes. The atmosphere in the containers was saturated with moisture throughout the experiments. Results indicated that salamandrids have higher critical thermal maxima than ambystomids. The lowest critical thermal maxima was recorded for 4 ambystomids which occur in the humid coastal forests of the northwest: Rhyacotriton, Dicamptodon, Ambystoma gracile, and A. macrodactylum (western Oregon). Several subspecies of A. macrodactylum show differences in the critical thermal maximum greater than the difference between some salamander species. In general there is less difference between species from the same area than between members of the same species from different areas. 9. Influence of the third eye on activity in night lizards. Robert Glaser. The number of locomotor movements of matched groups of night lizards Xantusia v. vigilis) was recorded over periods of weeks. In repeated experiments in which a total of 50 lizards yielded records of over 107,000 movements, the placement of an aluminum-foil shield over the parietal eye in one group was followed by an increase in activity compared with the control group. The experimental group seems to be subject to periodic bursts of activity and to a loss of the 24-hour rhythm. These findings help to support the idea that the parietal eye may act as a photothermal radiation dosimeter and that it may play a role in that capacity in a homeostatic mechanism that modulates activity. 10. Relationships of Texas neotenic plethodontids. Floyd E. Potter, Jr. Neotenic forms of Eurycea of Texas and Typhlomolge rathbuni are examined as to their phylogenetic relationships, distribution, life history, and ecology. 11. Utilization of radioiodine by the neotenic salamander Eurycea tynerensis. Harold A. Dundee and Aubrey Gorbman. About 100 specimens of <a>Eurycea <a>tynerensis, collected in Missouri, were injected with radioactive iodine for study of the metabolism of this element by the thyroid gland. They were maintained in 2 types of water, native Missouri water and New Jersey spring water, and the sexes were separated. Environmental temperature and lighting were controlled to approximate natural conditions. No differences in results could be correlated with sex or with type of environmental water. Thyroidal

accumulation of radioiodine reached a low maximum of 2.5% within 24 hours and there was little indication of turnover in the following 6 days. Significant small quantities of new radioiodine-labelled thyroxine did not appear until about 7 days after injection with the isotope. It is concluded on the basis of this and other evidence, that neoteny in \underline{E} . $\underline{tynerensis}$ is due to the low level of thyroid hormone synthesis.

12. The effect of acclimatization on thermoregulation in Sceloporus occidentalis.

Daniel C. Wilhoft and James D. Anderson.

Thirty Sceloporus occidentalis were acclimatized to 35° C. during both fall and spring; homenimals were dused as controls during the spring. Effects of acclimatization on thermoregulation was determined by placing the animals in thermal gradients for 10 hours and recording body temperatures every hour. Acclimatization to 35°C. in both fall and spring resulted in lowering the mean body temperature (30.7°C.) approximately 4° below the mean (35.0°C.) of the range which was known to be preferred in the field. The controls also exhibited an approximate 2-degree difference (33.4°C.) in preferred body temperature compared with that of the field animals.

13. Heart rates on intact unanesthetized snakes by electrocardiogram. Gary K. Clarke and Thomas I. Marx.

A new technique is described in which the electrocardiogram of the intact snake is recorded from external strap electrodes. Basal heart rates were taken on 5 species of native non-poisonous snakes. For one tropical species (Constrictor c. constrictor), cardiograms showing the heart rates in relation to the surrounding temperature were obtained. A comparison is given of the rate of an isolated boa constrictor heart with rate of an intact boa, The cardiogram of a rattlesnake (Crotalus r. ruber) was recorded at various temperatures during resting condition, during excitement, and during a provoked strike.

14. Some native and exotic amphibians and reptiles in color; problems and techniques in herpetological photography. Nathan W. Cohen.

A showing in color of some well-known and not so well-known amphibians and reptiles, with critical remarks on purpose, technique, equipment, habits, habitats, and need for patience.

15. Collecting reptiles in the Urique River valley of Chihuahua, Mexico.
Wilmer W. Tanner and W. Gerald Robinson. (Presented by abstract only).

The small mining town of Urique is located on the west bank of the Rio Urique, a branch of the Rio Fuerte, approximately 25 miles upstream from the Chihuahua-Sinaloa border. The elevation at Urique is approximately 1835 feet, but it is situated in a broad deep canyon from the rim of which (trail elevation about 6700 feet) one has a magnificent view. The gorge of the Urique is comparable in size to the Grand Canyon of the Colorado, but it differs in having considerably more vegetation on the slopes. To the north of the Pueblo Urique the valley becomes gradually narrower, more rugged and steep-walled, finally forming the famous Barranca de Cobre. Although only 14 species were taken, they represent a rather interesting group, for several are new State records and some are to be described as new forms.

9 THURSDAY AFTERNOON CONCURRENT SESSION II, ICHTHYOLOGY 1. The phylogeny of the Emblemariinae. John Stephens. A discussion of the intra-subfamiliar relationships of the Emblemariinae, including a revision of the genera, distribution, number of species, and probable evolution within this group. 2. A high mortality of warm-water game fishes associated with heavy parasitism.

Andrew C. Olson, Jr., Ronald W. Crawford, and Maurice H. Getty. In May 1958, bluegills (Lepomis macrochirus), crappies (Pomoxis sp.) and largemouth bass (Micropterus salmoides) were observed dying or dead in Sweetwater Reservoir, San Diego County, Calif. Initially, 6-10 fishes per day were noted by the dam keeper in the vicinity of the boat float. At the height of the kill in latter May, 1500 dead were counted in one day. Very conservatively, 10,000 fish were dead by June 5. Over 90% of these were bluegills. Leeches (Illinobdella sp.) were conspicuous around the head, mouth, and gills. This led reservoir personnel to assume that the leeches were directly responsible for the kill. Internal examination of adult bluegills of 6-7 inches standard length revealed metacercariae of the fluke Posthodiplostomum minimum to be conspicuous in the liver, heart, and spleen. Numbers in these organs ranged: liver 171-630, heart 57-212, spleen 2-28. Crappies showed essentially the same general distribution but infestation was not as heavy. No bass were examined. We do not believe that leeches were the prime cause of the mortality. It is suggested that the fishes may have been weakened by the internal parasites and possibly by spawning activity to the extent that they were vulnerable to attachment by leeches.

3. Intra- and interspecific patterns of variation in fishes of the family Hexagrammidae. Jay C. Quast.

Means of meristic characters were found to vary with latitude in representatives of this North Pacific family. In accord with geographic variation reported for many other fishes, sample means decreased significantly in numerical value toward the equator. No comparable changes in means of counts were shown throughout the ranges of those species with predominantly east-west distributions. Amounts of relative variation shown by each type of meristic and non-meristic count were usually similar within each species despite the significant shifts of means that frequently occurred with latitude. Interspecifically, the coefficient of variation shown by each type of count in the 9 species was more characteristic of the type of count than of the species counted. The coefficient remained approximately the same despite nearly 2-fold differences in some counts between species. Comparison with data for other fishes disclosed the hexagrammid values to be generally as low as those of the less variable representatives of other groups.

4. Variation and systematic significance of meristic characters in the darter subgenus Hololepis. Bruce B. Collette.

Variation is compared among the 7 species in this subgenus. Growth variation, yearclass variation, sexual dimorphism, temperature-dependent variation, and the possibility of genetic drift are considered. An attempt is made to correlate some of the variation with differences in environments. The species with the widest distribution, Hololepis fusiforme, shows the greatest variation and is considered in more detail than the other 6 species.

- 5. The osteology and interrelationships of oviparous cyprinodonts. R. P. Sethi The classification of the oviparous cyprinodonts (Cyprinodontidae) remains a controversial issue among ichthyologists. Since 1931, when Myers published a general classification of the group, a number of new forms have been described. The discovery of the genera Crenichthys Hubbs and Cualac Miller has aroused doubts as to the desirability of recognizing 2 separate subfamilies, Cyprinodontinae and Fundulinae, on the basis of differences in teeth alone. The classification of the group appears to need re-examination based on as many criteria as practicable. Moreover, since knowledge of the precise relationships of the numerous genera is inadequate, a thorough knowledge of osteology seems absolutely necessary before their classification can be satisfactorily attempted. I have concentrated upon an analysis of skeletal characters of a number of the genera, and have found that the skeletal features previously considered characteristic of the suborder Poeciloidea and of various other taxons are not universilly applicable. From my study it is possible to show that there are basic differences between the Cyprinodontinae and Fundulinae in such structures as parietals, post-temporals, nature of articulation of first vertebra with the skull, and the exoccipital condyles. The implications of these findings are discussed.
- 6. Systematics of the dolly varden, Salvelinus malma. J. D. McPhail
 Evidence is presented supporting the recognition of Salvelinus malma as a species distinct from S. alpinus. Collections were examined from 4 localities in Alaska where the 2 species occur sympatrically. The range of S. malma is discussed and morphological variation is described. Subspecific désignations are found to be invalid.
- 7. The Tripterygiidae and New World zoogeography. Richard Rosenblatt.

 The endemic New World tripterygiid genera are not very closely related, instead most are related to Old World types. An analysis of the relationships of the genus Enneanectes reveals that the members of sibling pairs are not separated by Central America, but occur in the same ocean, and the former sea connection between Atlantic and Pacific may not have been important to this group.

8. Artificial spawning boxes for largemouth bass, Micropterus salmoides, in a multiple purpose reservoir. John T. Salyer

Ellis (1936) pointed out that impounded reservoirs exhibit problems not ordinarily present in natural bodies of water. Since evaporation rate is of prime concern in reservoirs used for water storage, it is not surprising that such impoundments have steep, rocky canyon walls. Such shorelines may at times not offer adequate spawning areas for largemouth bass. Floating (8) and stationary (10) bass spawning boxes were installed in San Vicente Reservoir to determine if this technique warrants serious consideration in a large reservoir. A stationary box was set within 40 feet of each floating box so that results of the 2 types would be comparable. In general, the instructions of Regan (1934) were followed with regard to the floating type. Heavy spring rains in 1958 produced turbid water conditions in the reservoir which persisted for several weeks. During this period only 3 of the 8 floating boxes were observable, and none of the stationary boxes could be seen. Of the observable floating boxes, 2 were definitely used by bass and possibly the third was also used, for fry were seen swarming near it on May 4, 1958. Results were inconclusive with respect to either floating or stationary boxes, because complete observation was impossible.

9. The distribution of the bathypelagic fishes of the genus Melamphaes in the eastern North Pacific Ocean. Alfred W. Ebeling.

Melamphaes, 1 of the 5 or 6 genera into which the berycoid family Melamphaeidae may be divided, comprises about 20 species, 8 of which occur in the eastern North Pacific. Some of the species exhibit considerable endemism and are localized in physically and biologically defined water masses. The water masses of the eastern North Pacific include Subarctic, Transitional, Central, Intermediate, and Equatorial waters. The geographical distributions of the eastern North Pacific species were inferred from analyses of midwater trawl samples. Because water masses are usually identified by their density characteristics, curves of salinity as a function of temperature were constructed for each species from data obtained from hydrographic casts taken vertically at each locality of capture. In this way certain species were shown to inhabit particular water masses. Others, however, apparently occur only in areas of relatively high productivity either near land or in vertically mixed oceanic waters. The meridional distributional limits of many other bathypelagic fishes coincide generally with those of Melamphaes. Together with temperature and currents, biological factors, especially the extent of highly productive areas, probably determine these limits.

10. <u>Is the Lahontan cutthroat trout, Salmo clarki henshawi, extinct?</u> Robert J. Behnke.

During the past century the native cutthroat trout of the Lahontan Basin has been brought to the verge of extinction. Conditions resulting from dams, diversions, pollution, and the introduction of exotics raise doubt that a pure strain of the native trout continues to exist. Examination of museum material provided taxonomic criteria by which the original species might be recognized. It was found that the Humboldt drainage had a trout distinct from that of the Tahoe-Truckee system. The stocks being propagated as Lahontan cutthroats at the present time by California and Nevada are not representative of the original trout.

11. Evolution of the Amblyopsidae (Cyprinodontiformes, Amblyopsoidea): absolute and relative growth rates. Thomas L. Poulson

The 2 evolutionary lines (Woods and Inger, 1957) in this family include 5 species, which show marked ecological differences yet are more homogeneous behaviorly and morphologically than the occurrence of both eyed pigmented epigean forms and blind depigmented cavernicolous forms would indicate. It appears that progressively decreasing growth rates characterize the series of surface—to—cave forms. The validity of and ecological basis for the aging criteria will be discussed. Relative and absolute growth rates involving body and brain parts differ considerably between species and to a lesser extent within species. The relative importance of intraspecies relative growth differences as influenced by genetic and environmental conditions will be discussed as regards evolution of the cavernicolous habit in this group. Chologaster agassizi, an intermediate cave—spring form, will be analyzed in particular.

12. <u>In situ observations of the deepsea environment using a bathyscaphe.</u>
Andreas B. Rechnitzer.

The bathyscaphe <u>Trieste</u> is now available for American investigations to study deepsea fauna in <u>situ</u>. This unique craft, capable of carrying man and machine, can descend to depths of 18,000 feet. Two wide-angle windows permit excellent visual observation of the deepsea environment. Lights provide illumination below the depths penetrated by sunlight. Ecological studies of the deep sea will be rapidly advanced through the utilization of this craft.

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THURSDAY EVENING

CONCURRENT SESSION I, AQUARIUM SYMPOSIUM

(no abstracts received)

- 1. Observations on the behavior of captive Pacific pilot whales. David Brown
- 2. Growth records of certain marine animals in captivity. F. G. Wood, Jr.
- 3. Maintenance of sharks in captivity. Eugenie Clark.
- 4. The relative ability of various species to survive under aquarium conditions.

 Murray Newman.
- 5. Problems in redesigning a multisystem aquarium within an existing structure. Earl S. Herald and Robert Dempster.
- 6. Public aquarium considerations. Sam Hinton.
- 7. Optical properties of aquarium glass and their applications to lighting and design. William Kelley.
- 8. Maintenance of aquatic herpetological exhibits. L. C. Finneran.
- 9. Public aquarium workshop report. Lawrence Curtis.
- 10. General discussion of exhibit labels and aquarium instructional techniques.

THURSDAY EVENING

CONCURRENT SESSION II, ICHTHYOLOGY

1. A contribution to the biology of the grouper, Epinephelus merra, of the Society Islands. John E. Randall.

A year's study was made of the biology of a small grouper, Epinephelus merra, in the Society Islands. This is the dominant carnivorous fish of its size in coral areas of lagoons. The stomach contents of 465 adults, taken mostly by spearing, were examined. About 2/3 of the food material was crustacean (mostly crabs and benthic shrimps), and most of the remaining third was fish. These percentages were not the same throughout the year. During the southern summer when the young of certain reef fishes were abundant, the amount of fish in the diet of this grouper went up sharply. Of 1000 E. merra marked with disk tags, 45 were recovered, providing data on growth and movements. Fish released at the point of capture were all recovered in the same areas. Males attain larger size than females. In spite of a definite spawning season (January to April), no definite modal groups could be perceived in a length frequency graph of 1,067 fish. Each month during the season spawning occurred over a period of 3 or 4 days, the peak occurring 2 or 3 days before full moon. On several occasions the eggs were artificially fertilized and the early development up to 5 days was studied.

2. First known sinistral examples of Microstomus pacificus (Lockington) and
Glyptocephalus zachirus Lockington, pleuronectid flatfishes of western North
America, with meristic data. W. I. Follett, Ralph B. McCormick, and E. A. Best.

Two specimens of Microstomus pacificus (Lockington) and 1 specimen of Glyptocephalus zachirus Lockington, collected off northern California, are the first known sinistral examples of those species of Pleuronectidae. In most species of that family of flatfishes, sinistrality (eyes and protective coloration on the left side) has been considered so rare as to appear teratological. Neither specimen of Microstomus pacificus exhibits extreme meristic counts. Vertebral abnormalities occur in 1 specimen. In both specimens, the normal arrangement of the viscera is retained, with the liver on the left and the intestinal coils on the right. In 1 specimen, and probably in both, the left optic nerve crosses above the right in the chiasma, and the 2 nerves are almost doubly crossed. The specimen of Glyptocephalus zachirus exhibits no significant meristic or vertebral abnormalities. It has a higher number of branched pectoral rays on the blind side than on the eyed side. The characteristic arrangement of the viscera is reversed. This condition (situs inversus viscerum), which has been recorded in only 1 specimen of a flatfish, was not encountered in 649 specimens of the present species. The relative positions of the optic nerves in the chiasma cannot be determined.

3. The Draconettidae. A review of the family. John C. Briggs and Frederick H. Berry.

The discovery of the type locality of the rare benthic fish <u>Draconetta</u> acanthopoma Regan together with the location of additional specimens gives proof, for the first time, that the family Draconettidae exists in the marine waters of the New World. In addition, a new species of <u>Draconetta</u> is described from specimens taken off the coast of northeastern South America. The family Draconettidae is defined and its anatomical characteristics are compared with those of the most closely related group, the Callionymidae. Aside from the bones of the opercular series (which are difficult to evaluate in terms of relative specialization), the general morphology of the Draconettidae indicates that it is the more primitive of the 2 families and should be considered close to the ancestral line of the Callionymidae.

4. Distributional patterns of the myctophid fishes. Rolf L. Bolin

The lantern fishes provide needed data on the zoogeographical provinces of the high seas which have remained poorly defined in comparison to the littoral ones. Derivatives of the ancestral stock, which probably originated in the East Indian region, soon spread throughout the tropics. From this warm-water belt repeated invasions of the cooler water to the north and south gave rise to a series of northern and southern warm-temperate species, boreal and antiboreal forms, and finally to arctic and antarctic representatives. Since the continental land masses provide effective barriers in the north, the Atlantic and Pacific boreal and warm temperate species are almost all distinct. Numerous tropical species are circumglobal, but a considerable number of forms are restricted to either the Atlantic or the Indo-Pacific. While the tropical Atlantic appears to represent a single zoogeographic unit, the Pacific is clearly divided into eastern and western parts. Farther to the south land barriers become ineffective and almost all species are circumglobal. However, there is some slight evidence of longitudinal differentiation even in high southern latitudes where no barriers of any kind are evident.

5. Death of a fish fauna in a multiple purpose reservoir. John W. Wilton and R. W. Crawford.

An entire fish fauna composed of species of the families Centrarchidae, Ameiuridae, and Cyprinidae was killed during a 2-day period in Morena Reservoir, San Diego County, California. The kill was presumably due to a sharp decrease of dissolved oxygen during the evening hours after treatment of the reservoir with copper sulphate to reduce a very rich bloom of blue-green algae, Cylindrospermum sp. Essentially the entire kill was documented with "around the clock" physical and chemical measurements of the waters.

6. Ontogenetic change in color pattern and general appearance exhibited by the short big-eye, Pseudopriacanthus altus (Gill). David K. Caldwell.

Juvenile Pseudopriacanthus altus undergo a marked change in color pattern and general appearance during a short span of growth. It is believed the change takes place during, possibly as a result of, a transition from a pelagic to a

7. Comments on argentinoid fishes. Daniel M. Cohen.

benthic habitat.

Various genera of argentinoid fishes have been placed in several orders and suborders. Only relatively recently has the unity of the group been pointed out. As few as 1 and as many as 8 families have been recognized. The present study recognizes 3, which it is believed represent 3 evolutionary lines. The families Argentinidae, Bathylagidae, and Opisthoproctidae are briefly discussed and illustrated. Evolution within these families is considered.

8. Ecology of the swordfish (Xiphias gladius L.) in northern Chile, April-May, 1956.
Donald P. de Sylva.

The distribution of the swordfish (Xiphias gladius L.) in northern Chile, based on personal sightings and records from fishermen, is discussed in relation to surface water temperatures and bathythermograph readings. Temperature data were taken in April and May, 1956, over a relatively small area north and suth of Iquique, and seaward to about 60 nautical miles. Complex coastal currents, based upon these temperatures, with resultant upwellings of cool water, are not conducive to swordfish occurrence, and they were not recorded in waters of less than 20°C. Swordfish occurred where warmer eddies from the South Equatorial Current are juxtaposed with those of the cold Humboldt Current. This mixing also appears to give rise to plankton production in the form of dinoflagellates (Procentrum micans), which in turn encourage a food web of euphausiids and zoea, anchovies (Engraulis ringens), bonitos (Sarda chilensis), and squid (Dosidicus gigas). The concentration of the latter forms, as important foods of the swordfish, is thought to be an indirect result of the productivity caused by the juncture of the 2 currents.

9. Jaw structure and tooth replacement in the opaleye, Girella nigricans (Ayres), with notes on other species. Kenneth S. Norris and John H. Prescott.

Girella nigricans possesses jaw and tooth anatomy somewhat different from

that known for other teleosts. The teeth of the anterior portion of the premaxillaries and dentaries form several diagonal rows which extend beneath the lip tissue. Some of these appear to be in the process of being shed. Dissection reveals that none of the teeth are firmly attached to the jaw but occupy a smooth tissue-filled trough along the anterior border of the jaw. The tooth primordia develop within the anterior trough tissue and this tissue, with the developing teeth, moves posteriorly across the trough and the fully developed teeth lodge in a system of bony flanges

along the alveolar margin of the jaw. Experimentally, teeth were marked by clipping the hoe-shaped scraping blade. Observing the progress of the marked and unmarked teeth demonstrates that replacement does occur. The jaw and tooth structure of several additional species related to Girella, or having similar habits, was examined. In 2 species (Microspathodon bairdi and Ophioblennius steindachneri) a remarkable degree of structural convergence with Girella was found. Since examination of additional grazing fishes will certainly uncover other examples of this type of replacement, the descriptive term "progenic serial replacement" has been proposed.

10. <u>Information gleaned from a collection of fossil otoliths from the San Diego</u>
<u>Formation</u>. John E. Fitch.

A Pliocene deposit (San Diego Formation) was recently excavated by the Los Angeles County Museum (their locality number 305), and yielded 3255 otoliths as well as a few other fish remains. Examination of the otoliths revealed that many were forms that are stilllliving off our coast today. Twenty-nine present-day species in 24 genera and 12 families were identified and there were 4 additional genera in 3 additional families for which species names could not be assigned. Otoliths of the white croaker, Genyonemus lineatus, were most abundant, there being 1989 of them. Critical examination of these white croaker otoliths and comparison with otoliths from living individuals revealed some extremely interesting information on the probable ages, sizes, spawning habits, and deaths of these prehistoric fishes.

11. Morphology and biology of the iniomous fishes belonging to the suborder Giganturoidea. Vladimir Walters.

Study of material from the western Atlantic and eastern Pacific has disclosed the existence of at least 2 genera in the Giganturidae, and if Regan's observations on the osteology of <u>Gigantura vorax</u> are correct, this form represents a third genus in the family. The family presents no structural innovations, hence is not considered worthy of ordinal status. It is presently placed as a suborder of the Iniomi, close to the synodontid section of the suborder Myctophoidea. However, there are indications that the giganturids are not iniomus fishes as that order is currently defined, but instead may be most closely related to the isospondylous family Enchodontidae, from Cretaceous deposits. The structure of the Giganturidae is interpreted in terms of habitat, entropy, and neoteny. Their sensory cues, swimming, feeding, and respiration are discussed, based upon the anatomical studies.

12. Relationships of the Ateleogleopodiformes. Vladimir Walters. (prepared by abstract only).

A revision of the family Ateleopodidae is near completion. Four genera are included: Melanoglea, Ijimaia, Ateleopus, Parateleopus. Anatomical studies of Ijimaia antillarum and Ateleopus japonicus have shown that there is basically no difference between these genera and the recently-described families belonging to the order Miripinnati; the neurocranium, jaws, suspensorium, opercular apparatus, and paired fin girdles are strikingly similar and in all families the interhyal is exposed between the preopercular and the hyomandibular. An evaluation of the various structural features of the order indicates a phylogenetic position intermediate between the Iniomi and the anacanthine fishes, closer to the latter.

13. Morphology of the Trachipteroidei (Allotriognathi). Vladimir Walters, John E. Fitch, and Richard H. Backus. (presented by abstract only).

The trachipteroids are divided into 4 families: Lophotidae, with 1 fossil genus and 2 extant genera; Stylephoridae, with 1 extant genus; Trachipteridae, with 3 extant genera; Regalecidae, with 2 extant genera. The anatomy, external morphology, and development have been studied in most of the genera, and certain interesting features will be described. The phylogenetic position of the trachipteroid fishes is assessed to lie between the Iniomi and the Melamphaeidae.

FRIDAY MORNING, JUNE 19

JOINT SESSION

1. Some abnormal fishes and their significance. Gordon Gunter. There are many types of anatomical abnormalities among fishes, associated with early development. The color and head anomalies of flounders, connected with their peculiar type of development, were emphasized by E. W. Gudger. Pug-nosed fish have been noted by the early worker, Aldrovandi, and later writers. I recorded 2 fish with reversed scales and 2 without eyes, as well as a foreshortened one. Carl Hubbs described a fish with no mouth. There are fishes with waves in the vertebral column. Many abnormal fishes grow to adulthood and apparently they can reproduce. In some respects they are a measure of the latitude of non-fatal variation which fishes can undergo. These anomalies are not caused by atomic fall-out, but possibly some will be so caused in the future and it is a little late to study the incidence of such occurrences. Injured fish are also interesting. A case in point is a spadefish, Chaetodipterus faber, one of the angelfishes. A large part of the tail and rear end was bitten off and the fish grew up with 2 attenuated posterior appendages formed by the dorsal and anal fins. Its survival approaches the miraculous and the fish was certainly extremely tenacious of life. Examples of abnormal fishes are exhibited.

- 2. The eggs and embryos of the Del Norte Salamander, Plethodon elongatus. James Kezer. No abstract received.
- 3. Man and the changing fish fauna of southern Arizona. Robert R. Miller.

 During the century 1850-1950 the native fish fauna of the Gila River basin of southern Arizona underwent severe change, resulting in the replacement of many of the species by introduced forms and the extinction or threatened extinction of others. Repeated collections during 100 years at the same stations have dramatically shown the modifications that have taken place. Reasons for these changes and specific examples of replacement are illustrated and discussed.
- 4. Cyclic behavior of Sceloporus magister in an isolated controlled environment. R. D. Tschirgi and J. L. Taylor

Activity of an adult male <u>Sceloporus magister</u> under conditions of constant sound level in a homogeneously illuminated circular chamber, has been studied continuously for 60 days by means of time-lapse photography. Body position was recorded at 2-minute intervals.

When subjected to an alternating air temperature cycle of 12 hours at 35°C. and 12 hours at 20°C., the lizard burrowed under the sand, throughout the initial 10 cycles, only during the falling temperature phase. Time of emergence was highly variable. In subsequent cycles, burrowing frequently anticipated the temperature fall. After 20 cycles, the temperature was maintained constantly at 35°C. for 18 days. During the first 7 days of constant temperature, the lizard continued to display approximately 24-hour cyclic burrowing behavior. Subsequently he ceased burrowing entirely and displayed cycles of alternating activity and inactivity with an average duration of 80 minutes per cycle. Transition from motionlessness to total body movement and vice versa was generally accompanied by a period of head movement. These observations suggest that this organism does not possess a stable inherent 24-hour behavior rhythm independent of environmental cues, but displays an activity cycle of considerably higher frequency in the absence of diurnal variations in illumination, temperature, and sound.

5. Food of transitional young tarpon, in relation to the inundation of a salt marsh.
Robert W. Harrington, Jr.

Stomachs of 472 tarpon, 16-157 mm. standard length, were examined with respect to food taken at different lengths. Of these, 231 were collected at intervals between September 10 and October 10 on a salt marsh flooded September 9 after prolonged exposure during a drought. Tidal, rainfall, and salinity data are related to the collection dates, and stomach contents analyzed for periods September 10-12, 17-18, 28; and October 1-2, and 10. Chief food items in order of frequency wrre: copepods, fish, saltmarsh mosquitos (Aëdes taeniorhynchus, with far fewer A. solicitans), acarina, chironomids, caridean shrimps, crustacean zoea, ostracods; other food items occurred in 10 or fewer stomachs. Cyclopoid copepods were the most persistent item; mosquitos reached a peak and then fell off, because of emergence of adults; fish were eaten after a week, and more often during October. With increase in length of tarpon, cyclopoid copepods continued to be taken, the incidence of fish in the dist increased, that of mosquitos decreased slightly, and caridean shrimp became a significant constituent of the diet.

FRIDAY AFTERNOON

CONCURRENT SESSION I, HERPETOLOGY

- L. Geographic variation in Plethodon cinereus. Richard Highton.
 No abstract received.
- 2. Territoriality and homing behavior in the canyon lizard, Sceloporus merriami. William W. Milstead.

Canyon lizards (Sceloporus merriami) are monogamous, have definite home ranges, and both males and females show strong territoriality. These lizards also show homing behavior. Following removal from their home range, females return much more quickly than males. This is attributed to time lost by the males in elaborate combat displays.

3. Observations on populations of amphibians and reptiles in the tropical rain forest of Negros Island, Philippines. Walter C. Brown.

Some observations on the habitats, distributional patterns, and population densities of amphibians and reptiles in the montane and submontane tropical forests of the Cuernos de Negros, in southern Negros Island, Philippines, are reported.

4. The breathing cycle in snakes - misapplication of the term "apneusis."
Harry S. McDonald.

Two types pf breathing cycles occur in snakes. The first consists of successive inspirations and expirations without a significant pause between breaths. The second, which has been termed "apneustic," is often observed in specimens breathing slowly and infrequently. In outward appearance this cycle seems to comprise: expiration, inspiration, partial expiration, pause. By inserting a needle into the lung cavity and recording intrapulmonary pressure, it was found that despite external appearances, the ventilation rhythm is biphasic. At conclusion of inspiration the glottis closes and the costal muscles relax, allowing the body wall to contract somewhat and place the lung contents under a slight positive pressure which is maintained throughout the respiratory pause. Each cycle commences with opening of the glottis and a passive outflow of gas before active expiration. Thus, "apneusis" (a sustained partial contraction of inspiratory muscles) does not occur in snakes. Reports which have taken into account glottal function in reptiles indicate that a similar non-apneustic cycle occurs in lizards, turtles, and crocodilians also. The intrapulmonary pressure between breaths should be considered in assaying respiratory responses in reptiles and in interpretation of their blood oxygen-dissociation curves.

5. Origins and distribution of the reptile fauna of Ecuador, with colored photographs of reptiles and amphibians of Ecuador. James A. Peters.

The reptile fauna of Ecuador is extremely diverse, although the country is small. There are 2 main origins for this fauna: 1- Invasion from comparatively large faunal units in neighboring countries, and 2- In situ development of highly endemic faunae. There are at least 7 completely distinctive faunal divisions within the country, and some of these are subdivisible into units as distinct as the major divisions. A series of slides of living or recently killed Ecuadorian reptiles and amphibians will be presented, designed to show the rich variety of color of these species in life.

6. Color variants of the red-legged frog, Rana aurora draytoni Baird and Girard.

James P. Mackey, and Alan E. Leviton.

During the past 2 years several color variants have been discovered in populations of the red-legged frog in San Francisco and vicinity. These variants include both albinistic and melanistic individuals, and intermediates between these and the normal color phase. Several variants will be illustrated in colored slides and compared with the normally colored form.

7. Notes on the reptiles of Saline Valley, Inyo County, California. Benjamin H. Banta

Saline Valley is a completely isolated desert basin with hydrographic limits located between 36° 30' and 37° N, and 117° 35' W. It is bounded on the east by the Panamint Mountains and on the west by the Inyo Mountains. The northern and southern boundaries of the valley are formed by fusion of segments of the Inyo and Panamint Mountains. Observations and samplings of the reptile fauna were made on February 3-6, March 6-8, April 5-11, April 24-26, May 1-3, May 22-24, and June 7-12, 1959, at elevations ranging from 1200 to 5000 feet above sea level. A qualitative analysis of the species sampled will be presented, and kodachrome slides of each species and of some of the environmental types will be shown.

8. Effect of some hormones and temperature variation on melanophores in some nocturnal desert reptiles - a preliminary report. Richard A. Lockwood.

Reports in the literature indicate some species variation in melanophore response and an incomplete understanding of the control of melanophores in reptilian skin. This is a preliminary study to demonstrate the effect of various hormones and temperature variation on the melanophores of Crotalus cerastes cerastes, Phyllor-hynchus decurtatus perkinsi, Xantusia vigilis, and Coleonyx variegatus. The role of the pituitary and the adrenals in melanophore control is demonstrated in hypophysectomized and adrenalectomized specimens and in isolated skin. Melanophore arrangement and distribution is described for the species studied. Experimental results are discussed in relation to possible ecological significance. Channels of further investigation now in progress are noted, as well as the application of these studies to other experimental problems.

9. Comments on Eastern Asiatic caecilians of the genus Ichthyophis. Edward H. Taylor.

As recently treated, the genus <u>Ichthyophis</u> consists of 2 species having a distribution from the southern Philippines, throughout much of the Malay Archipelago, Malaya, Cambodia, Thailand, Laos, Burma, India, and Sikkim in the Himalaya Mountains. Such a remarkable distribution would seem to violate the principle that least vagile animals tend to speciate more readily than animals of greater vagility. Examination of materials from the areas mentioned proves the presence of a number of species heretofore unrecognized, often as many as 4 species occurring in the same locality. The larval forms differ in the retention of the lateral line system, in the number of gill openings, the size at transformation, and the character of the number of scale rows, and especially in dentition. However, no forms are described from larval material.

10. Observations on Equadorian casque-headed treefrogs, Tetraprion jordani, in captivity. Richard B. Loomis.

Three live (1 young, 2 adult males) and 1 dried casque-headed treefrogs were obtained at San Pedro, California from banana boats which had originated in Ecuador, in the vicinity of Guayaquil. Tentative identification of the 3 live examples as Tetraprion jordani Stejneger and Test is based upon published descriptions of the adults and the similarity of the young treefrog to the living adults. The adults are uniform brown dorsally, light tan ventrally. The juvenile has a light yellow dorsal and ventral ground color, with several longitudinal brown stripes extending over the head and back. General similarities in body proportions and in eye color seem to indicate the same specific identity. The young example is being reared to note any changes in color pattern. One male has been heard calling, with paired vocal sacs. Feeding notes and other observations have been taken.

Lip curling or "snarling" behavior of the red-bellied snake. Carl Gans.

Lip curling or "snarling" behavior has been described in the red-bellied snake, Storeria occipitomaculata (Gosner, Copeia, 1942: 181), as well as in the eastern ground snake, Haldea v. valeriae (Conant, 1938, Amer. Midl. Nat., 20 (1):96.) Preliminary investigation of the former species has shown that the lips are "curled" by a lateral movement of the maxillae and that there is a simultaneous lifting of the rostral region. The behavior is characteristic of the beginning of the slug-feeding cycle, serving to widen the skull base and provide for palatal mobility, etc. Its utilization for "warning" would seem secondary.

12. Comments on African bufonids. Joseph A. Tihen.

The genera Nectophryne, Nectophrynoides, and Wolterstorffina, considered bufonids, differ from most other members of the family in osteology, thigh and pectoral musculature, and other details. In many respects they resemble certain anomacoelan anurans, and the vertebral column is typically anomacoelan. Two possibilities in particular require further examination. One is that these are really anomacoelans, presumably pelobatids; if this is the case, the possibility of affinity with the Sooglossinae is suggested. The other possibility is that they are correctly considered bufonids; if this is true, it suggests that the bufonids may have arisen from pelobatid-like, rather than leptodactylid-like ancestral stock.

The nesting habits of the large "smith" or "hammer-frog", Hyla faber, were observed by the author, Prof. Gualter Lutz, and Mr. Venancio, at Rio de Janeiro, in the summer of 1951 and by her in 1959. It was found that it is the male and not the female (as stated by Goeldi, 1895) that builds the clay nest used for spawning. He sits in shallow water and circles around, forming and deepening a rounded cavity (30-33 cm in diameter); clay is pushed up and patted onto the walls by the hands, forming the raised rim; occasionally the male goes under and brings clay up on the snout. When he has finished, or even before, he stops working and drums. Attracted females approach cautiously, halting on the way. One enters the nest and finally lays a hand on his back. Fights between males were witnessed several times, in the nests or outside. The fighters seize each other around the neck or head, and dig in the sharp curved pollex rudiments, either lying still or thrashing around. They can be lifted out together and examined. The author concludes that Hyla faber has developed an incipient notion of territory regarding the nesting site.

FRIDAY AFTERNOON

CONCURRENT SESSION II, ICHTHYOLOGY

L. A preliminary report on biometric studies of tunas (genus Thunnus) of the western North Atlantic. Frank J. Mather, III.

Morphometric and meristic characters of 5 species of Thunnus (sensu lato) are described with emphasis on identification of species and on allometric growth. Total gill raker counts separate atlanticus (less than 25) and thynnus (more than 33) from the others (25-33). The pectoral fin is short (less than 80% of head length) for thynnus, long (over 120% of head length) for alalunga, and intermediate (nearly equal to head length) for the others. The second dorsal and anal fins of large albacares are remarkably elongate. T. albacares is slender (in terms of weight, girth, depth); obesus and atlanticus are robust; thynnus and alalunga are intermediate in this respect. The eyes of obesus, atlanticus, and alalunga are large; those of thynnus and albacares (except small individuals) are small. Excepting the gill raker count and the length of pectoral, these characters intergrade for small individuals. Color characteristics are variable, but the white posterior edging of the caudal of alalunga is distinctive, and the absence of yellow in the finlets of fresh atlanticus is important. A superficial comparison indicates that bluefin tuna of the western and eastern Atlantic are races of the same species, but that the Atlantic populations differ from those of the Pacific in gill raker count to a degree that suggests subspecific or specific difference. This work was supported by a grant from the National Science Foundation.

2. The distribution of fishes in a Central California estuary in relation to salinity.

Albert C. Jones

The fish population of an estuarine area in Tomales Bay showed marked seasonal changes which were correlated with changes in salinity. A total of 25 species was collected during a 2 year sampling period; 7 species were collected in fresh water, 16 in the estuary, and 19 in essentially marine conditions in Tomales Bay. Fishes present could be divided into 5 groups on the basis of their seasonal distribution patterns: stenchaline marine, euryhaline marine, euryhaline freshwater, stenchaline freshwater, and anadromous. No component of the fish fauna was wholly estuarine, since no species was able to complete its life cycle within the estuary. Greatest utilization of the estuary was made by juvenile forms of several euryhaline marine species. Laboratory studies of Leptocottus a. armatus suggest that larvae and small juveniles of this species are most tolerant of low salinities; eggs, large juveniles, and adults are less tolerant.

3. A description of fishes taken in McMurdo Sound, Antarctica, during Operation
Deep Freeze IV. Hugh Hamilton De Witt.

A description of the species, characteristics, and general ecology of the fishes collected during Operation Deep Freeze near McMurdo Base in McMurdo Sound.

The bathypelagic fish family Astronesthidae. Robert H. Gibbs, Jr. The family Astronesthidae is composed of 6 genera. Astronesthes contains 18 possible species; 2 are common to the Atlantic and Indo-Pacific, 5 are known only from the Indo-Pacific (of which: 3 are closely related), 9 are known only from the Atlantic, 2 are doubtful. Borostomias contains 3 good and 1 doubtful, species; 5 Atlantic species are included in B. antarcticus when variation and allometry are considered; 4 Atlantic and Indo-Pacific species are included under B. elucens for similar reasons. The eastern Pacific forms are all considered as B. panamensis. From Diplolychnus 1 species is removed; the remaining 2 are probably identical but are temporarily retained. The status of the genus is questionable. Heterophotus is monotypic; 2 nominal species of Rhadinesthes are considered synonyms. Neonesthes consists of 2 Atlantic species; 3 formerly recognized forms are included under N. capensis on the basis of range of variation and allometry. The lumping of so many nominal species points out to students of rarely-collected groups the need for greater conservatism and better recognition of the well-demonstrated facets of phenotypic plasticity and normal allometry.

5. Scute development in Caranx crysos. Frederick H. Berry.

The straight part of the lateral line of species of Caranx is covered by modified scales termed scutes. These scutes are enlarged and thickened and possess posterior-directed spines. The development of these scutes in Caranx crysos is described and illustrated from their initial formation in the early juvenile stage to their characteristic appearance in the adult.

6. Meristics and relative growth of rainbow trout, Salmo gairdneri Richardson, cutthroat trout, Salmo clarki Richardson, and reciprocal hybrids. Gordon F. Hartman.

Reciprocal hybrid crosses were made of cutthroat and rainbow trout. Hybrids were incubated and reared under similar conditions with pure cutthroat and rainbow parental stocks. In the resulting 4 lots of experimental fish, studies were carried out in viability, sex ratios, relative growth of head and body parts, meristics, tooth counts, pyloric caeca counts, and coloration. Hybrid crosses were as viable as intraspecific crosses. Sex ratios did not differ significantly from expected. Cutthroats had larger heads, larger head parts, and deeper peduncles than rainbows. Hybrids were usually intermediate. Rainbows had higher scale, ray, and vertebral

counts than cutthroats. Vertebral counts in hybrids tended to resemble the female parent. Hybrid tooth counts differed between rainbow and cutthroat trout. Coloration differences were noted between parental stocks; hybrids were intermediate in some color characters but resembled 1 parent in others. Some distinguishing features found on experimental fish were noted in wild fish.

7. A new percid fish from Kentucky. William M. Clay.

A long-snouted darter, allied to Percina phoxocephala of the Cheat River and New River watersheds of West Virginia and to P. nasuta of the Ozarkian upland, occurs in the Big Sandy, Kentucky, and Licking drainages of Kentucky and is proposed as a new species.

8. New type of luminous organ in fish. Y. Haneda.

Most known luminous fishes belong to the groups Stomiatina and Myctophida and have surface light organs of the direct emission type. However, certain macrourid, berycoid, and percoid fishes which show no outward evidence of luminous structures have internal luminous bodies, the light from which is diffused through an area of translucent muscle. The light emission is enhanced by reflecting tissues and is modified by shutter-like areas of chromataphores. This type of luminosity can be demonstrated only by careful observation of living specimens in the dark. In some fishes these structures are self-luminous and in some they derive light from luminous symbiotic bacteria. Among percoid fishes, examples are listed from the Leiognathidae, Pempheridae, Apogonidae, and Acropomidae. The morphology and luminous secretions of 2 Japanese fishes, Parapriacanthus beryciformes and Apogon ellioti, are discussed in detail. Study of living specimens will probably confirm additional examples of internal luminosity.

9. Contributions to the systematics of northwestern coregonid fishes.

Casimir Charles Lindsev.

New material from Alaska and Canada is presented to demonstrate that Coregonus clupeaformis and C. nasus are distinct. Their comparison involves a discriminant score technique which is an improvement on former types of character indices. Evidence is presented for existence of 1 or more additional species of Coregonus in Yukon territory. Possible synonymies between species of Palearctic Whitefishes recognized by Svärdson and Nearctic species are discussed.

- 10. Notes on distribution and reproduction in the benthonic Iniomi. Giles W. Mead.

 No abstract received.
- 11. <u>Variations in the duration of gametic function of southwestern darters.</u>
 Clark Hubbs.

All southwestern darters studied have a relatively short gamete function in the natural environment. Those that have the greatest frequency of known natural hybrids also have the longest gamete function. In general sperm function longer when tested with eggs of their own species. This activity resembles that of echinoderms in which "gamone B" of the egg agglutinates foreign sperm. A popullation of Etheostoma lepidum from the Nueces River is a notable exception. If its eggs are exposed to the sperm of other species, that sperm functions as long or longer than when used in homospecific matings. As E. lepidum is the only darter known from the upper Nueces River system, there is no need for that population to be protected against hybridization. Other intrapopulational variations of gamete activity can also be correlated with the distribution of related species with which hybridization is possible. This suggests the reinforcement (or de-reinforcement) of an isolating mechanism.



TOLUME I NUMBER I

FEBUARY 1961

Artedia Sings - An issue devoted to songs and verse that have been naturally selected by the members of

THE PIETER ARTEDI NATURE SOCIETY

Including Such Favorites As:

"She may be just an ecophenotype, but she sure looks good to me"

"Get out of my miche, Mr. Gause, there ain't room in here for both of us"

"I didn't believe in macromutations until I met you"

"I don't thermoregulate anymore"

"Ramsden disc blues"

Wreck on the Highway

Who did you say it was brother? Who was it fell by the way?
When whiskey and blood run together, did you hear enyone pray
Chorus) I didn't hear anyone pray dear brother, I didn't hear
anyone pray. I heard the crash on the highway but I didn't
hear nobody pray.

Then I heard the crash on the highway, I knew what it was from the start.

I went to the scene of destruction and a picture was stamped on my heart.

Chorus)

There was whiskey and blood all together, mixed with glass where they lay.

Death laid her hand in destruction but I didn't hear nobody pray.

Chorus)

I wish I could change this sad story, that I am mow telling you.

But there is no way I can change it, for somebody's life is now through.

Chorus)

There soul has been called by the Haster. They died in a crash on the way. •

I heard the groans of the dying, but I didn't hear nobody pray.

Chorus)

Wabaah Cannon Ball

From the great Atlantic Ocean to the wide Pacific shore - From the queen of flowing mountains to the south belies by the shores, she's mighty tall and handsome and known quite well by all, she's the combination on the Mabush Cannon Ball.

She came down from Birmingham ontcold December day, as she rolled into the station you could hear the people say. "There's a girl from Tennessee, she's long and she's tall - she came down from Birmingham on the Jabash Cannon Ball."

Chorus) Listen to the jingle, the rumble and the roar, as she glides along the woodland through the hills and by the shore - hear the mighty swish of the engine, hear the lonesome hobo's call, you're traveling through the jungle on the Wabash Cannon Ball.

The eastern states are dandy, so all the people say - from New York to St. Louis and Chicago by the way - From the hills of Minnesota where the rippling water falls, no changes can be taken on the Wabash Cannon Ball.

Chorus)

Here's to daddy Claxton may his name forever stand - and always be remembered round the courts of Alabam - His earthly race is over and the curtain round him falls - We'll carry him home to victory on the Wabash Cannon Ball.

Hoving On

That big eight wheeler going down the track means your true loving daddy ain't a comming back - I'm a moving on - Oh hear my song - You were flying too high for my little ol sky and I'm a moving on.

That big loud whistle as it blew and blew - said hello to the southland I'm a coming to you - I'm a moving on - I'll soon be gone - You had the laugh on me - now I'm a setting you free and I'm a moving on.

Mr. Fireman won't you please listen to me - cause I get a pretty momma in Tonnessee I'm a moving on - I'll soon be gone - So shovel the coal and let this rattler roll and keep a moving on.

Er. Engineer with that throttle in hand - this rattler's the fastest in the southern land - keep a rolling on - keep moving on - Your gonna case my mind and put me there on time - keep a moving on.

Now baby I warmed you from time to time but you just wouldn't listen or pay me no mind - now I'm a moving on - You done your daddy wrong - I warmed you twice now you can settle the price cause I'm a moving on.

You've switched your engine now and ain't got time - for a trifling woman on my main line - I'm a moving on - You done your daddy wrong - Too bad your blue - I'm through with you and I'm moving on.

IN MUNIHEN STEHT EIN HOFBRA'U HAUS

IM MÜNCHEN STEHT EIN HOFERRÜ HAUS, EIN, ZWEI, ZUFA!

DA LÄUFT SO MANCHES WEGS HINAUS, EIN, ZWEI, ZUFA!

DA HAT SO MANCHES BRAVER MANN, EIN, ZWEI, ZUFA!

ER ZEIGT WAS ER SO VERTRAGEN FANH,

SCHON FREU, AM MORGEN FINGER AN,

UNO SPETT AM ABENIO ENM ER HERAUS,

SO SCHÖNST IST HOFBRÄUHAUS!

ICH HAT ENEW KAMERADEN,
ICH HAT ENEW KAMERADEN,
EINEM BESSERN FINDST DU NIT,
DIE TROMMEZ SCHLUG AM ZETTE,
ER GING AM MEINER SETTE,
IM GLEICHEM SCHRITT UND TRITT,
IM GLEICHEM SCHRITT UND TRITT,

Eine truget kam geflogen
gilt es mir order gilt es dir,
Ihn hat es Wege ließen,
er liegt mir um den Filgen
als bersein Stück von mir,
als bersein Stück um mir,

Föresterstächterlein

In walden grünen Walde, da steht ein Förestushaus,

da schault jedem Morgen so frish und frei von Sorgen,

das Föresterstöchterlein heraus,

das Föresterstöchterlein heraus, (1)

Ti li li li, Ti li li li, ti li li li, ti li li, Reevar(1)

Lole Lole Lole Lole, schön sind Mädchen von siebzehn

achzehnjahr, Lole Lole Lole lole sehön sind Mädchen

gibst überall,

Wood komt der Flühling da r. Tol

und homt der Flühling da's Tal, grüss mir die Lole noch einmal, (Repeat) A'die, A'die, A'loh

Fireball wil

Watch her fly - hugging the rails. Let her by- by- fireball mail.

Let her go - look at her steam. Listen her blow - wistle and scream.

Like a hound - awagging his tail. Dallas bound- bound-bound- fireball mail.

Engineers - making up time. Tracks are clear - look at her climb.

Cee that train - a turning the rails. Ind she's late- late- late- fireball mail.

Watch her swerve - look at her sway. Get that curve - out of the way.

Watch her fly - look at her sail. Let her by- by- fireball mail.

Freight Train Blues

I was born in Dixic in a boomer's shack. Just a little shanty by the railroad track. The humming of the drivers was my hullaby and blowing of the whistle taught me how to cry.

Chorus

Ive got the freight train blues, Lordy-Lordy, Lordy, I got 'em the bottom of my rambling shoes, and when the whistle blows, I gotta go. Ch lordy, I guess I'll never gonna lose the freight train blues.

By daddy was a foreman and my momma dear, she was the only daughter or an engineer. Sweetie loved a brakeman and now it ain't no joke, the way she always kept a good man broke.

Chorus

I know I'm ald enough to quit my running around. I've tried a hundred times to stop and settle down. Every time I find a place I want to stay, I hear a freight train blow and I'm on my way.

Dork as a Dungeon -(1)
Come all you young tellows so young and
so time so fine. And (ist while I tell you of the Dark, Dreary
Mine. It will form as a habit and seep in your Soul, 'till the streams of your blood run as black as the coal! Where it's dark as a dungeon And damp as the dew! Where the dangers are double And the pleasures are Few. Where the rain never Falls And the sun never shines. It's dark as a dungeon way down in the mines. Oh - there's many a man I have known in my day. who has livel just to labor his whole life away. (continued)

Dark as a Dungson - (2) Like a Fiend with his dope or a drunkard his wine. A man must have lust for the lure of the mine. chorus I hope when I die and the ages do roll. (3.) My body will crumble and turn into cont. And then when I sit in my heavenly home. Fill giby the miner a-diggin my bone. Chorus

- OH THERE WAS A LOFTY SHIP, AND SHE PUT OUT TO SEA,

 AND THE NAME OF OUR SHIP WAS THE GOLDEN VANITY,

 AND SHE SAILED UPON THE LOW AND LONESOME LOW,

 AND SHE SAILED UPON THE LONESOME SEA.
 - SHE HAD NOT BEEN OUT BUTTWO WEETES OR THREE, WHEN SHE WAS OVERTAKEN BY A TURKISH REVEILLE AS SHE SAILED UPON THE LOW BALD LONESOME LOW, AS SHE SAILED UPON THE LOWESOME SEA.
 - THEN UP DID SPACE OUR LITTLE CABINBOY,

 CRYIN' WHAT WILL YOU GIVE ME IF I WILL THEM DESTROY,

 "IF I SINK THEM IN THE LOW AND LONGSOME LOW,

 "IF I SINK THEM IN THE LONGSOME SEE!
- "OH THE MANTHAT THEM DESTROYS", OUR CAPTAIN THEN REPLIED,
 "FIVE THOUSAND POUNDS AND MY DAUGHTER FOR HIS BRIDE,
 "IF HE SINES THEM IN THE LOW PARD LONESOME LOW,
 "IF HE SINES THEM IN THE LOWESOME SEA."
- THEN THE BOY SMOTE HIS BREAST, AND DOWN JUMPED HE,
 HAD HE SWUM TILL HE COME TO THE TURKISH ENEMY,
 PS IT SHILED UPON, ETC.
 - HE HAD A LITTLE TOOL, THAT WAS MADE FOR THE USE,
 AND HE BORED MINE HOLES IN HER HULL ALLAT ONCE,
 AS SHE SAILED, ETC.
- THEN HE SWUM BACK TO HIS SHIP, FIND HE BEAT UPON THE SIDE,

 CRYIN' "CAPIN, PICKME UP FOR I'M WERRY WITH THE TIDE,

 "AND I'M SINKING IN THE LOW, FTC".
 - "THE SHOOT YOU, I'LL DROWN YOU, THEN REPLIED,

 HUD THE SINT YOU, ETC".

Du, Du, LIEGST MIR IM HTRZEN

PU, DU, LITEST MIR IM HERZEN, DU, DU LITEST MIR IM JINN,

DU, DU, MACHST MIR WEL SCHMERZEN, WEISST NICHT, WIE GOT ICH DIRBIN.

JA, JA, JA, JA, WEISST JA WIE GUT ICH DIR BIN! (ROPERT LAST LINE)

SO, SO, WIE ICH DICH LIESE, SO, SO, LIEBE AUCH MICH.

DIE, DIE, ZÄRTLICHSTEN TRIEBE FÜHLE ICH EINZIG FÜR DICH....

JA, JA, JA, FÜHLE ICH ENZIG FUR DICH.

DOCH, DOCH, DARF ICH DIR TRAVEN, DIR, DIR, MIT LEKHTENSINN?

DU, DU, KANNST AUF MICH BAVEN, WEISST JA, WIE GUT ICH DIR BIN.

JA, JA, JA, JA, WEISST JA, WIE GUT ICH DIR BIN.

UND, UND, WENN IN DER FERNE, MIR, MIR, DEIN BILD ERSCHEINT,

DANN, DANN, WÜNSCHT ICH SO GERNE, DASSUNS DIE LIEBE VEREINT,

JA, JA, JA, JA, JA, DASS UNS DIE LIEBE VEREINT.

THE LAIRD O' COCKPEN

THE LAIRD & COCKPEN, HE'S PROUD ANDHE'S GREAT, AND HIS MINDS TAFEN UP WI AFFAIRS OTHE STATE, HE WANTED A WIFE, HIS BRA HOUSE TO KEEP BUT FEVERLY WOOIN' WAS FECTOUS TO SCER. DOWN BY THE DIKESIDE A LADY DID DWELL AT HIS TABLE HEAD HE THOWENT SHED LOOK WELL-MCLEISH'S AIN DOTTER, THE CLEVER SALLEE, A PENHYLESS LASS, WI A LANG PEDIGREE. HIS WIG WAS WELL-POWDERFD, AS GOOD AS MEN KNEW-HIS WESKIT WAS WHITE, HIS COAT IT WAS BLUE, HE WAS WEARING ARIBBOIN, A SWORD AND COCKED HAT, AN' WA COULD REFOSE A LAIRD WI'ALL THAT? HE MOUNTED HIS MARE AND HE RAE CAVALIE TILL HE CAME TO THE HOUSE OF THE CLEVER SALLEE! "GAE TELL MISTRESS VEAN TO COME SPEEDILY HEN, SHE'S WANTED THE SPECK WI'THE LAIRD O'COCKPEN"

MISTRESS JEAN, SHE WAS MAKIN'THE EXPERTIONER WINE;
"WHAT THE DIVIL BRINGS THE LAIRD AT SUCH A WATIME?"
BUT SHE OFFS WI'HER APRON, PUTS ON HERSILK GOON,
WI'A MUCHLY RED RIBBON, AN GAE TOWA DOON.
MISTRESS JEAN MADE A COURTSY, HE BOOBEO FULL LOW,
AND WHA WAS HIS ERRAND, HE SOON LET HER KNOW;
AND WHA WAS HIS ERRAND, HE SOON LET HER KNOW;
AND WI & LAE COURTSY SHE TURNED A WEN A.

PUMBEOUNDED WAS HE DUT NAE SIGN DID HE SHE;
HE MOUNTED HIS MARE AN' HE RAE CAVALIE;...
BUT HE OFTTIMES REMARKED AS HE RAE THROUGH
THE GLEN,

1 SHE WAS DAFT TO REFUSE THE LAIRD OF COKPAN.

I'VE GOT NOUSE FOR WOMEN

THEY LE STICK BY A MAN FOR HIS MONEY,

THEY'LL STICK BY A MAN FOR HIS MONEY,

WHEN IT'S GONE THEY'LL TURN HIM DOWN,

THEY'RE ALL ALIKE AT THE BOTTOM —

SELFISH AND GRASPING FOR ALL

THEY LL STICK BY A MAN WHEN HE'S WINNING

AND LAUGH IN HIS FACE WHEN HE FALLS,

I'M GOIN DOWN THE ROAD FEELIN BAD

I'M GOIN DOWN THE ROAD FEELIN BAD (REPEAT TWICE)

I'M GOIN WHERE THE WATER TASTES LIKE WINE

(REPEAT)

OUT HERE THE WATER TASTES LIKE TURPENTINE

OUT HERE THE WATER TASTES LIKE TURPENTINE

I'M GOIN' WHERE THE CHMATE SUITS MY CLOTHES

(REPEAT TWICE)

I AINT AGONNA BE TREATED THISAWAY

WAS KOMMT DA VON DEM HORE ?

WAS KOMMT DA VON DEM HÖHE?
WAS KOMMT DA VON DEM LEDEREN HÖHE
TSA TSA LEDEREN HÖHE
WAS KOMMT DA VON DEM HÖHE?

ES IST DER POSTILLION,
ES IST DER POSTILLION,
ES IST DER LEDEREN POSTILLION,
TSP TOP POSTILLION.
ES IST DER POSTILLION.

WAS BRINGT DER POSTILLION?
WAS BRINGT DER POSTILLION?
WAS BRINGT DER LEDEREN POSTILLION,
TSA TSA POSTILLION,
WAS BRINGT DER POSTILLION?

ER BRINGT DER FUCHSCHEM MIT, ETC.

Was TUT DER FUEHSCHEN HIER ?, ETC.

EK WILLT EN MANN BEKOMMT, ETC.

BIER HIER

 BANDIERA RUSSO, BANDIERA RUSSO

AVANTE POPOLO, ALLA' RECOSA, BANDIERA RUSSO, TRIUMPHUNAL.

(2) {LA DANDIERA RUSSO E TRHUMPHUNAL, VIVA LA COMMUNISMO E LA LIBERTAD REPERT (1) REPERT (1)

> DYMIE ROOSCHKOO - A PHONETIC RENDITION

YASON SLOVAK, TEE SLOVENKA,
DYMIE ROOSHKOO!
ROOSHKOO ME POOTA VOM,
TERMA VERMA NOS A VOM,
DOOSHA MOY A, HEY! LALALA
DOOSHA MOY A, HEY!

EIN PROSIT, EN PROSIT,

DER GEMÜTLICHKEIT!

(PEPEAT)

EIN, ZWEI, PROST!

You wouldn't answer my letter if I wrote you You told me not to call you on the phone But there's somethin that I jest hav to tell you So I wrote it in the words of this song.
Chorus I didn't know God made honky took angels I might have known that you'd never make a wife - you gave up the only one that ever loved you and went beck to that wild side of life. The glemot of the gey night life has loved you to the places where the wine and liquor flued - where you wait to be . I any bodies sweetheart and firget the truest one you ever knowed - charus -THE OTHER NIGHT DEAR I SATTHE NUKEBOX PLAYING-THAT SONG ABOUT, THE WILD SIDE OF LIFE -AS I LISTEN TO THE WORDS YOU PRESAYING BRINGS BACE MEMORIES WHEN I WAS A TRUSTINGWIFE, IT WASN'T GOD WHO MADE HONKY TONE ANGELS LIKE YOU SAID IN THE WORDS OF YER SONG TOMPNY TIMES MARRIED MEN STILL THINK THEYRESINGLE THAT HAS CAUSED MANY A GOOD GIRL TO GO WRONG, IT'S TOO BAD THAT ALL THE BLAME ISON US WOMEN IT'S NOT TRUE ONLY YOU MEN FEEL THE SAME FOR EVERY TIME THET THERE'S BUTH A HEART THAT'S BROKEN THERE HAS ALWAYS BEEN A MAN TO BLAME, (CHORUS)

What a beautiful thought I am thinking - Concerning a Great Speckled Bird - Remember her name is recorded on the pages of God's holy word. with all the other birds flocking round her - she hears the calls and pleas of us all. - The Great Speckled Bird is the Bible - representing The great church of God -Desiring to lower her standards They watch every move that she makes They long to find fault with her Teachings - but really they find no mistakes I'm glad I have learned of her meekness - I'm proud that my hame 15 in her book - for I went To be one never fearing the foce of my sovier's true looks - when he cometh descending from heaven - On the clouds as to meet him on the wings of the Great Spectial Bid.

July 29, 1966 Dear Members: I sincerely apologize for not having the minutes of our April meeting before this. As usual there are plenty of good excuses. However, at this point, I am relieved that we are finally mailing this material out. For those of you who have not paid your Chapter dues of \$1.00, we would appreciate your \$1.00 contribution at this time as our financial margin is down to a minimum. Please send your contributions to Mr. Charles Viox, our Chapter secretary. I'm sure Charles will be mighty pleased to see a healthier bank account. His address is noted on the first page of the news letter. If you have any suggestions, criticisms or ideas for our next annual get-together or for a meeting prior to that time, please do not hesitate to write me. Fred Eiserman, Coordinator -Fisheries Management FME / slw

COLORADO-NEVADA CHAPTER, AMERICAN FISHERIES SOCIETY

NEWSLETTER

APRIL, 1966

OFFICERS

Fred M. Eiserman, <u>President</u>
Wyoming Game & Fish Commission
937 West 20th
Casper, Wyoming

George Post, <u>Vice-President</u>
Dept. of Fish & Wildlife Biology
Colorado State University
Ft. Collins, Colorado

Charles Viox, Secretary-Treasurer Wyoming Game & Fish Commission 456 Buena Vista Lander, Wyoming

As a result of the efforts of a good number of individuals and the particular labors of Harold Hagan and George Post, the Colorado-Wyoming Chapter of the American Fisheries Society is at last a reality.

The first official meeting convened at 8:30 a.m. on April 1 at the Student Center, Colorado State University, Fort Collins, Colorado. There were 59 fisheries workers and others in allied fields present.

Harold Hagan presided over the business session during which the purposes and objectives of the organization were discussed. A very complete review of thoughts, previously expressed by fisheries workers in Colorado and Wyoming concerning the establishment of a chapter, were reviewed by Mr. Hagan. In summary, purposes and objectives were as you might suspect - to encourage more informal contact and an exchange of information with fisheries people in research, management, administration, students of fishery biology and workers in related fields. In addition the chapter meetings will allow for associations and an exchange of thoughts on regional problems not possible through divisional or parent meetings.

It was decided that meetings would occur no less than once each year, preferably during late March or early April. The next meeting will be scheduled during this period in 1967 at the University of Wyoming, Laramie, Wyoming. Although a once-a-year regularly scheduled meeting was agreed upon (because of work loads and a full calendar of other meeting dates), it would not prohibit the possibility of holding seminar type get-to-gethers on fisheries subjects of particular interest or when speakers of national reputation are in the immediate area. Without the benefit of by-laws at this writing, it is suggested that, if possible meetings of this type occur, the best procedure in alerting chapter members would be through members of the Executive Committee or members of the Program Committee (see Committee Appointements.)

Colorado-Nevada Chapter, American Fisheries Society - Continued It was decided that officers of the chapter shall consist of a president, vice-president and secretary-treasurer, and that the officers shall be elected at the designated, annual meeting by a majority of the members in attendance. Officer candidates will be submitted by a nominating committee appointed by the President. Additional nominations from the floor would also be acceptable. Term of office would be for one year. Officers elected for the current year are as noted on the letterhead of this newsletter. As always, there has to be a charge to cover the cost of the meeting and chapter activities, and I am pleased to say a nominal registration fee of only one dollar was agreed upon. By the way, your Secretary-Treasurer, Charles Viox, would appreciate receiving a dollar from all those who were in attendance and did not contribute at this April get-to-gether and from all other members of American Fisheries Society who wish to participate in a good cause. Committee Appointments. An Executive Committee, working again without by-laws and following customary procedures, shall be composed of the current year's president, vice-president, secretary-treasurer and the preceding years's president. As there is no previous year's president in this case, I am appointing Harold Hagan as the fourth member of the Executive Committee. By-laws Committee - Phil Sharpe, Chairman, George Post, Dick Kline, Jack Kanaly, Don Horack and Kerry Connell. I am sure Phil will appreciate receiving comments and suggestions on any by-laws concerning other chapters of the American Fisheries Society. Through the courtesy of Mr. Tom Boaria, Utah Fish and Game Department, and Mr. Brian Kinnear, we have already received by-laws that have been set up for the Bonneville Chapter in Utah and the California-Nevada Chapter. Harold Hagan has also supplied us with a leaflet furnished by the Parent Society, describing recommended guidelines and by-laws for the formation of a local chapter of the American Fisheries Society. With this much information on hand,

our By-laws Committee should have an easier time.

Program Committee - George Baxter, Chairman, Doug Mitchum and Wes Nelson. As you might suspect, these fellows will be responsible for the formulation and implementation of all technical business and social programs for the year.

Nominating Committee. To be appointed by your president at a later date. For this initial meeting, these were the extent of committees authorized; however, in the future I suspect other standing committees might consist of a Resolutions Committee and a Membership Committee.

Following the business portion, a very informative session on the cutthroat trout in Colorado and Wyoming was held. After 13 presentations and informal discussion, the first annual meeting was successfully brought to adjournment on or about 7: p.m. For those who have not received summaries of these papers, additional copies are available from George Post, Fort Collins, Colorado.

lst ANNUAL MEETING OF THE COLO.-WYO. CHAPTER OF THE AMERICAN FISHERIES SOCIETY April 1, 1966 Room 208 Student Center, Colorado State University, Fort Collins, Colorado OUTLINE FOR THE CLASSIFICATION OF WESTERN TROUTS Robert J. Behnke University of California, Berkeley More than 35 specific or subspecific names have been applied to the native trouts of the genus Salmo of western North America. I recognize two major evolutionary divergences; the cutthroat series and the rainbow series. The golden trout complex is a third evolutionary lithat suggests its origin from a primitive cutthroat-rainbow intermediate form or from early

cutthroat series and the rainbow series. The golden trout complex is a third evolutionary line that suggests its origin from a primitive cutthroat-rainbow intermediate form or from early cutthroat-rainbow hybridization in the lower Colorado River area. The limits of species and subspecies are difficult to assess because reproductive isolation between the evolutionary lines is slight. No single definition of a species or subspecies is adequate to handle the classification of our western trouts. For the interior cutthroat trout, I recognize subspecies if all of the native populations within a drainage basin, or a geographical area, share a complex of characters which differentiate these populations from other cutthroat populations outside

interbasin populations, then all such inter-basin populations are considered as the same subspecies. On this basis, I consider the Yellowstone, the Colorado River, the Rio Grande, and the Bonneville basin cutthroat trout all as the subspecies, Salmo clarkii lewisi. The native cutthroat of the Arkansas and Platte drainages may be recognized as the subspecies S. c. stomias.

the basin. If the variability is as great among populations within a basin as it is between

A PRELIMINARY REPORT ON THE STATUS OF THE COLORADO RIVER CUTTHROAT TROUT IN WYOMING George T. Baxter

Department of Zoology, University of Wyoming, Laramie

The Colorado River cutthroat trout, Salmo clarkii pleuriticus (Cope), was originally widespread in the Colorado River drainage, from the Wind River mountains in western Wyoming, to the mountains of Arizona. In recent years it has only been reported as small isolated populations in Wyoming and Colorado, and the characters whereby this variety may be recognized have not been well documented in the recent literature.

This paper reports collections of cutthroat trout from five separate localities in Wyoming, three in the Little Snake River drainage, Carbon Co., one on the headwaters of Boulder Creek, Sublette Co., and one from a tributary to the Thomas Fork of Smith's Fork of the Bear River, Lincoln Co., which are similar in characters which generally conform to the early descriptions of the Colorado River variety and are quite distinct from the widespread Yellowstone variety, S. clarkii lewisi.

These populations are generally characterized by bright red coloration on a dark background, with large spots which are crowded, enlarged and tending to be rectangular on the caudal peduncle, and to cover the ventral surface of the peduncle. In the Little Snake populations, and the Thomas Fork specimens, the adipose fin has no spots but is distinctly black bordered. This last character, although striking, is seen in juvenile rainbow and may be a "juvenile" character.

It is recommended that certain sanctuary areas (which were designated after a 1955 survey in the Little Snake drainage) be expanded and that a brood stock of this variety of cutthroat be developed. It is suggested that a cooperative program among different western states might be developed in an effort to preserve this and other rare species and varieties of fish.

THE DEVELOPMENT OF A CUTTHROAT BROOD STOCK, Salmo clarki lewisi Earl Wilde Wyoming State Fish Hatchery, Auburn, Wyoming

Very little selective breeding of our native stream cutthroat has been carried out in the Rocky Mountain Region. Apparently, in the past, improper diets have made it difficult in rearing cutthroat to maturity. Since the commercial dry feed has been implicated in the diet, a faster and better quality brood stock has been produced.

Selective breeding records indicate that early spawners can be developed to provide fingerling of suitable size for summer planting.

The use of malachite green as a fungicide with a drip type incubator appears to be the most satisfactory method to eye green eggs at the Auburn station.

Better results are obtained from feeding the fry beef liver for a period of thirty days rather than starting them on a complete dry diet.

The following chart gives data on progress made with selective breeding.

Lot/year	Date start to spawn	No. eggs per female	No. eggs per ounce	Total eggs taken	Percent eye up	Remarks
1953 1956	Mar. 20 Feb. 1	No record 976	334	29,000	83%	wild fish
1959	Feb. 18	976	513 497	122,000 1,072,000	57% 75%	fatty liver
1960	Jan. 27	1582	423	1,862,000	88%	
1961	Jan. 18	1857	381	3,157,694	87%	
1962	Feb. 7	2001	402	3,169,893	89%	
1963 1964	Jan. 17	1678	426	2,404,855	83%	
1965	Dec. 17,'63 Dec. 3,'64	2209 2465	473 504	2,284,979 2,030,680	85%	
1966	Dec. 24, '65	2403	304	2,030,000	89%	not completed
			rational cos	st per/1000 gr r/1000		30¢ 08¢

REARING CUTTHROAT TROUT Tom French National Fish Hatchery, Leadville, Colorado

First, I believe that each hatchery or rearing station is an individual in itself; by this I mean that the water quality, and temperature can differ from another hatchery even a few miles apart.

It is an established fact that one type of fish food will raise fish at one hatchery and will fall short at another, therefore, what I say here will have to be taken as general and not a fast hard fact for every station.

Second, with cutthroat trout, as with all other trout, sanitary conditions of the hatchery and rearing facilities should be maintained at all times to cut down the chances of disease, as disease in young fry is quite difficult to control without heavy losses. The cutthroat trout fry will not stand the crowding that rainbow trout will. The food requirements are different from other species, so the New York State Feeding tables are used only as a guide.

Cutthroat trout fry and fingerlings require a great deal of care during the early stages. The fry should be fed as soon as they start free swimming. The food can either be a commercial type fry feed or finely ground beef liver. I prefer the commercial feed to liver as it can be fed more times a day without the chance of causing gill trouble. We try to feed the new fry ten or twelve times a day. Liver causes a cloudy condition in the water when fed with a very fine screen, which in turn will cause gill trouble, therefore, it is not advisable to feed liver quite as often.

The fry should be watched very closely for any trouble, especially for gill irritation, and checked for bacteria. Any gill trouble at all should be cleared up immediately with either a chemical for bacteria or by feeding liver for the Western Type Gill Disease. It is very possible to have both types at the same time. I believe that if it were possible to have a feed fortified with pantothenic acid by a commercial feed manufacturer that cutthroat trout could be raised without liver, as the lack of pantothenic acid will cause the Western Type Gill disease.

The larger the fingerlings are, the easier they are to handle as they can eat different physical consistency of food and it makes it easier to feed drugs etc., for the control of disease.

We use the Cortland Diet, with good results, or a slight variation, for large fingerlings and adult fish. The diet consists of 25% beef liver; 25% beef spleen; 12% wheat shorts; 12% cottonseed meal; 12% fish meal; 12% distillers soluables; and 2% salt. This is definitely not a 100% complete diet, as after several years, the livers are very pale.

The cutthroat trout that I have had the most experience with are the Yellowstone blackspotted trout. This might be one of the reasons that we found that the fish prefer deep water. We have

used raceways, ponds, and small lakes to raise the fish.

Bacteria gill disease is one of the great problems with fry and fingerlings. We use Roccal at 1/50,000 concentration for control of this disease. If the disease is prevalent, three treatments of one hour each day for three consecutive days will be required to control it.

Octomitus or Hexamitus is another great problem at our station. This we control with 2% Epson salts added to the diet for three consecutive days. For years, we used calomel and carbasone at the same level, but calomel is toxic to the fish and carbasone, at first, was very expensive

and later was thought to be carcinogenic.

Of the external parasites, Gyrodactylus and Tricodina are the worst at our station. These are very easily controlled with formalin at a concentration of 1/4000. We have probably killed more than our share of fish with this chemical until we found out how to use it. Formalin is very dangerous to use at any concentration strong enough to knock the parasites in a water temperature of 52° or higher. The higher the water temperature, the greater the kill of fish. Water temperature of 48° or below is safe without any mortality from the treatment. When we had trouble with formalin, it was a three hour delay mortality, with no signs of distress before this time. Usually a 10% or greater kill was experienced.

We also have epistylis that causes some trouble, not known in terms of mortality, but when

in great abundance, in the condition of the fish.

This can be controlled with a 2 minute dip in 3% salt and 1/15,000 malachite green.

THE MANAGEMENT OF CUTTHROAT TROUT IN YELLOWSTONE LAKE, YELLOWSTONE NATIONAL PARK, WYOMING

F. Phillip Sharpe

Bureau of Sport Fisheries and Wildlife, Fort Collins, Colorado

The first written information of the cutthroat trout fishery in Yellowstone Lake was recorded by Hayden in 1871. From that time until 1901 there is little information on fishery management and research on the lake. Hatchery operations were established in 1901 and continued until 1953. General stocking of all species other than cutthroat trout was discontinued in 1939. No stocking

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has taken place since 1953. A basic research team conducted investigations on the lake from 1950-1961. At this time the Division of Fishery Services, Bureau of Sport Fisheries and Wildlife was delegated investigation and management responsibilities.

The present fishery policy considers management of the native species in a closed watershed on the basis of natural reproduction. The entire management program works within a framework

established by National Park Service policy.

Extensive creel census, trapping operations, electrofishing, and boat dock samples are employed to obtain information on the harvest, age and growth, length-frequency, and size distribution of fishes in Yellowstone Lake. These data are analyzed separately and in combination to obtain information related to the condition of the overall fishery. Findings are represented in annual recommendations to the National Park Service.

A PRELIMINARY REPORT ON THE BIOLOGY OF THE CUTTHROAT TROUT IN THE SNAKE RIVER, WYOMING Pete Hayden Wyoming Game and Fish, Jackson

This report discusses some findings of the first segment of a planned long term study of the Snake River cutthroat trout population. The work is directed by the Wyoming Game and Fish Department and is financed from Dingell-Johnson monies. The first segment began in July, 1964, and terminates December 31, 1966.

The objectives of this segment were to evaluate the role of three tributary streams in recruitment to the Snake River cutthroat trout fishery. These streams are located along a fifteen mile section of the Snake River immediately south of Grand Teton National Park in Teton County, Wyoming. From south to north, they are designated Blue Crane Creek, Fish Creek, and Bar BC Spring Creek. All are similar in that they are of low gradient, eutrophic, spring fed, and known to contain good spawning areas. They differ in size, fluctuation, and temperature characteristics.

In 1964, fish traps were constructed in Fish Creek and Bar BC Spring Creek. These traps and an existing trap in Blue Crane Creek were operated in 1964 and 1965 to catch fish moving upstream or downstream. Scale samples were taken for age-growth studies at all traps. Other information gathered included bottom fauna samples, water chemistry, temperatures, and estimates

of resident fish populations.

In Blue Crane Creek, the peak of the cutthroat spawning run was found to occur in April. In Fish Creek, it occurred in May, and in Bar BC Spring Creek, in June. Although adequate information on downstream migration of cutthroat fingerlings was obtained only from Blue Crane Creek, the pattern appears to be similar for all three creeks—usually beginning in December and reaching a peak in January and February. In Blue Crane Creek it was also observed that up to 40% of the cutthroat migrating to the Snake River had spent at least one winter in the stream.

In 1966, the Fish Creek and Bar BC Spring Creek traps will be operated again to obtain further information on spawning activity. A study to evaluate egg fertilization and mortality will also be attempted in Bar BC Spring Creek.

1st Annual Meeting of the Colo.-Wyo. Chapter of the American Fisheries Society - Continued -5-A PRELIMINARY REPORT ON A COMPARATIVE STUDY OF THE GROWTH OF BROOK TROUT AND CUTTHROAT TROUT IN BEAVER PONDS IN SOUTHEASTERN WYOMING Richard E. Lakey United States Air Force An investigation was conducted to determine whether brook trout or cutthroat trout were most suitable for planting in beaver ponds on the Pole Mountain Division of the Medicine Bow National Forest, Wyoming. Cutthroat and brook trout were planted, together, in representative ponds during September of 1964. A total of 261 fish, 96 cutthroat and 165 brook trout were recaptured with gill nets during the late summer of 1965. The following data were taken from each fish and encoded onto IBM punch cards. A. Identification number of fish B. Specie C. Date of capture D. Pond captured in E. Total length in inches F. Total weight in pounds G. Sex H. Coefficient of Condition This data was fed into the University of Wyomings' Philco computer programmed for a "Least Squares Analysis of Variance for Unequal Subclasses." Computer analysis revealed: A. That there was no significant differences in the total lengths achieved by the two species. В. That there was a significant difference, in both weights and Coefficient of Condition, (C factor) between the two species. The brook trout appeared to be able to put on more weight and consequently enjoy a higher C factor than the cutthroat, when both were raised in beaver ponds. C. There was a significant difference between the ponds in which the fish were raised. For both species, larger ponds yielded larger fish. In this study overpopulation of any given pond did not appear to be a factor. D. With the exception of the Coefficient of Condition no one pond appeared to be more suitable to either trout. In the case of the C factor smaller ponds resulted in a disproportionate lowering of the Coefficient of Condition for brook trout. In the cutthroat the lowering of the C factor was strictly a straight line relationship. While it might appear that cutthroat do better in small ponds than do brook, this is not so as the brook still enjoys a significantly higher C than the cutthroat. In light of the above findings it is recommended: A. That this study be continued on an enlarged scale. There was enough statistically significant evidence present to indicate that there is a definite difference between the growth rates of brook and cutthroat, in beaverponds, during their first year of life. It would appear to be of value to know if this difference continues throughout the life history of the two species. B. That brook trout, rather than cutthroat, be planted in the majority of the suitable beaver ponds on Pole Mountain.

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CUTTHROAT TROUT MANAGEMENT IN WYOMING

Salt and Snake River Drainages - Max Rollefson

The entire Snake River complex in Wyoming from Palisades Reservoir upstream is managed primarily for cutthroat trout. Although most of the trout production in this area results from naturally spawned fish, two hatchery developments are located in the area. These stations raise only cutthroat trout, primarily the Snake River variety. In addition to the cutthroat trout, Mackinaw and brook trout are also raised and used to supplement the fishery in those areas having special problems.

Plants of catchable cutthroat trout are limited to heavy use sections of the Hoback River and the Snake River below Moran Dam. Sub-catchables are planted in Palisades Reservoir, the Salt River, and specific lakes throughout the drainage. Fingerling cutthroat trout are stocked in Jackson Lake and in beaver dam areas. In Jackson Lake, stocking efforts are designed as an effort to re-establish stocks of cutthroat trout found in good numbers in these waters in the early 1900's.

A special study on ecology of the Snake River cutthroat in this drainage is in progress. Spot checks and scheduled creel censusing programs are maintained to evaluate year to year harvest rates. Some stream improvement structures have been installed in spring-fed tributaries and in Cliff Creek; results have varied from complete failure to a moderate improvement in the environment. Annual removal of whitefish in the Salt River has given some indication of improvement in the quality and quantity of the cutthroat trout fishery. Initial introductions of Yellowstone cutthroat in the upper Yellowstone River Drainage above Woodard Canyon were made in 1965.

Green River Drainage - Bob Jackson

Cutthroat trout management is restricted to high mountain lakes, where stocks of Yellowstone and possibly Colorado River cutthroat are maintained primarily by natural reproduction. In some situations, natural reproduction has resulted in over-population and associated low quality fishing.

North Piney Lake is one of several locations believed to hold pure strains of the original Colorado River cutthroat. The Henry's Fork of the Green River has successfully maintained distinct stocks of cutthroat trout in spite of plants of rainbow trout, plants of other varieties of cutthroat and, in general, habitat deterioration. In Salt Creek, a tributary to the Bear River, cutthroat trout populations have been maintained in fishable numbers by natural reproduction in spite of earlier plants of brook trout and stream channel relocation by highway construction.

An attempt to re-establish natural reproducing populations of cutthroat trout in North Piney Creek and in tributaries has also been initiated.

Wind River Drainage - Chuck Viox

There are no drainage-wide programs to maintain cutthroat populations in this management district. Observations on fingerling Snake River variety cutthroat in a lotic environment, previously devastated by extreme flooding, indicates that fishable populations of this variety of cutthroat can be established in three years. Investigations have not proceeded to the point where it can be established if these populations are being maintained by natural reproduction in sufficient numbers to adequately support a sport fishery.

In recent years lakes at higher elevations, when chemically treated to remove undesirable fish populations, have been restocked with cutthroat successfully. Most high mountain lakes in this area maintain adequate populations of cutthroat for a sport fishery by natural reproduction.

There are some situations where golden trout and cutthroat hybrids have developed naturally. lake, Lake-of-the-Woods in Fremont County, is successfully managed as a brood stock lake for Snake River cutthroat. Proper annual stocking rates are still a matter of concern here.

Shoshone and Clark's Fork Rivers - Lou Pechacek

Drainage-wide cutthroat trout management is practiced with varying degrees of success. In the South Fork of the Shoshone at lower elevations, the stocking of fingerling, sub-catchable and catchable cutthroat trout has not resulted in a self-sustained, satisfactory sport fishery. In this lower area, habitat conditions are poor - wide, shifting flood plain, dewatering the lower reaches by irrigation needs, and resident brook trout populations occupying key spawning and nursery tributaries. Attempts to maintain and re-establish cutthroat populations at acceptable levels at this stage is considered unsuccessful. It should be noted that rainbow and brown trout are also present in these lower elevation waters. In the upper portion of the South Fork Drainage, populations composed of naturally reproducing cutthroat and brook trout populations require little in the way of direct management applications.

In the North Fork of the Shoshone, cutthroat trout populations of both the Yellowstone variety and the recently introduced Snake River variety are being maintained by natural reproduction and supplemental stocking to provide a good sport fishery. Rainbow trout are also

present in limited numbers in this drainage.

Sub-catchable and some catchable cutthroat trout are stocked in heavy use areas and in areas

where there is a possibility of establishing spawning runs.

Fingerling Snake River cutthroat trout are also stocked in Buffalo Bill Reservoir and have contributed to the sport fishery there at acceptable standards. Migration of spawning cutthroat trout out of this reservoir up the North Fork of the Shoshone are considered important to both the river and reservoir fishery. The degree of this support, however, has not been completely measured and studies are presently in progress to evaluate these runs.

The Clark's Fork Drainage contains mixed populations of cutthroat trout, rainbow trout, brook trout and some brown trout. The inaccessible canyon sections and some tributary streams maintain cutthroat trout populations by natural reproduction. In areas of heavy use in the Clark's

Fork Drainage, catchable cutthroat trout of the Snake River variety are stocked.

Two lakes in this area were chemically treated in 1965 to remove low quality brook trout populations. These lakes, both in a series on the same drainage, have been restocked with Yellowstone and Snake River variety cutthroat in an effort to develop a better quality sport fishery in this immediate area.

One lake in this area is managed to produce cutthroat trout eggs for hatchery production. Some problems with bisexual cutthroat and low quality eggs have been noted. Reasons and causes for the high incidence of bisexual fish is presently being investigated.

> CUTTHROAT TROUT MANAGEMENT IN THE WIND RIVER DRAINAGE OF WYOMING Charles A. Viox, Jr. Wyoming Game and Fish, Lander

Cutthroat trout are restricted to a few lakes and streams in the Wind River Drainage. The East Fork of the Wind River is the only major drainage with a cutthroat trout fishery. Plants of fingerling cutthroat of the Snake River variety have been successful in maintaining a fishery in East Fork and Bear Creek, but because of the nature of the Wiggins Fork, additional plants of catchable cutthroat may be necessary in the future to provide a good fishery now that better access has been provided by improved roads to this stream.

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The high mountain lakes that contain cutthroat are maintained by natural reproduction with the exception of two lakes which are accessible by four-wheel drive units. Spawning areas are limited and yearly plants of cutthroat are made to produce a fishery.

Efforts will be made to maintain the present cutthroat trout fisheries and plans for expansion into virgin mountain lakes have been made when the need arises and access by trail can

be provided.

A BIOLOGICAL EVALUATION OF THE LAHONTAN CUTTHROAT IN EIGHT MILE LAKE, CARBON COUNTY, WYOMING Jack J. Kanaly

Wyoming Game and Fish

Eight Mile Lake is an eighty acre lake located eight miles south of the City of Rawlins, Wyoming, at an elevation of 6,800 feet. The lake has a maximum depth of 18 feet, and is fed primarily by runoff and water from oil wells located near the lake. Oil well water flows were capped in the fall of 1965. The lake has no outlet and acts as an evaporating basin for the inflowing waters. Eight Mile Lake has extremely high total dissolved solids, ranging from 7,870 ppm in 1955 to 13,658 ppm in 1965.

Some of the ions or combinations of ions have reached or exceed levels toxic to most species of trout. It is entirely possible that the liver changes encountered in the Lahontan cutthroat could be induced by the high total dissolved solids alone, or the concentration of certain ions or combination of ions in the lake. With these considerations in mind, it is extremely doubtful if Eight Mile Lake can continue to support even the Lahontan or Eagle Lake varieties of trout.

Lahontan cutthroat were first introduced in Eight Mile Lake in June of 1961 when 10,000, five to six-inch fish were planted. There are two groups of cutthroat in Eight Mile Lake - the original plant, ranging in size from 18 to 23 inches, and survivors of the 1964 plant, now

averaging 13 to 14 inches.

Spawning operations and hatching of the fish for planting back into the lake has met with fair to poor success. Of 221,659 eggs taken in the years 1963, 1964 and 1965, only 23,205 produced fish that survived for planting. Of this number, there was only survival of the fish planted in 1964. Although survival of the 1964 plant was successful, it may not be adequate to establish a continual spawning population. With this in mind, the 2,000 fish produced were planted in Chapman Reservoir #3 in 1965 in an attempt to establish a brood stock of Lahontan cutthroat.

CUTTHROAT TROUT MANAGEMENT AND RESEARCH IN COLORADO
Wes Nelson
Colorado Game, Fish and Parks Department, Fort Collins

This brief survey of cutthroat trout management and research in Colorado has pointed up our lack of knowledge concerning this species and its environment. It has been shown that cutthroat trout are found in about a fourth of our 2,000 public lakes and thus constitute an important fishery resource. Most of these lakes are small, at high elevation, are remote and are well suited as cutthroat habitat.

Colorado has no particular, formal plan of cutthroat trout management. However, similar operational plans are applied by the four regional fish biologists. Eggs obtained from two sources in the state are raised to the swim-up stage and then planted, usually in early September.

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Most plants are by airplane, at the rate of 100-500/acre and every 1-3 years in a given lake. Consideration of statewide stocking and catch results for the years from 1946-65 indicates that recent annual plants $(1-1\ 1/2\ \text{million})$ are adequate to maintain the catch at present levels.

Cutthroat trout research has been limited in Colorado. The most intensive studies have been at Trappers Lake and have concentrated on determining the effect of spawn taking operations, fisherman harvest and other factors on fry recruitment. Scattered information on cutthroat biology is available from some high lakes studies. Survival of cutthroats may be good in the absence of competitor species but usually is not in their presence.

The cutthroat population in Trappers Lake is self-reproducing and fry recruitment has been found to be directly related to runoff but not to spawner escapement. Cutthroat do not reproduce successfully in most high lakes and must be maintained by plants of fry. Growth rates of cutthroat are quite variable depending on age of fish and lake. They are greatest during the first three years (2 - 9''/yr) but less thereafter (0 - 3''/yr). The usual maximum size reached in most of the lakes is 17-18 inches. Age of cutthroats is difficult to determine from scales but they are known to live at least six years and some may survive twice this long. Cutthroat trout eat what is available - plankton, bottom fauna, emerging aquatic insects and terrestrial insects but appear to consume more at, or near-surface type food.

It is suggested that before cutthroat management can progress further in this state more research will have to be done. One immediate and pressing problem is to evaluate the success of our fry stocking program in a variety of lakes. Another is to estimate utilization and yield of our high lakes and make future projections. Finally we need to find ways of speeding up cutthroat trout culture, that is of growing them faster so they may be planted sooner and at larger size. It has been shown many times that survival of two inch fish, particularly when they are planted at the beginning of the season, is very good. Colorado should aim for such a program with cutthroat trout as well as rainbow trout.

RE-STOCKING CUTTHROAT TROUT FOLLOWING BROOK TROUT REMOVAL W. D. Klein Colorado Game, Fish and Parks Department, Fort Collins

In the early days of trout culture in Colorado many of the back country lakes and streams were stocked with brook trout ($Salvelinus\ fontinalis$) and progeny from these plants are still abundant in some waters. The brook trout populations are often considered undesirable because of the small size and poor condition of the fish. It is sometimes feasible to remove these trout with a toxicant and restock another species, usually native trout ($Salmo\ clarki$). This procedure was followed in two small (under 6 acre) sub-alpine lakes and the progress of the newly introduced native trout was followed for a number of years.

One rehabilitated lake was stocked at a mean rate of 235 trout per acre annually. The other lake received one airplane plant of 3,000 fish per acre.

Native trout in both lakes eventually provided trout over 11 inches in length and a catch per man hour under .5 as compared to brook trout with a mean length of less than 8 inches and a catch per man hour of .83 in one lake and 12.8 in the other lake.

The change from brook to native trout was achieved at a cost of two years with no fishing, one to two years with fishing for small natives, minor monetary expenditures associated with killing the brook trout and the prospect of perpetual stocking of the lakes with native trout. However, it was concluded that conversion from brook trout to native trout is advisable in situations where improvement of the quality of the fishing in terms of larger trout will compensate for the problems associated with the change.

R.B. - BIBLIOGRAPHY -EXTENT AND CAUSES OF EARLY MORTALITY IN FRESHWATER FISH resented (1963)

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Hubbs (1921)	
Kalleberg (1958)	Smith & Moyle (1945)
LeCren (1962b)	Smyly (1952)
Mantelman (1958)	Svardson (1949)
Northcote (1962)	Toetz (1966)
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Johnson (1961)	Rothschild (1961)
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Lennon & Parker (1960)	John & Hasler (1956)
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Daykin (1965)	Vibert (1954)
Garside (1959; 1966)	Morphology - 5
Gottwald (1965)	Fish (1932)
Hall (1925)	Harrington (1947)
Hayes (1949)	Pritchard (1930)
Hishida & Nakano (1954)	Purkett (1961)
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Shepard (1955)	Colby & Smith (1967)
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Forney & Houde (1964; 1965)	Zenner (1965)
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PETROMYZONTIDAE Petromyzon marinus McCauley (1963) Piavis (1961)

ACIPENSERIDAE Acipenser spp. Nikolsky (1961) Semenov (1957) Yurovitskii (1964)

POLYODONTIDAE Polydon spathula Purkett (1961)

CLUPEIDAE Alosa pseudoharengus Edsall (MS)

SALMONIDAE Coregonus artedi Dryer & Beil (1964) John & Hasler (1956) Pritchard (1930) Smith (1956) Stone (1938)

Coregonus autumnalis Mescheryakova & Chernyaev (1963)

Coregonus clupeaformis Christie (1963) Hall (1925) Hart (1930) Lawler (1965) Miller (1952) Price (1940)

Onchorynchus nerka Kimsey (1951)

Salmo clarki
Ball & Cope (1961)
Brown & Buck (1939)
Bulkley & Benson (1962)
Drummond & McKinney (1965)
Merriman (1935)
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Smith (1944)
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SALMONIDAE (cont.)
Salmo gairdneri
Brown & Buck (1939)
Coble (1961)
Eisler (1961)
Embody (1934)
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Gottwald (1965)
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Hatch (1957)
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Mantelman (1958)
Marchetti (1965)
Northcote (1962)
Shirahata (1966)
Silver, et al (1963)
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Salmo salar Bishai (1961) Dumas (1966) Kalleberg (1958) Neustroev & Podymakhin (1966a, 1966b) Vibert (1954) Warner (1963)

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Salvelinus namaycush
Atkinson (1931)
Burdick, et al (1964)
Embody (1934)
Garside (1959)
Martin (1955, 1957)
Prevost (1956)
Simpson (1939)

White (1930)

Thymallus arcticus
Brown & Buck (1939)

OSMERIDAE
Osmerus mordax
McKenzie (1947)
Rothschild (1961)
Rupp (1965)

HIODONTIDAE

<u>Hiodon alosoides</u>

Battle & Sprules (1960)

ESOCIDAE

Esox lucius
Carbine (1942, 1944)
Franklin & Smith (1963)
Johnson (1957)
Kostomarova (1959)
Swift (1965a)
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Volodin (1960)

CYPRINIDAE

Campostoma anomalum

Lennon & Parker (1960)

Raney (1940)

Carassius auratus
Swingle (1949)

Cyprinus carpio
Mantelman (1958)
Swee & McCrimmon (1966)

Exoglossum maxillingua Raney (1940)

Hybopsis spp.
Lachner (1952)
Raney (1940)
Reighard (1943)

Notemigonus crysoleucas
Kramer & Smith (1960)
Lewis (1961)

Notropis spp.

Harrington (1947)

Hunter & Wisby (1961)

Raney (1940)

Pickering (1966)
Pickering & Vigor (1965)

Semotilus atromaculatus Raney (1940)

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<u>Ictalurus punctatus</u>

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Fundulus heteroclitus

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Percopsis omiscomaycus
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CENTRARCHIDAE

Ambloplites rupestris
Davis (1959b)
Hile (1941)

Chaenobryttus gulosus
Larimore (1957)

Lepomis cyanellus
Hunter & Wisby (1961)

Lepomis macrochirus

Bennett, et al (1940)
Cairns, et al (1965)
DiCostanzo (1957)
Faber (1967)
Krumholz (1949)
Tebo & McCoy (1964)
Toetz (1966)
Werner (1966)

Lepomis microlophus Emig (1966)

Micropterus dolomieui
Brown (1960)
Cleary (1956)
Fry & Watt (1957)
Henderson & Foster (1957)
Latta (1963)
Meehan (1911)
Rawson (1945)
Reynolds (1965)
Webster (1948, 1954)

Micropterus punctulatus
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Micropterus salmoides
Buck (1956)
Jurgens & Brown (1954)
Kramer & Amith (1960, 1962)
Strawn (1961)
Swingle & Smith (1943)
Tebo & McCoy (1964)

Pomoxis annularis
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Pomoxis nigromaculatus
Faber (1967)

PERCIDAE

Etheostoma spp.

Hubbs (1961)

Hubbs & Armstrong (1962)

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Lucioperca lucioperca

Dmitrieva (1960)

Lyashenko (1961)

Perca flavescens
Faber (1967)
Forney (1966)
Forney & Houde (1964)
Pycha & Smith (1955)

Perca fluviatilus
LeCren (1955, 1965)
Smyly (1952)
Swift (1965a)

Percina spp.
Hubbs (1961)

Stizostedion v. vitreum
Allbaugh & Manz (1964)
Colby & Smith (1967)
Eschmeyer (1950)
Forney (1966, 1967)
Forney & Houde (1964, 1965)
Houde (1967)
Johnson (1961)
Kramer & Smith (1966)
Moyle (1963)
O'Donnell (1942)
Smith & Kramer (1963)
Smith & Moyle (1945)

Aplodinotus grunniens
Davis (1959a)
USBSFW (1967) p. 56

ATHERINIDAE

Labidesthes sicculus

Hubbs (1921)

Table 1. Mortality Rates during early life history stages of 12 species of freshwater fish - compiled from the fishery literature

Species	<u>a</u> 1/	<u>i</u> 2/ (Daily)	Investigator
	Spawning to Fert	ilization	unang 2
S. clarki	.0102	_	Mills (1966)
S. clarki	.01	es-cies	Snyder & Tanner (1960)
S. gairdneri	.02		Hatch (1957)
S. salar	.008011		Warner (1963)
S. clarki S. gairdneri S. salar S. fontinalis	.20	R088.	Hazzard (1932)
	Pre-Eyed St	age	
S. clarki	.1139	.007031*	Mills (1966)
S. clarki	.39	•	Snyder & Tanner (1960)
S. gairdneri	. 08	-	Hatch (1957)
S. salar	.036052*	981-281	Warner (1963)
	Eyed Stag	<u>e</u>	
S. clarki	.0104	.00040021	Mills (1966)
S. salar	.017022*	-	Warner (1963)
			82 3013
	Spawning to Ha	tching	
P. marinus (Lab, 65°F)	.22	.013*	Piavis (1961)
S. clarki	.46	-	Snyder & Tanner (1960)
S. trutta	.977996	89.	Allen (1951)
S. trutta	.11	-	Hobbs (1940)
5. <u>fontinalis</u>	. 085	.0014*	McFadden (1961)
. fontinalis	.2134	101199	White (1930)
o. mordax	.963999	nexter and di	McKenzie (1947)
o. mordax	. 76	.079*	Rothschild (1961)
o mordax	. 989	.188*	Rupp (1965)
1ucius	.1036	.007045*	Franklin & Smith (1963
• v. vitreum	.6172	a sr a same	Allbaugh & Manz (1964)
•v. vitreum	.6499	.054233*	Johnson (1961)
vitreum	. 98	oxa peblashe	0'Donnell (1942)
	Fertilization to	Hatching	
A. pseudoharengus (53°F -		. 05*	Edsall (MS)
pseudoharengus ((53°F.)		.0921*	Edsall (MS)
6. clarki	.75	.041*	Ball & Cope (1961)
M. salmoides	.06-1.00	.031-1.514*	Kramer & Smith (1962)
8.v. vitreum (Hatchery)	.2363	.011068	Smith & Kramer (1963)
S.v. vitreum (River)	.5082	.014050	Smith & Kramer (1963)
	Prolarval Sta	age	
o. mordax	. 98	-	Rothschild (1961)
			`

Species	<u>a</u> 1/	<u>i²/</u> (Daily)	Investigator		
Spawning to End of Larval or Alevin Stage					
S. clarki S. fontinalis O. mordax E. lucius	.915995 .21 .995 .996999	.0014*	Snyder & Tanner (1960) Shetter (1961) Rothschild (1961) Carbine (1944)		
Juvenile Stage					
S. fontinalis (MarJune) S. fontinalis (June-Sept.) S. fontinalis P. flavescens P. flavescens S.v. vitreum	- .94 .7996 .9399 .6775	.024 .006 .0153* .021058 .028042 .011014	Latta (1962) Latta (1962) Shetter (1961) Forney (1966) Forney & Houde (1964) Forney & Houde (1964)		
Spawning to End of First Summer					
S. trutta S. fontinalis	. 94 . 95	03 yazow5180 y	LeCren (1962a) Shetter (1961)		
Hatching to End of First Summer					
S. fontinalis	.98	.014*	McFadden (1961)		
and the second s		and the second section of the section of the second section of the section of the second section of the			

$$\frac{1}{a} = \frac{\text{Number dying during period}}{\text{Number alive at start of period}} = \frac{N_0 - N_t}{N_0}$$

$$\frac{2}{\underline{i}} = \frac{\log_e N_o - \log_e N_t}{t}$$
; where t is expressed in days.

^{*} Computed from investigators' published data.

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The Wilderness Society

May 1979

RE II: 36 Million Acres to Get the Ax

By John Hooper TWS Washington Representative

The Carter Administration's RARE II recommendations, announced on April 16, give the Forest Service immediate authority to release more than 36 million acres of roadless lands to development including road construction, timber cutting, mining and motorized recreation. The Administration's recommendations essentially reaffirm the Department of Agriculture's disappointing January 4 RARE II Final Environmental Impact Statement.

Sixty percent of the untouched remnants of the nation's national forest roadless lands are now open to broad multiple uses, even though the acreage inventoried contains inconsequential commodity resources and is of demonstrated high wilderness quality.

The Wilderness Society, in a joint press release with the Sierra Club and

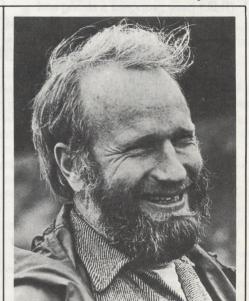
Friends of the Earth, denounced the RARE II recommendations as "imbalanced and shortsighted." Society Executive Director William A. Turnage termed the announcement "among the most negative decisions in the history of public land management and one which threatens to negate the Administration's impressive environmental record."

Only 9.9 million acres in the lower 48 states have been recommended for wilderness designation while nearly 29 million acres were allocated to non-wilderness. Another 7.6 million acres will receive further planning. Conservationists are extremely disappointed in the results, particularly since citizens across the nation expressed strong support for more wilderness during the public involvement phase of the RARE II process. The predominance of comments on the final EIS from governors, members of Congress and federal agencies also recommended

enlarging the wilderness and further planning categories.

More than 200 environmental groups across the nation signed an April 10 telegram to President Carter urging him to intervene personally to improve the severely imbalanced RARE II results. Conservationists are now turning their attention to Capitol Hill since it is the Congress which makes the final decisions on wilderness designations.

The highest priority for citizens across the country will be to determine which RARE II inventory areas are endangered through proposed Forest Service activities this year and next, and to ensure that Congress focuses on those areas within this imminently endangered category which deserve legislative protection as wilderness. The June issue of Wilderness Report will carry an in-depth analysis of the recommendations and potential congressional action.



Willi Unsoelo

Unsoeld's Death On Mt. Rainier Saddens Society

Willi Unsoeld, a member of the Governing Council of The Wilderness Society and of its executive committee, died on March 4 in an avalanche on Mount Rainier. Willi and 21 students in the outdoor education program at Evergreen State College in Olympia, Washington had spent eight days on the mountain and were caught in a severe storm near the top of the peak. As they descended to the 11,000-foot level an avalanche struck, burying Willi and two students, one of whom others in the party were able to dig out and revive.

Willi was a member of the Society's Governing Council for just over a year, but in that short time he left an indelible imprint upon the organization and had won the love and respect of the council and the staff. A warm, charismatic man of exuberant spirit and penetrating mind, he helped take us back to our philosophical roots while always looking towards the far horizon.

A world-renowned mountaineer, Willi was a member of the 1963
American Everest expedition and made the first ascent of the difficult West Ridge and the first complete traverse of the peak. From 1962-67 he lived in Nepal as director of the Peace Corps there and as a community development advisor with the Agency for International Development. He later served as executive vice president of Outward Bound, and in 1970 joined the planning faculty of Evergreen State (See UNSOELD, page 3)

High Alpine Valley Coveted by Mining Corp.

By John Hooper TWS Washington Representative

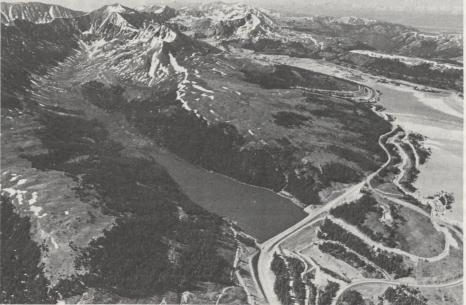
A proposed land transfer between the Forest Service and a gigantic mining corporation has cast a shadow over the future of Clinton Amphitheatre, a beautiful 11,600-foot high alpine valley used by Colorado hikers and cross country skiers. Lying on the east slope of the Rockies, the amphitheatre's steep, glacier-carved walls rise impressively from the valley floor.

Out of sight but unfortunately not out of reach in an adjacent valley is the world's biggest molybdenum mine, operated by AMAX, Inc. at Climax, Colorado. With more than \$3 billion in assets, AMAX is the world's largest producer of molybdenum, a gray-colored mineral used as an alloy in many steel products. Although molybdenum is considered a strategic metal, approximately 60 percent of the Colorado supply is exported to Germany and Japan, and some even finds its way to Czechoslovakia.

Under the Freedom of Information Act, an Aspen-based biologist, Robert Lewis, learned in 1976 that AMAX, Inc. was negotiating with the Forest Service to acquire Clinton Amphitheatre in exchange for "bits and pieces" of AMAX inholdings in national forests all over Colorado. The General

Land Exchange Act of 1922 (PL 67-173) authorizes land exchanges "when the public interest will be benefited thereby." In this case, it is obscure that the public interest will be served. No one is quite sure why AMAX wants to make the trade other than to "expand its operation." Thousands of acres near Climax have already been mutilated over 70 years of mining activity.

For every ton of ore mined, only four pounds of molybdenum are extracted and the remaining 1,996 pounds are discarded as tailings. Lewis and other concerned citizens believe that AMAX intends to build a road from the Climax mine across the fragile alpine terrain and into Clinton Amphitheatre so the valley can be used as a dump for hundreds of tons of top soil. (See AMAX, page 4)



If a land trade is made, AMAX, Inc. apparently plans to build a road across fragile alpine terrain to gain access to Clinton Amphitheatre (upper left).

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Alaska Update

House to Vote in Early May

Exactly one year ago the House of Representatives overwhelmingly passed the Alaska National Interest Lands Conservation Act. May is once again the month when Alaska legislation meets a critical test on the House floor.

This year members of the House must choose between three different versions of the legislation. Rep. Morris Udall (D-Ariz.) and John Anderson (R-III.) have proposed a strong and comprehensive measure similar to the one approved in 1978. Two significantly weaker bills are also under consideration: the substitute offered by Rep. Jerry Huckaby (D-La.) which cleared the Interior Committee, and the version sponsored by Reps. John Breaux (D-La.) and John Dingell (D-Mich.) which was approved by the Merchant Marine Committee.

Although the conservationist-backed Udall-Anderson Substitute to H.R. 39 now has the support of 153 cosponsors, the final vote is expected to be much closer than the 277-31 victory of last year. The June issue will carry a full report on the House floor action expected in early May.

Rep. Gerry E. Studds (D-Mass.) emerged as a key leader for a protective Alaska lands bill in the Merchant Marine Committee. Other members who came forward with strong support were Representatives AuCoin (D-Ore.), Bonker (D-Wash.), Bonior (D-Mich.), D'Amours (D-N.H.), Donnelly (D-Mass.), Emery (R-Me.), Evans (R-Del.), Hughes (D-N.J.), Lowry (D-Wash.), Mikulski (D-Md.) and Stack (D-Fla.). They deserve the thanks of conservationists even though the opposition viewpoint prevailed.

On the Senate side, S. 222 now has 19 cosponsors, but Senate leaders have said they will not act on the measure until it has cleared the House. Conservationists have heard that the Senate Energy Committee may not expedite review of the Alaska lands bill since the committee is preoccupied with energy legislation. This runs counter to a statement made by Energy Committee Chairman Henry Jackson (D-Wash.) in a March 13 letter: "I am confident that all the work we did on this subject has laid the foundation for early action in this Congress. The committee will give top priority to this legislation in 1979.

Efforts to protect Alaska's wildlands also continue on the administrative front. When President Carter established national monuments in Alaska last December 1, he instructed Interior Secretary Cecil Andrus to take the necessary procedural steps under Section 204C of the 1976 Federal Land Policy and Management Act (FLPMA) to establish national wildlife refuges under the jurisdiction of the Fish and Wildlife Service. Approximately 40

Wilderness Report Changes Schedule

Wilderness Report missed the month of April but will issue forth in normally neglected June. We have altered the publication schedule in order to bring readers a timely report on the House vote on the Alaska legislation which is expected to occur in early May.



16,237-foot Mount Sanford in Alaska's Wrangell Mountains.

million acres are involved. The Interior Department held hearings on the proposed land transfers in late April in six Native Alaskan villages, and additional hearings in other locations are anticipated.

Cosponsors as of April 23

See the February *Wilderness Report* for the original listing and the March report for subsequent additions.

Additional Senate cosponsors of S. 222 bringing the total to 19:

John C. Culver (D-Iowa)

Additional House cosponsors of H.R. 39 bringing the total to 153:

Annunzio (D-III.) Barnard (D-Ga.) Beard (D-R.I.) Dixon (D-Calif.) Guarri (D-N.J.) Jacobs (D-Ind.) Leland (D-Tex.)

Luken (D-Ohio) Matsui (D-Calif.) Mikulski (D-Md.) Ratchford (D-Conn.) Regula (D-Ohio) Stack (D-Fla.)

EDITORIAL

Administration Badly Off Course on RARE II

The Carter Administration's April 16 endorsement of the Forest Service RARE II proposal was a disappointment not only because it condemned nearly 30 million acres in the lower 48 states to non-wilderness status — but also because it marks a major setback in the Administration's environmental record.

It was a decision clearly based on political considerations since no one at the White House level could have possibly evaluated the 2,000 RARE II roadless areas on the basis of their resources during the short Administration review period. In the end the influence of development interests prevailed over the views of the governors, senators and congressmen who responded to Agriculture Secretary Bob Bergland's request for comments on the final environmental impact statement released on January 4.

Most governors and many members of Congress favored additions to the wilderness and further planning categories. Perhaps the most significant example of Administration insensitivity to the opinions of elected officials involved the RARE II recommendations for Missouri. Governor Teasdale, Senators Danforth and Eagleton and five Missouri congressman wrote endorsing all five Forest Service wilderness proposals in the state. They also recommended wilderness designation for the Irish roadless area, which had been allocated to further planning, and recommended further planning for Spring Creek and Swan Creek, which had been allocated to non-wilderness. Yet the only White House imposed changes in Missouri weakened the recommendations by downgrading the Paddy Creek area from wilderness to further planning status.

Both the Council on Environmental Quality and the Environmental Protection Agency submitted lists of roadless areas which their professional staffs believed had been hastily allocated to non-wilderness by the Forest Service and which they urged should be reallocated to wilderness or futher planning. No agency suggested that any wilderness designations be dropped because of timber values.

Given all these positive signals, why did the Carter Administration fail to improve the Forest Service proposal? Some educated guesses can be made: (1) Since the first attempts to eliminate controversial pork barrel water projects, the Carter Administration has endeavored to soft peddle other environmental concerns affecting the West, where Carter lost every state in 1976. (2) A preoccupation with upcoming presidential primaries may have influenced the significant wilderness deletions in New Hampshire and the failure to improve recommendations in Oregon. (3) Some economic advisors in the Administration are making a case that RARE II has inflationary implications and are arguing for intensive logging in the timber-rich Northwest. (4) The Administration's decisions may also be linked with attempts to neutralize timber industry opposition to the proposed reorganization of a Department of Natural Resources.

Conservationists believe the White House chose the wrong course. Grassroots wilderness leaders throughout the country have a strong personal commitment to individual areas for which they will fight in Congress. The RARE II decisions struck hard at the wilderness areas grassroots supporters know and love. Should such areas be lost, they will not be forgotten, and neither will this black mark on the Administration's generally strong environmental record.

Society Opposes Park Service Fee Increases

A plan to increase national park admission and user fees by more than 70 percent has been strongly criticized by The Wilderness Society. In testimony before the Senate Appropriations Committee, Society Executive Director William A. Turnage declared that "If anything, entrance fees should be abolished. Our national parks are symbolic of the public's ownership of the public lands. They should be free and open to everyone, regardless of economic status."

The Park Service has proposed increasing the revenue collected from park admission and user fees from about \$17 million to \$29 million annually. The Office of Management and Budget literally forced the Park Service to take this action since OMB had drastically cut the proposed park maintenance budget but allowed the agency to pick up some of the lost revenue through fee increases.

Ron Tipton, the Society's national parks specialist, pointed to this as "another example of the gross insensitivity of OMB to the need of the public and to the need for wise and effective management of our public lands. The very small amount of additional federal revenue that would

be received from the proposed fee increase simply does not justify charging the American taxpayer \$5.00 to ride a shuttle bus in Mt. McKinley National Park, or \$4.50 to enter Yosemite," Tipton said.

The Wilderness Society believes that entrance fees increase both economic and psychological barriers to the enjoyment and future protection of the national parks. When public access is not inhibited by cost, more people are encouraged to visit the parks, and the level of appreciation is enhanced. As Turnage told the Senate committee: "When a tourist enters Disneyland he may feel a sense of wonder, but when he enters the Smithsonian that wonder is mixed with pride that his tax dollars helped make it all possible that what he sees belongs to him. Paying an admission fee only detracts from this positive proprietary sense."

Rep. Phillip Burton (D-Calif.), chairman of the House National Parks Subcommittee, has decided to try and block the increase in admission fees, stating that "I am going to spare no effort to stop it cold in its tracks." He is considering legislation to either freeze current admission fees or to eliminate them entirely.

ACTION LINE: Write to Rep. Phillip Burton, Chairman, National Parks Subcommittee, U. S. House of Representatives, Washington, D. C. 20515, and to Sen. Dale Bumpers, Chairman, Parks and Recreation Subcommittee, U. S. Senate, Washington, D. C. 20515 and express your opposition to the proposed fee increase.

Wilderness Report

Editor: Sandy Marvinney

Wildemess Report (USPS 406-310) is published monthly, except for April and with a combined July/August issue, by The Wilderness Society, 1901 Pennsylvania Ave., N.W., Washington, D. C. 20006. Second-class postage paid at Washington, D. C. Annual membership dues in The Wilderness Society are \$20.00, of which \$1.50 is for a subscription to the Wilderness Report.

The Wilderness Society

The Wilderness Society is a non-profit citizens organization founded in 1935 and dedicated to preserving America's wildlands.

President: Theodor R. Swem Executive Director: William A. Turnage

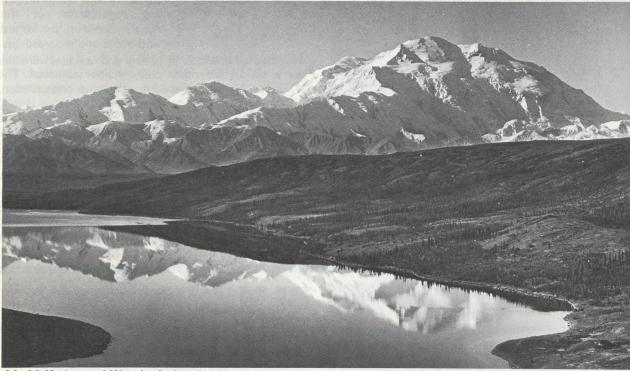
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The Wilderness Society

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Mt. McKinley and Wonder Lake, Alaska

The Land Ethic

There is yet no ethic dealing with man's relation to land and to the animals and plants which grow upon it . . . The land-relation is strictly economic, entailing privileges but not obligations. . . .

Individual thinkers since the days of Ezekiel and Isaiah have asserted that the despoliation of land is not only inexpedient but wrong. Society, however, has not yet affirmed this belief. I regard the present conservation movement as the embryo of such an affirmation.

All ethics so far evolved rest upon a single premise: that the individual is a member of a community of interdependent parts. . . . The land ethic simply enlarges the boundaries of the community to include soils, waters, plants and animals, or collectively: the land.

We can be ethical only in relation to something we can see, feel, understand, love or otherwise have faith in. A land ethic, then, reflects the existence of an ecological conscience, and this in turn reflects a conviction of individual responsibility for the health of the land

Aldo Leopold
A Sand County Almanac

The Genesis

"land ethic" lies at the heart of The Wilderness Society's work. In the writings of both Leopold and Robert Marshall—two founders of the Society—the full force of the wilderness ethic took form. Leopold believed wilderness was essential to the health of the land. He saw it as a cultural inheritance, a learning ground for the skills of survival and a source which gave meaning to life—a source worthy of love, reverence and preservation. As a young forester in New Mexico, Leopold urged the U. S. Forest Service to set aside the Gila Wilderness as the first administratively protected area in 1924.

Robert Marshall was a forester, explorer, writer and hiker extraordinaire who often covered 30 miles in one day. He, too, appreciated the ecological and cultural values of wilderness and understood from his own experience that dynamic beauty and remote

solitude foster in man a sense of physical and mental well-being.

Both Leopold and Marshall despaired that the shrunken remnants of wilderness could melt away, in Marshall's words, "like the last snowbank on some south-facing mountainside during a hot afternoon in June." He felt there was but one hope to save what was left—"the organization of spirited people who will fight for the freedom of the wilderness."

That organization came into being in January 1935 when Leopold, Marshall, Benton MacKaye, who conceived the idea for the Appalachian Trail, and five other men of similar visionary outlook met in Washington, D. C. to launch the fledgling Society. Since its inception The Wilderness Society has drawn leadership and inspiration from a succession of remarkable individuals who have been at the forefront of our nation's conservation movement—among them wildlife biologist Olaus J. Murie noted for his pioneering work in Alaska, Sigurd F. Olson, a staunch wilderness advocate and guiding light of the fight for protection of

Minnesota's Boundary Waters Canoe Area, and Willi Unsoeld, the first man to climb the West Ridge of Mount Everest and who until his recent death instilled a love and respect for wilderness in scores of students and friends.

In the course of the Society's evolution, passage of the 1964 Wilderness Act stands as a landmark victory that gave tremendous impetus to the wilderness preservation movement. Hell's Canyon, Maroon Bells, Selway-Bitterroot, Dolly Sods, Boundary Waters, Washakie, Kalmiopsis, Okefenokee, Shenandoah, Superstition, Golden Trout, and Great Bear are colorful names for wild places of special beauty and unique ecological value-a few of the 187 areas that now make up the National Wilderness Preservation System. Protection of America's last free-flowing rivers, preservation of threatened and endangered species and their habitat and wiser management of all our nation's public lands and resources have been a focus of concern since the Society was founded and remain high on our list of priorities for the future.

A Statement from the paring to enter the decade of the 1980's with a unique and historic challenge; the establishment of the land ethic as a basic element of American culture and philosophy. While it is easy to dwell upon

culture and philosophy. While it is easy to dwell upon the strenuous battles waged by the Society and other environmental organizations during the past twenty years and more, I believe we should look to the future with the perspective of the remarkable successes achieved. In just a few short decades our nation's dimension of conciousness has changed profoundly. Conservation has become a major concern of our time. The President and the Congress have repeatedly affirmed the importance of environmental protection and land preservation in our laws and our lives.

Aldo Leopold, writing in the 1940's, said that man's relation to the land was "still strictly economic" and that land use decisions were "judged by expediency only." I believe our nation is now prepared to consider ethics as a major criterion—to preserve lands, waters and wildlife because it is right, not just when it

is cost-effective. This awakening of a new receptivity among our fellow citizens and our decision-makers imparts to The Wilderness Society a greater responsibility to vigorously articulate the land ethic so that ever-growing numbers of Americans will support its precepts. We accept as a major challenge of the 1980's the education of a much larger, broader and more committed wilderness preservation and land protection constituency.

President Carter's sweeping action to protect 56 million acres of Alaska's wildlands is unprecedented and would have been inconceivable only a decade or two ago. It is a great tribute to the American people that an industrial society would demonstrate the restraint and foresight to preserve such vast acreages. We must move from strength to strength. As the Alaska campaign continues, we must build upon this success to win more comprehensive protection for Alaska's fragile wildlands and to ensure their wise management in the years ahead.

The Forest Service RARE II program has given us an enormous agenda for wilderness preservation and the debate over disposition of millions of acres of national forest roadless lands is likely to continue for many years. We have barely begun to realize the po-

tential for wilderness preservation within the National Park System, and the Bureau of Land Management has just initiated a massive wilderness review which could encompass tens of millions of acres of extraordinary and often unique wildlands. Public land planning and management is an area of vital concern in which we will be assuming a more active "oversight" and advisory role. These are the Society's conservation priorities in 1979 and early 1980.

We at The Wilderness Society are committed to excellence as an organization and to leadership in the environmental community. We hope to enhance the Society's capacity for economic research, to improve and expand our highly successful field program of grassroots citizen education and involvement, and to develop the ablest and most experienced staff of conservation experts in the nation. We will be reaching out to bring new people into the conservation community and to expand the Society's membership base — our mainstay of the past and the key to solid growth in the future

We need your friendship, your ideas and your support. Working together I think we can and will realize many dreams.

William A. Turnage Executive Director

The Issues: Achievements and Priorities

Alaska The Great Land. America's last wilderness frontier. Our last great first chance. These are the rallying calls for the conservation community and for citizens in all parts of the country who have placed preservation of Alaska's magnificent wildlands at the forefront of the nation's environmental

consciousness. It is the last opportunity to protect whole ecosystems and to safeguard the lifestyles of Native peoples who still live close to the land. This has truly become the most important conservation initiative of our generation. It is The Wilderness Society's number one priority.

In 1978 conservationists won several major victories in the long battle to protect this wilderness frontier. The House of Representatives, responding to an outpouring of citizen concern, overwhelmingly passed a strong Alaska lands bill. Unfortunately, the opportunity to enact legislation last year was lost when the Senate failed to clear the measure in the waning hours of the 95th Congress.



Caribou

President Carter then made a bold and historic decision on December 1 when he established 56 million acres of national monuments in Alaska to protect key national park, wildlife refuge and forest wilderness proposals. Revised Alaska lands legislation was introduced early in the 96th Congress to supplement the President's action and extend protection to other key lands that remain vulnerable. More than 100 million acres are under consideration—some of America's most spectacular terrain and greatest natural ecosystems. These last stages of the battle to win permanent and comprehensive protection for Alaska's wildlands promise to be the most difficult and hard-

fought, but The Wilderness Society is determined to see it through to a successful conclusion—to win passage of the "land and wildlife conservation measure of the century."

The Wilderness Society helped found and is a leading organization of the Alaska Coalition, the largest and most sophisticated en-

vironmental coalition in history and one that will serve as a model for other conservation initiatives. The Coalition has built a diverse alliance of conservation, civic and labor organizations and is working closely with the Alaskan Native community and a nationwide grassroots network of local and citizen environmental activists. Charles M. Clusen, the Society's Conservation Director, serves as the Coalition's Chairman. TWS Alaska Coordinator Peter Scholes is directing the Coalition's lobbying effort on Capitol Hill and Rita Molyneaux is running the media campaign. Other TWS staff in Washington and in the field are working closely with the Coalition on citizen organizing, preparation of alerts and newsletters and other educational programs.

National Gaining permanent protection for national Forest wildlands closely follows Alaska on the Society's priority Wilderness list. 1978 was the year of RARE II—the

Forest Service's second Roadless Area Review and Evaluation program which inventoried over 2,000 roadless areas totalling 62 million acres, our last unprotected forest wildland. It is the first serious Forest Service review that looked beyond western lands to encompass the wilderness resource in the East and in the national grasslands.

The Society's regional representatives worked closely with citizen conservationist to evaluate and develop recommendations for specific roadless areas. During the summer of 1978 more than 360,000 individuals responded to the agency's request for public input on the RARE II draft environmental impact statement (EIS), the largest such response in history.

Nevertheless, in the final EIS released in January 1979, the Forest Service recommended only 15.1 million acres for wilderness (9.5 million acres in the lower 48 states and 4.6 in Alaska) while allocating 37 million acres to the non-wilderness category and only 11 million acres to further planning. Conservationists are bringing their case to Capitol Hill in 1979 to try to right this imbalance and win wilderness designation for much more forest land.

AND THE PROPERTY OF THE PROPER

Grand Wash Cliffs, Arizona

BLM The Wilderness Society led the successful effort to include a provision in the Wildlands Federal Land Policy and Management Act of 1976 mandating a wilderness review of the public lands managed by the Bureau of Land Management, an agency that was not included in the provisions of the Wilderness Act. As BLM is the nation's largest federal land manager, overseeing more than 400 million acres, the potential for expanding the Wilderness System through designation of key BLM land presents a challenge that will engage the Society for many years

The Wilderness Society played a major role in influencing BLM's wilderness inventory procedures which were issued in September 1978. If applied consistently, these procedures should lead to a satisfactory inventory of the wilderness values of the public lands. However, the Society is very disappointed in the draft interim management policy for lands under study. Unless major changes are made in this policy, it could allow certain activities or developments on these study lands that could compromise their wilderness quality, a direct violation of the intent of the wilderness review provision of FLPMA. The Wilderness Society will continue to play an active role in this program and ranks protection of the BLM wildlands as one of its four major conservation priorities.

Legislative Milestones

1978 was a milestone year for wilderness preservation. Over 4.5 million acres of national park and national forest wildlands gained protection, by far the largest expansion of the Wilderness System since passage of the 1964 Act. The year saw the culmination of a number of long and intense legislative campaigns.

National Park System

Wilderness acreage in the National Park System nearly tripled with passage of the National Parks and Recreation Act of 1978, a monumental piece of legislation which designated 1,854,242 acres in eight park system units. Everglades National Park at 1.3 million acres now stands as the largest unit in the Wilderness System.

In addition, the act protects eight new wild and scenic rivers running 620 miles and authorizes 17 others for study and possible future protection. It triples the extent of the National Trails System, creates 21 new National Park System units, authorizes additions for facility improvement for scores of others, and allocates substantial funds for local and urban park rehabilitation.

Our national parks are a cornerstone of America's natural heritage, and The Wilderness Society is placing

increasing emphasis on protecting the wilderness resource in such parks as Yosemite, the Great Smoky Mountains and Cumberland Island National Seashore in Georgia. The proposal to establish a Tallgrass Prairie National Park will also receive priority attention

Boundary Waters

One of the significant achievements of 1978 was the resolution of the long struggle to better protect Minnesota's Boundary Waters Canoe Area, a million-acre unit of the Wilderness System. New legislation permanently bans logging, severely restricts mining and phases out motorboats for most of the waters of this unique lakeland wilderness and canoer's paradise.

Other Victories

Another milestone of the 95th Congress was passage of the Endangered American Wilderness Act which protected 1,303,207 acres in 17 threatened national forest roadless areas in 10 western states. Under this measure Utah gained its first addition to the Wilderness System with spectacular Lone Peak.

Separate measures also protected 904,500 acres of the magnificent Absaroka-Beartooth and established a 285,700-acre Great Bear Wilderness, both in Montana and both critical habitat for the threatened grizzly bear and other wilderness-dependent species such as the timber wolf. Conservationists also finally won a tenyear fight to protect the beautiful 70,000-acre Indian Peaks Wilderness just south of Colorado's Rocky Mountain National Park.

The National Wilderness Preservation System

While the Wilderness System now totals nearly 20 million acres, this represents less than one percent of the nation's land area. Many millions of acres remain vulnerable and deserving of protection. The Society's mission in the years ahead is to bring such national forest, park, wildlife refuge and BLM lands into the Wilderness System, to seek alternative means of protecting other critical natural areas and to promote wiser management of all federal lands.

	Acreage
Added by 95th Congre	ss 4,534,520
Prior to 95th Congress	
Total Wilderness System	m 19,337,231
By Agency	Units Acreage
Forest Service	
National Park Service.	
Fish Wildlife Service	52 771,452

The Organization

Leadership As a national, nonprofit membership organization, The Wilderness Society is directed by a Governing Council of prominent citizen conservationists who represent a broad spectrum of experience and expertise. The Governing Council meets semiannually to assess the Society's goals and accomplishments and to establish its policies and priorities.

The most significant organizational action of 1978 was the appointment by the Governing Council of William A. Turnage as the Society's new Executive Director. A man of broad interests and ability, he had served for six years as the business manager and environmental associate to Ansel Adams, the noted photographer and conservationist. Adams and Turnage were together active on a number of environmental projects relating to the national parks and were also instrumental in the drive to establish the Big Sur Foundation to work for creation of a new national seashore to protect California's spectacular Big Sur

Earlier in his career Bill Turnage worked for the State Department as an economic program officer and as special assistant to the director of the U.S. aid program for Latin America. A graduate of Yale University, he also studied at Balliol College, Oxford, the Yale Law School and the Yale School of Forestry and Environmental Studies.

Since assuming the executive directorship on November 1, 1978, Bill Turnage has established his firm



leadership of the organization, initiating a sound development program, streamlining management and undertaking a review of major program areas. His most important staff appointment was made in February 1979 when he asked Charles M. Clusen, one of the most experienced and respected environmental leaders in the nation, to join The Wilderness Society as Conservation Director.

Chuck was with the Sierra Club for eight years, most recently as associate director of the Washington office. An acknowledged expert on public land preservation, he has played a leading role on a variety of conservation initiatives including national forest and national park wilderness legislation, wild and scenic rivers protection, wildlife refuge matters and federal land management issues.

Chuck is a founder and Chairman of the Alaska Coalition, a founder and officer of the American Rivers Conservation Council and an officer of the Urban Environmental Conference. He received a bachelor of science degree in conservation from the University of Michigan and did graduate work there in urban and regional planning.

The Wilderness Society thus entered 1979 with energetic new leadership that draws upon the roots of a strong historical tradition. We are ready to meet the challenges ahead and look to a period of growth and enhanced effectiveness in our wilderness and conservation work.

The Governing Council

Officers

Theodor R. Swem President Evergreen, Colorado Frances G. Beinecke Vice President* Washington, D. C.

Thurman H. Trosper Treasure Ronan, Montana

Richard W. Van Wagenen Secretary' Washington, D. C.

Council

Arnold W. Bolle Missoula, Montana David W. Griffith Boulder, Colorado Harold A. Jerry, Jr.* Albany, New York

John M. Kauffmann Washington, D. C. and Anchorage, Alaska

Richard M. Leonard San Francisco, California George Marshall

Los Angeles, California

James Marshall New York, New York Michael A. McIntosh Palm Beach, Florida

Margaret E. Murie Moose, Wyoming **Bernard Shanks** Logan, Utah

Charles H. Stoddard* Minong, Wisconsin

*Member of the Executive Committee

Honorary Council Members

Sigurd F. Olson Honorary President Ely, Minnesota

Ernest S. Griffith Honorary Treasurer Washington, D. C.

Paul F. Oehser Honorary Council Member McLean, Virginia

The Wilderness Society's programs are administered through the Society's national headquarters in Washington, D. C. A staff of 43 people includes 11 regional representatives.

The Society's Washington representatives, each a specialist in a particular area of federal land policy and management, serve as the liaison with Congress, government agencies and other national conservation organizations. They research and analyze technical data on public lands and resources, develop wilderness proposals, prepare issue alerts for our members, represent the Society on various environmental coalitions, and present invited testimony at administrative and congressional hearings.

The field program, with 11 regional representatives based across the nation, is a great strength of the organization. The "reps" are the Society's closest link to active members and concerned citizens as well as to the natural resources we are all striving to protect. The reps organize grassroots support for designating endangered areas, work closely with regional conservation organizations, conduct workshops and educational programs, review the land management plans and activities of the federal land agencies, and testify at administrative and congressional hearings both in the field and in Washington on issues specific to their states and regions. A field program coordinator in the national headquarters ensures close communications and cooperation on planning and strategy between the Washington representatives and the field staff.

Other Wilderness Society staff in Washington, D. C. handle the organization's administrative functions, coordinate fund raising programs, write and edit publications, fulfill membership requests, work with the press and media, and oversee membership development and record-keeping.



William A. Turnage Executive Director

Sarah Muyskens Director of Development James G. Deane Editor The Living Wilderness Marjorie Aspinall Perry Moyle Field Coordinator Rita Molyneaux Media Coordinator and

Special Assistant to the Executive Director Sandy Marvinney Education Coordinator and Editor, Wilderness Report

Membership Director Jody Bolz Assistant Editor, The Living Wilderness Valerie Wenner Executive Secretary

Lynn Kraynak

Michael Nadel

Historian

Support Staff Leona Ames Pam Bleen Cheryl Conway Michelle Curtin Barbara Dutchak Katherine Jacksor

Deborah Jefferson Marty Peale George Roque Micky Watson Margaret Williams



Charles M. Clusen Conservation Director

Washington Representatives Alaska Coordinator -Peter Scholes National Forest Specialists -Tim Mahoney, John Hooper National Park Specialist— Ron Tipton Bureau of Land Management Specialist – Debbie Sease Alaska Specialist Denise Schlener

Regional Representatives Alaska - Stan Senner California, Hawaii - Jim Eaton Idaho - Steve Payne Montana, North Dakota Bill Cunningham Southeast - Randy Snodgrass Southwest - Dave Foreman, Bob Langenkamp (consultant) Oregon, Washington-Joe Walicki Nevada - Roger Scholl Utah - Dick Carter Wyoming, South Dakota, Nebraska - Bart Koehler Colorado, Kansas - Vacant

Alaska Team Staff Vicki Dompka Dee Frankfourth Vicky Frankfourth

Educational Education has been **Programs**

a fundamental thrust of the Society's work since 1935. The

founders and early leaders recognized the vital need to communicate their wilderness philosophy to members and the public at large with the aim of building a strong base of support and encouraging active involvement in wilderness preservation work. This remains our goal today - one that grows in importance each year as the issues become increasingly complex and the battles more intense.

Our tools for education and communication are many-a magazine, newspaper, issue alerts, special publications, workshops, seminars, slide shows, films and special media projects. Plans are underway for a major expansion of our educational programs in 1979. We are preparing new publications and audio-visual materials aimed at a variety of audiences - our members and grassroots activists, decision-makers in the resource conservation field and the general public.

The Living Wilderness, the Society's quarterly magazine, has been carrying the message of wilderness preservation to members since the Society's founding. Now it also goes to thousands of schools and libraries, key federal government decision-makers, members of Congress and the media. Fine color photography and in-depth articles have made it one of the most attractive and influential of the nation's environment-oriented publications.

Wilderness Report, the Society's four-page tabloid newspaper published ten times a year, is our primary educational tool for keeping members and other readers up-to-date on wilderness issues of regional and local as well as national significance, the status of legislation on Capitol Hill, and agency management plans. Many articles carry "Action Lines" informing readers how they can express their views to decision-makers and become more actively involved in wilderness preservation efforts.

The Members From a seminal organization of of the Society 576 members in 1937 The

in 1937 The

Wilderness Society's membership has grown to more than 60,000, ranking it as one of the nation's oldest, largest and most influential citizen conservation organizations. The continuing, enthusiastic backing of our members is directly responsible for our many achievements and victories over the years. Gifts and contributions from members provided critical financial support for a broad range of Society programs.

Resources for the Future, a Washington-based research and educational organization, last year conducted a study of five national conservation organizations including The Wilderness Society. A lengthy questionnaire was sent to a representative membership sampling and an impressive 65 percent responded.

The Society's members live in every state of the Union and many foreign countries and they range in age from grade schoolers to octogenarians. TWS members voice their concern about the issues-63 percent of those surveyed wrote at least one letter to a public official last year. Our members not only help protect wilderness through their letters, dues and contributions, they love to use it too. Half are backpackers, 54 percent are birders and 43 percent enjoy day

The survey showed that nearly all our members believe the nation's environmental problems are serious and that they feel their gifts and active support are helping the Society to influence strong government action. It is gratifying to know that 96 percent of our members believe that if The Wilderness Society achieves its goals, their lives and their children's lives will benefit.



Bald Eagle

The Wilderness Society is truly an organization built upon the concern **Bottom** and generosity of its members and friends. In 1978 almost half of the Society's income was raised through membership dues.

Contributions above and beyond dues accounted for slightly over 28 percent of the income. Grants from foundations comprised nearly 16 percent of the fund raising total and were used primarily to support our Alaska education efforts and the regional representative program.

The Society's operating expenses in 1978 were \$1,554,300 - slightly less than those of 1977 due to the phasing out of the wilderness trip program. A decision was made by the Governing Council to incur a deficit because of the urgent need to expand our commitment to the Alaska campaign and the RARE II program by allocating increased manpower and financial

resources for these crucial conservation initiatives. The operating deficit amounted to \$166,179 (which excludes a provision for decline and market value of \$16,775 and a loss on disposal of assets of \$15,119).

Forty percent of the Society's 1978 budget was spent on its conservation programs with funds divided almost equally between Washington, D. C. activities and the field program. Another 20.5 percent was spent on education, publications and public information efforts. Expenditures for membership and development also totaled 20.5 percent while administrative expenses accounted for the remaining 19 percent of the Society's 1978 operating budget.

The proposed budget for 1979 reflects no increase over that of 1978 if inflation is considered. Major programs are underway to expand membership and increase development income to finance the many activities necessary to meet our commitment to wilderness preservation and other conservation priorities.

Donors of \$1000 or More

Mrs. Ernest L. Adams Anonymous The Arcadia Foundation Ms. Ceroma Ballsun Ms. Frances Beinecke Frederick W. Beinecke Fund Beneficia Foundation Mr. Roger Boone Mr. and Mrs. T. William Booth Mr. Willis D. Hadley, Jr. Mr. William P. Boswell Mrs. Anne Broome Mrs. F. Carroll Brown Dr. Nancy Bucher Reverend and Mrs. Frederick Buechner

Mrs. Marion T. Dimick Donaldson Trust Mr. Charles R. Evenson Mr. Robert B. Flint, Jr. Mr. and Mrs. Gunther Fonken Ms. Mary Jo S. Garre Gibbs Brothers Foundation Mr. Paul Gilbert Harder Foundation Mr. John A. Harris Mr. Augustin Hart Mr. and Mrs. William Heidenreich Mrs. Ernest Hemingway Mrs. Joy Hilliard

Mrs. Miriam Hamilton Keare Henry P. Kendall Foundation Dr. Donald Kindschi L.A.W. Fund Mr. George Marshall Mr. James Marshall The McIntosh Foundation Richard King Mellon Foundation The Needmor Fund Ms. Joan Woodhull Overton David and Lucile Packard Foundation Mrs. Julia A. Piper Quetico Superior Foundation Retlaw Corporation Rockefeller Family Fund Mr. Laurance Rockefeller

Mr. Stephen Rockefeller Mrs. Edith Sacco Mrs. Roger Scholle Mr. Farwell Smith Mr. John Stephens Mrs. Ellen Dayton Sturgis Sulzberger Foundation, Inc. Mrs. Iphigene Ochs Sulzberger Nelson Talbott Foundation Ms. Ruth Thompson Mrs. Nelle Tobias Mr. William A. Turnage Mrs. Elise Untermeyer Ms. Priscilla von Colditz Mr. and Mrs. F. H. West Mr. and Mrs. T.H. Wiancko

Society

Henry Bull Foundation

Gifts, contributions and foundation grants are a major source of income for The Wilderness Society. Gifts of cash, appreciated securities, contributions in response to our special issue appeals, and

Mr. Robert Lee Hudson

gifts in honor or in memory of those who love the wilderness are received throughout the year and are tax-deductible.

Members and friends can also expresss their con-

cern for wilderness preservation by remembering the Society in their wills. Bequests, along with memorial and honorary gifts, become part of a permanent fund that provides an important source of support for programs described in this report.

The Society's Director of Development, Sarah Muyskens, would be pleased to provide additional information to those who would like to make special gifts or contributions.

1978 Memorial and Honorary Gifts

Memorial and honorary gifts are acknowledged in the donor's name with an attractive card. The Wilderness Society would like to acknowledge the following individuals in whose names memorial and honorary gifts were received in 1978:

Memorial Gifts

Eli Aaron Louise M. Blackburn Mable C. Blakely Peggy Boren anthony Bosavage ean Briggs Harvey Broome Mildren Capron Eileen Carey Robert L. Casebeer John Harvey Casey Clarence and Terrylou Helen Stubbs Cunliffe Tom Daniel John Deatherag Robert Doudna ne W. Downing, Jr. Mid Edwards Elvis

Dr. Richard N. Empson, Jr. Benjamin Barrett Fairley Anna M. Gage Mrs. L. T. Gawlinska Saul Gold llse Greenwald's mother Grant O. Hagen Warner W. Hall Commander Harold S. Hamlin Dr. Bernard Handler Edward Hilliard, Jr. Dr. Richard Benta Home Miralotte Ickes Dr. Bourne Jerome Donald Jones Mrs. Claude E. Keener, Sr. Norman Lazarus Myra Love Lynn Luth garet McCormick Karl Mally Frances Maloney

Joseph A. Mandina Phillip Mandina Dr. Richard H. Manville Mildred M. Menard Carl Middlemus Boyd J. Miller, Jr. Meadie Exum Mongo James Morrell Mr. Wyla H. Padgett Marguerite Pflueger Evelyn A. Philbin W. Lamar Pierce William L. Plourde Herbert Richter Ruth Carter Rowland Congressman Leo J. Ryan Dr. John J. Sacco

Dr. Rudi Schnidle

Dr. Kenneth Sigford

Ronald C. Simjian

Peter Shick

Vinal Smith Star Lady James F. Stuesse Mildred Thomas Charles G. Thompson .. I racey E. M. Upjohn Franklin M. Watkins Doris Wheatley Randall G. Wood

Honorary Gifts

Bob and Dorothy Bartkowiak Candace Beach
Bob and Linda Bradford Dr. S. K. Brickler William and Lynda Brown Father Francis Burlton Representative Phillip R. Burton Marie E. and Henry I. Christ Corte Madera School Faculty John Denver Dennis and Mary Dufilho

Alan D. Fong Carroll J. and Verna Furre Jack and Betsy Griffin Mr. and Mrs. Allan Hackstaff Keith and Marie Harville Wally and Winnie Honeywell Pat and June Kennedy Jack and Val Klorer Eva Marshall's birthd Dr. and Mrs. S. F. McCool Michael Nadel Kevin and Doris O'Brien Wes and Ellen Phelps George and Mary Ann Schulz George and Lucie Senn Stephen Shamles Mr. and Mrs. Karl Shirbro Robert and Donna Stokes Elise Untermyer Andy and Charlotte Wiesne Raymond Zuziak's birthday

The Wilderness Society **Balance Sheet** For the Year Ended December 31, 1978

ASSETS	
Cash	\$171,952
Investments	436,309
Accrued Interest Receivable	4,378
Prepaid Expenses	13,237
Other Assets	10,544
Furniture and Equipment	25,393
	TOTAL \$661.813

LIABILITIES AND FUND BALANCES Liabilities Accounts Payable \$ 67,054 Accrued Payroll and Payroll Liabilities 49,637 **Total Liabilities** 116,691 Fund Balances Unrestricted (council designated) Life Memberships 304,991 Robert Marshall Endowment 249,749 Undesignated (deficit) (100, 421)Total Unrestricted 454,319 Restricted Publications and Information 8,373 Wilderness Trips 4,950 Wilderness Review 52,087

STATEMENT OF SUPPORT, REVENUE and EXPENSES For the Year Ended December 31, 1978 SUPPORT AND REVENUE

Invested in Furniture & Equipment

65,410

25,393

TOTAL \$661,813

Total Restricted

Publications & Public

Information

Administration

			% of Total
Member Dues	\$	656,162	48.4
Member Contributions		382,846	28.2
Grants		214,547	15.8
Bequests, Memorials &			
Honorary Gifts		26,679	2.0
Investment Income		55,398	4.1
Subscriptions to			
The Living Wilderness		34,403	2.5
Other		13,808	1.0
TOTAL	L \$	1,356,227	100.0%
EXPENS	ES		
			% of Total
Wilderness Review	\$	618,654	39.8
Membership & Development		318,918	20.5

Financial information has been compiled from our annual financial report which was audited by the firm of Deloitte Haskins & Sells. A copy of the complete annual report can be obtained from The Wilderness Society.

318,436

(298, 292)

TOTAL \$1,554,300 100.0%

20.5

19.2

A more detailed annual report illustrated with photographs by Ansel Adams is available on request.

BLM Proposes "First Cut" on Initial Wilderness Inventory



The Madison River forms big rapids as it surges through Bear Trap Canyon in southwestern Montana. BLM will do a wilderness study of the area.

Public ParticipationWhat You Can Do

The BLM in each state has established a 90-day comment period for public review of the initial inventory. It is crucial that conservationists express their views. Separate comments should be submitted for each state. Write the BLM state director and:

1 Support the areas recommended for the intensive inventory.

2 Request that all BLM roadless lands contiguous to Forest Service RARE II lands be included in the intensive inventory regardless of the RARE II recommendations for those forest lands. Congress, not the Forest Service, will make the ultimate decision on whether areas will be designated wilderness.

3 Urge the BLM to assess the initial inventory carefully to ensure that inappropriate criteria such as external sights, sounds and smells, low scenic quality, flat topography, seedings of non-native plants, or potential resource conflicts were not used as rationale for dropping areas from further consideration.

4 If you know of areas with wilderness characteristics that the bureau has failed to identify for the intensive inventory, recommend that they be added and explain why they qualify.

Areas Overlooked by BLM

For the following states conservationists have already identified some areas that the bureau has overlooked. This list is not complete and during the comment period other areas may be identified.

COLORADO State Office Bureau of Land Management 1600 Broadway, Room 700 Denver, CO 80202 Comment Deadline: July 3, 1

Overlooked Areas:

Badger Creek Bangs Canyon
Lookout Mt. Philadelphia Creek
Grassy Mt.

NEW MEXICO State Office Bureau of Land Management Federal Building Santa Fe, NM 87501

Comment Deadline: June 11, 1979 Overlooked Areas:

Florida Mts. Negro Canyon
East Potrillo Mts. La Olla
Pecta Pinta Embudo Box
Mescalero Sands
San Antonio Rattle Snake Canyon

UTAH State Office Bureau of Land Management 136 E. South Temple Salt Lake City, UT 84111 Comment Deadline: July 2, 1979

Overlooked Areas:

Dugway Mts. Thomas Mts. Simpson Mts. Johns Canyon Ruin Canyon Beaver Creek Canyon Coyote Wash Comb Ridge White & Cheesebox Canyons

Other States

Conservationists have not yet prepared specific recommendations for the following states. For information contact your local TWS regional representative (addresses on page 4).

ARIZONA State Office Bureau of Land Management 2400 Valley Bank Center Phoenix, AZ 85703 Comment Deadline: Aug. 1, 1979

CALIFORNIA State Office Bureau of Land Management 2800 Cottage Way, Room E2841 Sacramento, CA 95825 Comment Deadline: May 29, 1979

IDAHO State Office Bureau of Land Management P.O. Box 042 Boise, ID 83724 Comment Deadline: June 15, 1979

MONTANA State Office Bureau of Land Management P.O. Box 30157 Billings, MT 59107 Comment Deadline: June 30, 1979

NEVADA State Office Bureau of Land Management 300 Booth St., Room 3008 Reno, NV 85909

Comment Deadline: Aug. 1, 1979
OREGON State Office
Bureau of Land Management
729 N.E. Oregon St.
Portland, OR 97208
Comment Deadline: July 6, 1979

If you live in one of the public land states listed above, you can help by doing field checks on the BLM's recommendations. For information on how to do field checks on areas needing further investigation, consult your TWS regional representative. If you live in an area that does not currently have a representative, write the BLM Team, The Wilderness Society, 1901 Pennsylvania Ave., N.W., Washington, D. C. 20006.

By Debbie Sease TWS Washington Representative

The Bureau of Land Management has released the results of its initial wilderness inventory for all western states except Alaska and is recommending that 114 million acres be given no further consideration for wilderness protection. Another 60 million acres were recommended for an intensive inventory to determine if they qualify for wilderness study.

During the initial inventory the BLM intended to quickly identify those areas that clearly and obviously lack wilderness potential so they can be released from interim management restrictions. Conservationists agreed this was a desirable goal since it would be much easier to ensure adequate interim protection for lands with wilderness values if the nonqualifying lands were expeditiously evaluated and released.

Areas subject to doubt or controversy regarding their wilderness value were to be included in the intensive inventory for futher consideration. During the 90-day comment period on the recommendations for each state, the public can request additions or deletions to the intensive inventory.

Conservationists are generally pleased with the quality of the initial inventory and feel that in most instances the methods used and the public presentations show marked im-

provement over the bureau's earlier efforts at accelerated inventories. However there is concern that some districts are using inappropriate criteria such as external sights and sounds, flat topography, low scenic quality and seedings of exotic plant species as the rationale for dropping areas.

There are also questions regarding the Wyoming inventory which eliminated 93 percent of the BLM lands in the state from any further wilderness consideration. No summaries were published giving the rationale for dropping areas. Furthermore, the Wyoming maps show only those roadless areas that are being recommended for the intensive inventory and sell for \$13 a set, when the maps for all other states are free.

Conservationists in many states have already identified specific areas which have wilderness values but which the bureau failed to recommend for the intensive inventory. During the 90-day review period, inventory results will be carefully checked and recommendations made for areas that should be added to the inventory. While these areas would not mean a substantial increase in the total acreage recommended for further review, they are important for their wilderness quality. Public support will be needed if they are to be given the consideration they deserve.

Initial Inventory Summary

State	Acreage Recommended For Intensive Inventory	Percent of Public Land Inventoried		
Arizona	5,625,000	47%		
California	2,076,000*	45%		
Colorado	1,170,000	14%		
Idaho	3,703,000	31%		
Montana	2,700,000	33%		
New Mexico	1,900,000	14%		
Nevada	20,500,000	42%		
Oregon/Washington	6,814,000	49%		
Utah	6,359,699	32%		
Wyoming	1,218,544	7%		
TOTAL	TOTAL 52,066,243			

 $^{^{*}}$ This acreage is exclusive of the 5.5 million acres identified for wilderness study areas in the California Desert Conservation Area.

UNSOELD (from page 1)

College to help realize the dream of a new, experimental college where he was to teach courses in outdoor education, wilderness consciousness and philosophy.

Willi had degrees in physics and theology and a doctorate in philosophy and was truly a ''renaissance man philosopher, teacher, conservationist, mountaineer, humanist. An ardent wilderness advocate, he believed the challenge of climbing a peak, running a rapid or confronting the elements was the greatest possible spur to selfknowledge and growth. He delighted in his role as guide and teacher and helped instill a love of wilderness in scores of students and friends. The Society's council and staff will miss him deeply, but take heart in knowing that the manner of his death was in keeping with the fullness of his life.



o save a flower it may be necessary to rescue a planet. If we must all become politicians to do this, let us begin.

PROFILE

This month our special series on the work of the Society's regional representatives focuses on Bill Cunningham, who covers Montana and North Dakota.

One hot Sunday afternoon in August, six Wilderness Society staffers set out for a hike on a steep, boulder-strewn path, appropriately named Little Devil Stairs, which threaded a tortuous route up a rugged gorge in Shenandoah National Park. We thought it strange that one member of the group wore running shoes rather than hiking boots, but when he said "bye, meet you for lunch farther up" and bounded off over the boulders at a fast clip. . . .

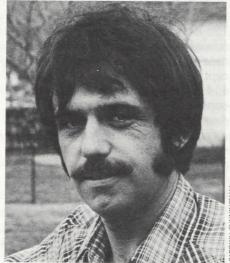
Bill Cunningham may be short in stature, but he will never be left trailing in the dust. Fortunately for the wilderness movement he applies the same dedication to his work that he does to his running (he's now in training for the Montana Governor's Cup Marathon). Bill has seen his efforts and those of other conservationists in the state pay off with a series of unparalleled legislative successes in the last Congress, including Wilderness System protection for the magnificent Absaroka-Beartooth area, the Great Bear Wilderness, Welcome Creek, and passage of the Montana Wilderness Study Act mandating review for nearly a million acres.

Bill credits these victories largely to the leadership and commitment of Montana's late Senator Lee Metcalf, whom Bill acknowledges as "one of the most important inspirations in my life." "Senator Metcalf was a real fighter who believed in open government accountable to the people. He was not afraid to take a stand based upon the intrinsic merits of an issue," Bill states.

Bill is a fifth generation Montanan whose forebears carved farmland out of the wilderness. He grew up with the traditional western utilitarian outlook on natural resource management, but was also raised to love the outdoors, spending summers on the family ranch in the Bitterroot Valley. Forestry seemed a logical profession and he earned bachelors and masters degrees at the University of Montana School of Forestry. Along the way Bill worked for a year with the Forest Service, laying out timber sales in some of the very roadless areas he is now trying to protect. "I was never really comfortable doing this," Bill admits, "but at the time I wasn't aware of the alternatives."

After graduate school Bill spent two years with the army in Germany and a year in Missouri doing wild and scenic river studies with, believe it or not, the Army Corps of Engineers. "The studies were completely ignored," Bill states. Then it was back to the University of Montana to teach natural resource law and forestry for a year before becoming a land use planning specialist with the state Department of Natural Resources.

By the mid 1970's Bill had become active in volunteer grassroots environmental work. The experience fed his growing concern over the difficulty of advocating his beliefs within a bureaucratic framework. In 1975 he reached a critical professional juncture when he decided to leave state government and



Bill Cunningham

become the staff director for the Environmental Information Center in Helena, a citizens lobbying group.

"I was 32 at the time, relatively old compared to most people entering the environmental field, but I realized I had to take a personal stand on the issues," Bill explains. He joined The Wilderness Society staff in March 1976, and after ten months in the field moved to Washington, D. C. in 1977 to serve for a year as the Society's wilderness affairs coordinator, an educational experience that has proved invaluable to his work back in the field.

Over the past year Bill has focused the major part of his time and energy on the RARE II issue and he is particularly concerned about protecting the Madison Range, the largest de facto wilderness remaining in Montana. The BLM wilderness review is another high priority. Bill also follows issues in North Dakota, a state that has only one designated wilderness and one grassland area proposed for wilderness in the RARE II recommendations.

He works very closely with the Montana Wilderness Association, a 20-year-old organization that has spear-headed preservation efforts in the state. Bill and other conservationists have lately been busy with public education projects, making TV and speaking appearances, and writing newspaper guest editorials to counteract the misinformation being spread in an all-out anti-wilderness campaign and media blitz generated by Montana timber, mining and development interests.

On his rare escapes from the pressures of the rep job Bill likes to indulge his "explorer's instincts" and get out into unblemished landscape. When he is not running up mountains he goes hiking with his eight-year-old twin sons and his wife, Carolyn. Other favorite activities are ski touring, backpacking, photography and hunting and fishing.

"I am working to save wilderness not just because I enjoy using it," Bill says, "but because wilderness is important in its own right for ecosystem stability. Preserving what little is left is far more important than extracting whatever resource commodities exist in these areas. I also believe that wilderness is a mark of our national identity. European countries have their architecture and their cathedrals, but the Wilderness System is unique to the United States. Someday we will look back upon this and measure our nation by our preservation achievements."

AMAX (from page 1)

According to an attorney for the mining company, the Forest Service has "agreed in principle" to the Clinton land trade even though the AMAX lands which would be exchanged have not been identified. Conservationists believe the swap is totally unnecessary since AMAX recently completed another land trade, acquiring approximately 1,000 acres which will be used as a tailings dump to replace the current dump site which is approaching full capacity.

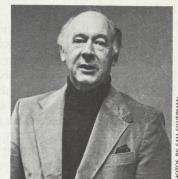
Although the company is required by law to reclaim closed dumps and reseed tailings dump areas, it has taken no steps to do so. It would be less expensive to remove the overburden in bulk and dump it elsewhere than to pulverize it for reclamation purposes. Conservationists are angry that a minor savings to a multi-billion dollar company might be made at the expense of Clinton Amphitheatre.

Thus far the proposed transaction has received virtually no public scrutiny. Colorado conservationists, with the Elk Mountain Mining Workshop taking the lead role, are demanding that an environmental impact statement (EIS) be performed

on the swap. Assistant Secretary of Agriculture M. Rupert Cutler has written Forest Service Chief John McGuire expressing concern over the lack of an EIS and questioning the rationale, in both ecological and economic terms, of exchanging a pristine alpine valley for remnants of land scattered throughout the state. An environmental assessment report is presently being compiled which will consider the Clinton situation. Conservationists hope this document will lead to a full EIS and public hearings.

Since 1967 AMAX has acquired over 14,000 acres of national forest lands in Colorado. The Clinton Amphitheatre exchange exemplifies an ongoing arrangement between the Forest Service and AMAX that may well have significance for other areas. Heated controversy has in fact already engulfed the tiny ski resort of Crested Butte where AMAX wants to develop an \$8 billion molybdenum deposit. If it is allowed to carry out its plans, the company will need to acquire thousands of acres of national forest lands to dispose of tailings. Much of the Forest Service land near Crested Butte is defacto wilderness and development/ preservation conflicts would be inevitable.









Scenes from the Alaska Colloquium

One hundred conservationists from 48 states, ranging in age from 17 to 83, converged on Washington, D. C. on March 10-11 for the 1979 Alaska Colloquium sponsored by the Alaska Coalition. Participants attended workshops and received briefings from Interior Secretary Cecil Andrus, Rep. Morris Udall, Sen. Paul Tsongas and other key leaders of the Alaska campaign. Top right, Secretary Andrus addresses the colloquium. Middle left, participants talk with Rep. John Seiberling, chairman of the House Subcommittee on Alaska Lands.

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Columbia Basin Salmon and Steelhead

Number 18

February 29, 1980

House Forges NW Energy Bill

The U.S. House of Representatives is engaged in the final, hectic throes of developing a companion bill to S. 885, The Pacific Northwest Power Planning and Conservation Act approved by the Senate last year.

At this writing (February 29) the action is focused in the House Subcommittee on Energy and Power (of the Interstate and Foreign Commerce Committee) chaired by Michigan Representative John Dingell. The subcommittee expects to mark up and report out a bill by mid March.

Energy Issues

Due to its sweeping scope, the regional energy legislation is fraught with controversial issues. Among the most notable are reapportionment of the electrical energy generated by the federal hydroelectric system and the proposal that the federal government guarantee to purchase electricity generated by private utilities.

The ultimate fate of the regional energy legislation will depend in large part upon the success of Congress in striking a politically acceptable balance on these two issues.

Meanwhile, Columbia Basin fishery interests are struggling to insure that the needs of salmon and steelhead and the people who depend upon them are protected in any regional energy legislation ultimately signed into law.

Fish Issues

Operation of the basin's hydroelectric system without sufficient concern for fishery impacts has drastically reduced what were once the world's largest, most valuable runs of chinook salmon and steelhead, some to the literal threshhold of extinction. The resulting social, economic and political impacts have been traumatic and widespread, extending from 1,000 miles into the interior of the basin all along the Pacific coast.

In recent years, techniques have been developed to minimize the loss of downstream migrant salmon and steelhead passing through the series of reservoirs and dams on the main-stem Columbia and lower Snake Rivers. Employment of these techniques and new technology currently evolving promise to revitalize the beleaguered upriver salmon and steelhead runs and the productive Indian and non-Indian fisheries and related economies they once supported.

For example, fishery analysts project a sixfold increase in prized upriver spring chinook over current depressed levels, a fourfold increase in summer chinook and summer steelhead, and a doubling in the number of fall chinook and sockeye. These increases are possible with minor changes in main-stem dam and reservoir operations and partial, long-belated compensation (replacement) for fish losses at federal, private and public utility district dams. (See upcoming Report.)

Because of the interrelationship between the production of hydropower and salmon and steelhead in the Columbia Basin, fishery interests consider the regional energy bill the ideal vehicle to insure the modest needs of fish and fishermen are accommodated in the operation of the federal energy system.

To that end, basin fishery agencies upon request of Congress have recommended:

• That salmon and steelhead protection and res-

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Director: Ed Chaney.

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toration be included as specific purposes of the act.

• That within one year of passage of the act, Columbia River Basin Indian and non-Indian fishery interests and federal agencies operating hydroelectric projects prepare and adopt a plan to provide suitable environmental conditions for anadromous fish. (I.e., sufficient quantity and quality of river flow to provide for successful downstream migration of juvenile salmon and steelhead and for the successful upstream migration of adult salmon and steelhead. And, provision of safe passage for downstream migrants at each project that will permit at least seventy percent of juvenile salmon and steelhead to safely pass the project other than through power production facilities).

• That private and public utility district hydroelectric projects in the basin be operated in a manner compatible with the plan developed to provide suitable environmental conditions for anadromous fish.

• That the power planning council to be established by the act annually request basin fishery interests to provide recommendations for preserving and restoring Columbia Basin anadromous fish runs.

• That the Bonneville Power Administration fund fishery research, coordination and development activities and acquire and dispose of power and use the energy resources of the regional energy system in a manner to preserve and restore anadromous fish resources.

House Action

Dingell has repeatedly vowed the modest needs of Columbia Basin anadromous fish would be accommodated in any regional energy bill reported out of his subcommittee. Draft legislative language reviewed by the *Report* in late February reflected that commitment. At this writing, however, it is not known what fishery protection language will survive subcommittee markup. Al Swift (Wash.), the only member of the northwest delegation on the subcommittee, has proposed fishery language of his own. Although predominately concerned with energy provisions of the Dingell language, energy interests are reportedly lobbying to dilute Dingell's fishery initiatives.

The House Subcommittee on Water and Power Resources (of the Committee on Interior and Insular Affairs) chaired by Abraham Kazen, Jr. is also working up a regional energy bill. A subcommittee spokesman told the *Report* they were basically marking time to see what is reported out of Dingell's subcommittee. Water and Power could build its own fishery protection language around proposals submitted by subcommittee member James Weaver (Oreg.), use Energy and Power's bill as the framework for a new bill, adopt fishery language developed by Don Bonker (Wash.) and/or Les AuCoin (Oreg.), or what have you.

Once the two subcommittees mark up their respective bills they will be scheduled for consideration by their parent committees. It is currently presumed both the Committee on Interior and Insular Affairs and the Committee on Interstate and Foreign Commerce will report out a regional energy bill. In that event the committee chairmen will go to the House Committee on Rules for a decision on how to reconcile the two bills or to send both to the floor of the House.

Once Rules rules, it is up to Speaker of the House Thomas P. O'Neill to schedule the bill(s) for floor consideration. After the House adopts its bill, a conference committee will be formed to reconcile differences between the House and Senate bills. These differences may be substantial, particularly in the area of fishery protection. Idaho Senator Frank Church inserted an important fishery protection amendment in the Senate bill [Ref. No. 16, p. 3]. The House bill is expected to expand and strengthen the mechanisms for attaining consideration of salmon and steelhead and fishermen in operation of the regional energy system.

Conferees are generally selected from the major committees with jurisdiction, and principally from the subcommittees that handled the bills. On the Senate side the bill came out of the Committee on Energy and Natural Resources chaired by Henry M. Jackson (Wash.). Dingell and Swift are almost certain to be among the conferees as is Church who serves on Jackson's committee.

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When the conferees are chosen, the politicking is apt to get fierce. Once the conferees strike a compromise they'll write a conference report and submit it to the Senate and then to the House for what are generally *pro forma* votes. And from there to the President for signing into law. Or veto.

Public Input

There is no assurance Congress will be able to pass a NW regional energy bill this session. There are powerful forces jockeying for advantage of access to the electrical energy produced by the federal system. Nonetheless, some analysts express confidence that the energy stakes are sufficiently high to provide incentive for an accommodation among competing interests.

Though not as controversial, the stakes are equally high for Indian and non-Indian sport and commercial fishermen in the Columbia Basin and ocean fishermen from Alaska to California.

By assuring protection for salmon and steelhead in the operation of the federal regional energy system, the now troubled runs and the productive fisheries they once supported can be dramatically revitalized. This would do much to salve the deep social, economic and political wounds inflicted among ocean and inland fishermen struggling over the remnants of the world's largest chinook salmon and steelhead runs, some unnecessarily reduced to near extinction by the operation of the federal hydroelectric system. (Among other things, Indian treaty fishing rights have been rendered virtually meaningless. Fifty percent of nothing is nothing.)

There are many key points for public input as the regional energy bill evolves to fruition. Presumably, Energy and Power will have reported out its bill by the time this is read. Then the action will shift to the Committee on Interstate and Foreign Commerce chaired by Harley O. Staggers (W. Va.). Simultaneously, Water and Power will begin working on its version for submission to Interior and Insular Affairs chaired by Morris K. Udall (Ariz.).

The bills reported out of Interior and Insular Affairs and Interstate and Foreign Commerce will go to Rules and then the floor of the House and finally to

House-Senate conference. Congressional analysts note that concerned citizens should make their views known at each step of the process, and concurrently, to their own congressional delegations and governors.

Threatened/Endangered Review Update

By mid March, fishery scientists hope to complete three basic studies which will in large part determine the course of the review of upper Columbia Basin salmon and steelhead runs for possible inclusion on the national list of threatened and endangered species [Ref. No. 17, p. 6].

The National Marine Fisheries Service, Northwest and Alaska Fisheries Center is engaged in determining if and how the runs under review fit the criteria of the endangered species act. Under contract to NMFS the University of Idaho Cooperative Fisheries Research Unit is analyzing the biological threshhold at which a given run of salmon or steelhead becomes threatened with or endangered by extinction, and the probable effects of artificial propagation on such runs.

NMFS hopes to present a synthesis of these pivotal studies at the mid March meeting of the Pacific Fishery Management Council.

To get on the mailing list for current information on the threatened/endangered review, contact:

Dale R. Evans, Chief
Environmental and Technical
Services Division
National Marine Fisheries Service
P.O. Box 4332
Portland, OR 97208
(503) 234-3361, Ext. 4301

Ben Franklin

On January 29 in Richland, Washington the Army Corps of Engineers held a public workshop in its continuing effort to develop a plan for the Hanford Reach of the main-stem Columbia River. This fifty-

Ben Franklin (continued)

mile stretch extending from Priest Rapids Dam downstream to the tailwaters of the reservoir behind McNary Dam is the sole free-flowing remnant of the Columbia in the U.S. above Bonneville Dam at river mile 146.1. [Ref. No. 17, P. 1]

Four alternative futures for the Hanford Reach were proposed for public discussion:

- A hydropower alternative consisting of one or more dams, potentially including the long-proposed Ben Franklin Dam.
- A navigation alternative including channel development in the Hanford Reach without a dam or navigation locks if one or more dams were built. In either event, locks would be required at Priest Rapids, Wanapum and Rock Island Dams to provide barge access to Wenatchee, Washington.
- A preservation/recreation alternative which would formally designate that the river be essentially preserved in its present state. This would include protection of riparian lands and instream flows.
- A no action alternative which would simply let future chips fall where they may.

Virtually every conceivable point of view on the future of the Hanford Reach was expressed during the workshop. But clearly, at this time and place the overwhelming majority of people present supported protecting the free-flowing river and associated resources and values. One speaker espousing this point of view received what was called "...a thunderous standing ovation..." from the standing room only crowd of an estimated 300-plus people.

Meanwhile

Under Fiscal Year 1980 funding, the Corps is continuing its studies on the environmental implications of constructing a Ben Franklin Dam in the Hanford Reach. A report and additional public meetings, workshops or other kinds of public involvement are anticipated late this year. A summary of comments made in and around the workshop period is being prepared for incorporation into a second edition of the workshop brochure for public distribution.

Current funding for studying the Hanford Reach expires at the end of FY '80. The President's budget proposals submitted to Congress in late January contain no funds for continuing studies beyond that point. However, Congress traditionally has evinced no reluctance to add funds for water projects opposed by the President. That's unlikely to happen in this case unless Washington Senator Warren Magnuson, chairman of the powerful Senate Appropriations Committee, withdraws his objection to further study of the hydroelectric potential of the Hanford Reach.

To get on the mailing list for current information on the Corps' investigations of the Hanford Reach of the Columbia River, contact:

David Sweger
Hydropower Section, Planning Branch
U.S. Army Corps of Engineers
Seattle District
P.O. Box C-3755
Seattle, WA 98124

BPA Fishery Initiatives

The production of hydroelectricity and salmon and steelhead are inseparably interrelated in the upper 90% of the Columbia River Basin. Northwest energy legislation now before Congress (see accompanying article) portends to insure that fish and related economies receive considerably more consideration in the operation of the region's hyropower system than in the past.

Among other things, the legislation will likely forge a formal, productive working relationship among basin fishery and water/power interests. The Bonneville Power Administration, which markets the power produced by federal dams operated by the Army Corps of Engineers and Water and Power Resources Service (formerly Bureau of Reclamation), seems destined to assume a new leadership role in

BPA Fishery Initiatives (continued)

seeking a better balance between energy and fish production.

Although BPA and basin fishery interests are still a very long way from agreement on what constitutes an optimum balance of fish and hydroelectricity, in very recent years BPA has demonstrated a heretofore unprecedented sensitivity to the needs of salmon and steelhead and the people throughout the basin and along the Pacific coast who depend upon them.

In 1976, confronted with the enormous social and economic impacts resulting from years of fish losses at main-stem Columbia and lower Snake River hydro projects, then Oregon Governor Bob Straub asked BPA to contribute \$5 million a year to help restore depressed salmon and steelhead runs. His request was supported by the governors of Oregon and Idaho.

Congress has long recognized that fishery protection was an integral part of constructing and operating multi-purpose federal dams in the Columbia Basin. And that project beneficiaries, e.g., consumers of electricity, should help bear the direct or indirect cost of providing such protection. This principle has been confirmed and reconfirmed in numerous court decisions, including one brought about in 1973 by the Confederated Tribes of the Umatilla Reservation. This decision essentially reaffirmed that power generating activities at federal dams are subject to constraints necessary to protect other resources, including salmon and steelhead.

BPA acknowledged the appropriateness of the governor's request and embarked upon a plan to fulfill its responsibilities. The first essential step was to insure the agency had the requisite legal authority. The U.S. Department of Interior's Regional Solicitor provided unambiguous assurance. "... The responsibility of the developers and operators of hydroelectric power facilities to take measures to protect fish in the rivers of the United States from the effects of the operation of such facilities is a longstanding policy of Congress...." And, "... meeting increased power needs without providing for such protection is no longer acceptable in the Columbia Basin."

In Fiscal Year 1978 BPA budgeted \$500,000 for fishery restoration programs. In FY '79 BPA's fish-

ery program encompassed eight studies recommended by Indian and non-Indian fishery agencies with a total price tag of approximately \$1.234 million. In FY '80 approximately \$1.498 million was provided for a total of nine fishery studies, including continuing funding for several programs initiated in previous years.

The current funding level is \$1.5 million per fiscal year. That amount could rise in response to inflation and need. These monies and the fishery programs they support are important in themselves. But they are perhaps most important as tangible evidence of an emerging, fundamentally new philosophy of Columbia Basin water management. One that if diligently pursued will insure the dramatic revitalization of what were once the world's largest, most valuable chinook salmon and steelhead runs:

"... The Columbia River is perhaps the most 'multiple use' river in the world. And none of these uses can be exclusive, or even assert a paramount claim. We must find a way to make it serve all the competing uses and the means to permit all uses to survive."

Sterling Munro
 Bonneville Power Administrator
 Before the Oregon Chapter,
 American Fisheries Society
 January 28, 1980



Single copies of the 700-page proceedings of The Mitigation Symposium — A National Workshop on Mitigating Losses of Fish and Wildlife Habitats held July 1979 in Fort Collins, Colorado are available from:

Publications Distribution
U.S. Forest Service
Rocky Mountain Forest and Range
Experiment Station
240 West Prospect St.
Fort Collins, CO 80526

Congress Urged to Add Columbia to Western Washington Enhancement Bill

In late December 1979, Senator Howard W. Cannon (Nev.), chairman of the Committee on Commerce, Science and Transportation introduced at the request of the Carter Administration a bill to deal with fisheries problems/opportunities in the wake of the controversial "Boldt decision" reaffirming Indian treaty fishing rights in western Washington.

- S. 2163 would authorize the appropriation of \$90 million for a variety of fishery-related activities:
- \$3 million for research, coordinated management or preparation of plans and programs described in the act (state matching funds required).
- \$28 million to be available over a ten-year period for salmon and steelhead enhancement projects (state matching funds required for non-Indian projects).
- \$19 million for operation and maintenance, to be available for seven years after completion of each enhancement project (state matching funds required for non-Indian projects).
- \$25 million over a ten-year period to reduce non-Indian fishing gear and effort in the charter sport and commercial salmon fisheries (state matching funds required).
- \$15 million revolving loan fund available for ten years to treaty Indian tribes for modernizing and developing fishing operations.

Enter Columbia River

As originally envisioned, S. 2163 would apply only to the so-called Boldt case area, i.e., "... all salmon and steelhead habitat within the State of Washington except for the Columbia River drainage basin, and in the fishery conservation zone adjacent to the State and subject to the jurisdiction of the United States."

At hearings held on the bill February 11 and 12 in Seattle, Columbia Basin fishery interests argued that the bill should be expanded to include the Columbia River drainage. They cited the fact that the decision rendered by U.S. District Court Judge Boldt in western Washington was subsequently applied virtually in toto to the Columbia River in a separate decision by U.S. District Court Judge Belloni.

In addition, very large numbers of Columbia River-produced salmon are caught off the coast of Washington and lesser but still significant numbers in Washington estuarine waters. Enhancement of coastal Washington salmon stocks could induce additional undesirable mixed-stock fishing pressure on some already troubled Columbia River runs. According to the Columbia River Fisheries Council testimony on February 11, "... the severe fishery management problems of the Columbia River could become even more critical."

Prognosis

A committee spokesman told the *Report* that work would begin on proposed amendments to S. 2163 the last week of February. Current plans are to report the bill out of committee sometime in March and get it scheduled for consideration on the floor of the Senate as soon as possible thereafter.

Senate Committee on Commerce, Science and Transportation

5202 Dirksen Senate Office Building Washington D.C. 20510 (202) 224-5115

Howard W. Cannon, Nev., Chairman Warren G. Magnuson, Wash. Russell B. Long, La. Ernest F. Hollings, S.C. Daniel K. Inouye, Hawaii Adlai E. Stevenson, Ill. Wendell H. Ford, Ky. Donald Riegle, Mich. J. James Exon, Nebr.
Howell Heflin, Ala.
Bob Packwood, Ore.
Barry Goldwater, Ariz.
Harrison Schmitt, N.M.
John C. Danforth, Mo.
Nancy L. Kassebaum, Kans.
Larry Pressler, S. Dak.
John Warner, Va.

At this point it is very unclear whether or not and if so, to what extent the Columbia River will be included in the bill. One possible stumbling block repeatedly mentioned by committee aides and others is the lack of a formal comprehensive plan within which to meld any Columbia River enhancement programs funded under S. 2163.

This deficiency will be corrected during 1980 as the result of a comprehensive planning effort currently underway by the Columbia River Fisheries Council (see upcoming *Report*). The plan is sufficiently far

Enhancement Bill (continued)

along to identify and prioritize needed enhancement efforts within the basin, and the plan will be completed long before any money could be appropriated. It remains to be seen if this will be enough to qualify the Columbia for inclusion in S. 2163.

President Budgets \$25.2 Million for Lower Snake Compensation in FY '81

President Carter's Fiscal Year 1981 budget request submitted to Congress in late January contains \$25.2 million for continued implementation of the Lower Snake River Compensation Plan. This plan is designed to partially compensate for fish and wildlife losses associated with construction and operation of four Army Corps of Engineers' hydroelectric and water transportation dams on the lower Snake River in Washington State.

Salmon and steelhead funds requested include:

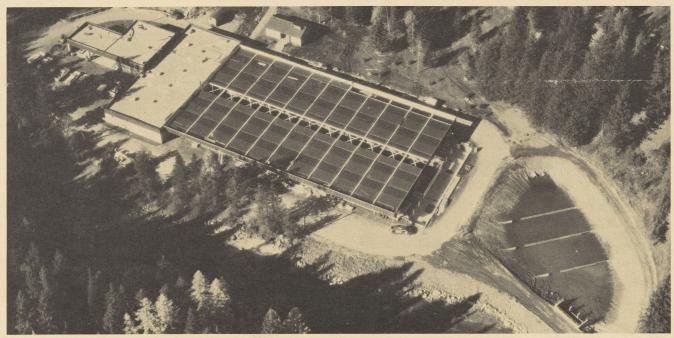
- \$5.725 million to complete design and begin construction of a steelhead hatchery near Hagerman, Idaho targeted for completion by the end of FY '82.
- \$3.162 million for continuing construction of a spring chinook hatchery on Oregon's Lookingglass Creek near Elgin. Construction is scheduled to begin

in the fourth quarter of FY '80 and be completed in mid FY '82.

- \$2.142 million to complete (by the end of the first quarter of FY '81) the water supply distribution system for hatchery facilities on the Palouse River near Lyon's Ferry, Washington; \$5.209 million to begin constructing phase one of the hatchery facilities and begin design of the second phase. Phase one construction is scheduled for completion by the end of FY '82.
- \$1.73 million to complete design and begin construction of a steelhead hatchery in the Twin Falls, Idaho area scheduled for completion in FY '83.
- \$120,000 to continue pilot salmon and steelhead rearing programs.

To get on the mailing list for the Corps of Engineers' Lower Snake River Fish and Wildlife Compensation and Status Report, contact:

Vic Armecost Army Corps of Engineers Walla Walla District City-County Airport, Bldg. 602 Walla Walla, WA 99362 (509) 525-5500, ext. 350



The summer chinook hatchery at McCall, Idaho is the first hatchery completed under the lower Snake River compensation program. First juvenile releases will be made this spring into Idaho's South Fork Salmon River. Army Corps of Engineers



Columbia Basin Salmon and Steelhead Report

Number 19 April 15, 1980

This *Report* presents a summary roundup of the 1979 status of Columbia Basin salmon and steelhead runs. It is based upon information from the Oregon Department of Fish and Wildlife and the Washington Department of Fisheries.

The data presented are not all encompassing, but focus upon primary indicators of run strength. From among the deadly recitation of comparative run sizes, commercial catches and dam counts emerges the now-familiar specter of generally continuing deterioration of the salmon and steelhead runs produced in the upper 90% of the Columbia River Basin above Bonneville Dam.

Upriver spring and summer chinook runs — once the largest, most valuable salmon runs for in-river fisheries — reached record low numbers in 1979.

All salmon and steelhead runs originating in the basin above the confluence of the Columbia and Snake Rivers are undergoing review for possible inclusion on the national list of threatened and endangered species.

The numbers that follow present a rather grim outlook for the upriver runs in apparent fulfillment of the cassandras' vintage prophecies that the upriver runs and the people who depend upon them have been and are living on borrowed time.

But times and things have changed. In most circles it is no longer considered argumentative to state flatly that the manner in which the basin's hydroelectric system is operated is responsible for the current status of the upriver runs and the resulting regionwide social and economic trauma. Most importantly, there is growing public awareness of that fact, and that the cassandras were wrong. That the eventual demise of the upriver runs is not inevitable. That the people of the Columbia River Basin can have their salmon and hydroelectricity too. That there really is a better way if they are willing to settle for more of both.

This public perception of the problem, potential solutions and benefits is a fundamental prerequisite to rehabilitating the upriver runs and the productive fisheries they once supported. The current precarious condition of the upriver runs is predominately due to the fact that they have had little effective political support from those with an economic and/or philosophical vested interest in salmon and steelhead.

Until recent times, fishermen have been for the most part preoccupied with clawing each other's eyes out in the struggle to catch the last fish destined for the upper Columbia Basin. Environmentalists have had other priorities on their agendas.

It took the specter of extinction to do it, but the upriver runs have attracted an ever-growing cadre of advocates in the political arena where salmon and steelhead runs and fisheries are made or broken. These advocates' success thus far in inserting strong salmon and steelhead protection in the regional energy bill pending in Congress — over extraordinarily powerful polit-

Produced by the nonprofit



Northwest Resource Information Center, Inc., P.O. Box 427, Eagle, Idaho 83616. Telephone (208) 939-0714.

Director: Ed Chanev.

Funded by but does not necessarily reflect the views of the Pacific Northwest Regional Commission, an independent commission established to stimulate economic development in Idaho, Oregon and Washington. Commission members include the governors of Idaho, Oregon and Washington and a federal co-chairman representing the federal government.

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(Continued from Page 1

ical opposition — bode well for the future of the upriver runs.

The upriver runs will not be revitalized quickly or easily. But given the requisite public and political support, they can be returned to very productive levels. The following 1979 status report presents a brief overview of where the runs are; following is a brief description of a comprehensive planning effort in progress which is designed to develop long-term goals and strategies for getting there from here.

1979 Status Report

Winter Steelhead

Winter steelhead enter the Columbia River from November into April, destined almost exclusively for tributaries below Bonneville Dam. Because winter steelhead spawn in virtually every lower river tributary, there is no good indicator of total run size. Annual sport catches, hatchery returns and tributary dam counts provide some perspective on comparative abundance.

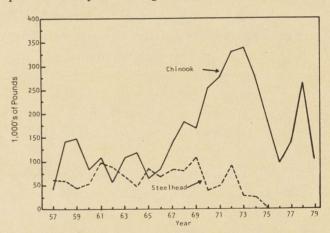
All the data have not been analyzed, but the 1978-79 winter steelhead run appears to have been considerably below average size. Since 1953, the main-stem Columbia River and lower river tributary sport catch has averaged approximately 57,000 fish.

The eight-inch minimum mesh gill nets employed during the lower river winter spring chinook season and the 1975 prohibition against the sale of steelhead have reduced the number of winter steelhead handled in each winter season to less than 500 fish.

Lower River Spring Chinook

Spring chinook destined for lower Columbia River tributaries — predominately the Willamette, Cowlitz, Lewis and Kalama Rivers — enter the Columbia

from late February through early May. The 1979 run contained an estimated 71,800 fish, compared to the previous ten-year average of 98,300.



Main-stem Columbia River commercial catch of lower river spring chinook and winter steelhead, 1957-79. ODF&W-WDF

Lower river spring chinook, predominately fish destined for the Willamette and Cowlitz Rivers are caught in the winter commercial gill net fishery. The 1979 catch was an estimated 5,000 fish (102,000 pounds) compared to the 11,000-fish (224,400-pound) 1970-78 average.

Runs of Spring Chinook to the Cowlitz, Kalama, and Lewis Rivers, 1973-791

	Cov	Cowlitz		Kalama		Lewis	
Year	Adults	Jacks	Adults	Jacks	Adults	Jacks	
1973	7,400	7,000	200	70	80	50	
1974	19.700	8,200	500	40	110	40	
1975	20,200	24,500	3,600	110	400	60	
1976	25,800	26,900	3,700	120	3,000	400	
1977	21,300	15,200	2,000	60	3,500	400	
1978	13,600	23,600	1.500	30	2,300	200	
1979	12,200	5,700	2,700	200	1,400	200	

¹Run estimates include hatchery returns, sport catch estimates, and natural spawning — totals less than 200 are rounded to the nearest 10.

WILLAMETTE RIVER SPRING CHINOOK DATA 1970-791

Year	Winter Season Catch of Willamette Fish	Number + Entering Willamette	= Minmum Run ²	% Caught During Winter Season	Lower Willamette Sport Catch	% Of Minimum Run in Sport Catch	Willamette Falls Count ³
1970-74	10,100	58,900	69,000	15	18,400	27	38,300
1975	6,400	32,600	38,900	16	12,500	32	19,100
1976	2,500	40,700	43,200	6	16,400	38	22,200
1977	4,800	58,000	62,800	8	15,000 ⁴	24	40,000 ⁴
1978	9,500	71,400	80,900	12	20,800	26	47,500
1979	3,500	44,600	48,100	7	14,100	29	26,600

¹Oregon Department of Fish and Wildlife, Washington Department of Fisheries.

²Does not include Willamette fish caught in lower Columbia River sport fishery or May gill net fishery.

³30,000-35,000 fish generally considered adequate for upper Willamette spawning and sportfishing.

⁴Total of these figures does not equal number of fish entering Willamette because it does not include Clackamas River escapement.

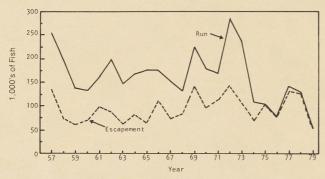
Based upon the recovery of hatchery-marked fish in past years, the Willamette is estimated to contribute at least 70% of the fish caught in the winter season. Most of the remainder are from the Cowlitz, Lewis and Kalama Rivers.

There is some overlap of lower river spring chinook and those destined for tributaries above Bonneville Dam. Few upriver spring chinook (about 5% of the winter season catch) are caught in the lower river commercial fishery because they don't enter the Columbia in significant numbers until mid March and peak in the lower river in mid April, long after the winter season closes.

Upriver Spring Chinook

Upriver spring chinook enter the Columbia River late March through May, destined for tributary spawning areas above Bonneville Dam.

The 1979 upriver run contained an estimated 51,400 fish, the smallest run on record. The previous record low of 78,300 was set in 1976.

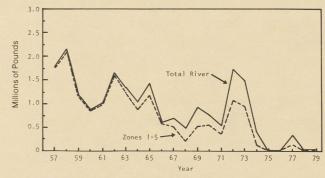


Estimated numbers of upriver spring chinook entering the Columbia River and escapement above Bonneville Dam, 1957-79. *ODF&W-WDF*

The upriver run averaged 184,000 fish 1957-73; the peak number during that period was 279,400 in 1972 with several years' runs containing above or near 200,000 fish.

Since 1973, the upriver spring chinook run, including the 1979 record low, averaged 102,500 fish, reflecting the impact of main-stem hydroelectric dams on downstream migrant juvenile salmon produced in upper river tributaries.

Spring chinook produced in the upper Columbia River Basin once supported major sport and commercial fisheries throughout their range in the basin and made substantial contributions to ocean catches from Alaska to California. In-river sport and commercial fisheries have been steadily curtailed, and in several recent years, eliminated.



Main-stem Columbia River commercial catch of upriver spring chinook, 1957-79. ODF&W-WDF

For example, in 1957-74 Indian and non-Indian commercial fishermen caught an average of about 72,000 upriver spring chinook (162,000 pounds) in the main-stem Columbia River. In four out of the

past five years the catch has been virtually zero — a few upriver springs were caught during the winter season. In recent years this catch has primarily been in the Indian fishery above Bonneville Dam. Indian fishermen caught an estimated 2,300 fish (47,000 pounds) in 1978, and caught approximately 400 upriver spring chinook (8,200 pounds) in a token, controversial fishery on the record low 1979 run. No sport fishing was allowed on the 1979 run anywhere in the basin.

Only 9,200 spring chinook were counted over Ice Harbor Dam into the Snake River drainage. This is by far the lowest count on record; only 7,600 passed over the uppermost of the lower Snake River dams to seed the vast natural spawning areas of the Snake River drainage. Only 7,800 fish passed over Priest Rapids Dam enroute to upper Columbia River tributaries.

Summer Chinook

Summer chinook enter the Columbia River from late May through July destined for spawning areas in the Salmon River drainage in Idaho and upper Columbia River tributaries in central and northern Washington.

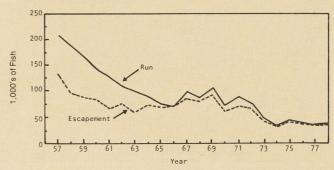
The 1979 run contained an estimated 34,200 fish, narrowly missing the record low run of 34,000 fish in 1974.

As late as 1957, the summer chinook run into the Columbia contained more than 200,000 fish. It has exhibited a generally steady decline since that time, reflecting chronic mortalities of downstream migrant juveniles at main-stem hydroelectric projects. Another very significant factor was the severe but now reversing degradation of major spawning and rearing habitat in the Salmon River drainage resulting from sedimentation associated with logging activities.

The desired escapement goal of 80,000 to 90,000 summer chinook has been achieved only twice since 1960.

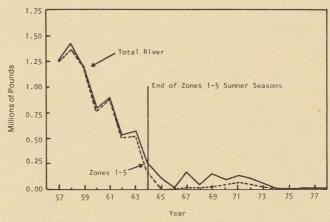
In 1979 an incredible, record low 2,600 summer chinook passed Ice Harbor Dam into the Snake River drainage. This was only about one-fourth of the already disastrous escapements the previous three years. Approximately 22,700 summer chinook were

counted over Priest Rapids Dam into the upper Columbia. This number exceeded the previous ten-year average, due in part to modest hatchery operations in that area.



Estimated numbers of upriver summer chinook entering the Columbia River and escapement above Bonneville Dam, 1957-78. *ODF&W-WDF*

Summer chinook once supported productive ocean and in-river sport and commercial fisheries. The main-stem Columbia River commercial catch averaged more than 1 million pounds annually 1938-56, and 900,000 pounds 1957-63. There has been no target in-river commercial fishery since 1963. In subsequent years, there were some incidental catches of summer chinook in fisheries targeted on other species. But for all practical purposes, all in-river summer chinook sport and commercial fisheries have been eliminated for some time in the past and the foreseeable future.



Main-stem Columbia River commercial catch of upriver summer chinook 1957-78. ODF&W-WDF

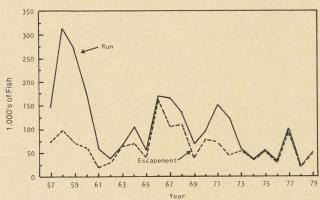
Sockeye

Sockeye salmon enter the Columbia River in June and July. The vast majority are destined for upper Columbia spawning areas in the Wenatchee and Okanogan River systems.

Historic run sizes have fluctuated dramatically. The record low 1945 run contained an estimated 11,000 fish. The historic high was 335,000 fish in 1947. The run averaged 105,500 fish in 1966-75.

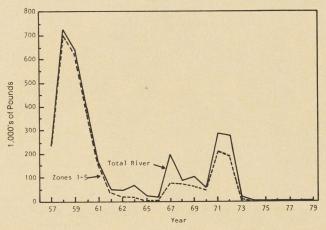
The 1979 sockeye run contained an estimated 52,600 fish, up dramatically from the 18,400 fish in 1978 which was the second smallest run in history.

Demonstrating their characteristic ability to pass main-stem dams with comparatively low mortality, 45,700 sockeye were counted over Priest Rapids Dam enroute to upper Columbia River tributary spawning areas. Only 30 sockeye were counted over Ice Harbor into the Snake, reflecting the near extinction of this segment of the run. Sockeye suffer from the loss of major spawning and rearing habitats, and like all other upriver salmon and steelhead, juvenile downstream migrant sockeye incur high mortalities at main-stem hydroelectric dams and reservoirs.



Estimated numbers of sockeye salmon entering the Columbia River and escapement above Bonneville Dam, 1957-79. ODF&W-WDF

Main-stem Columbia River Indian and non-Indian commercial fisheries caught 120,000 sockeye (394,000 pounds) from the 1960 run of 179,000 fish. Catches of approximately 286,000 pounds and 276,000 pounds were recorded in 1971 and 1972 respectively. No commercial fishing has been allowed since 1972 due to small run sizes; a few sockeye were caught incidentally in commercial shad fisheries. But for the past six years the catch has been virtually zero and the prospect for change in the foreseeable future is not good. The fate of the sockeye run, and all other upper Columbia Basin salmon and steelhead runs, is dependent upon altering the operation of main-stem hydroelectric projects to reduce mortalities of downstream migrants.



Main-stem Columbia River commercial catch of sockeye salmon, 1957-79. ODF&W-WDF

Summer Steelhead

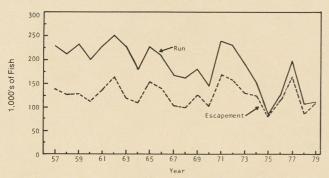
Summer steelhead enter the Columbia River from April through October, generally peaking in abundance in late June through early September. Several lower river tributaries have large hatchery runs, but the bulk of the run is produced in tributaries above Bonneville Dam.

The 1979 upriver summer steelhead run contained an estimated 114,000 fish — the Bonneville Dam count of approximately 112,400 plus about 1,800 summer steelhead caught in the main-stem Columbia River sport fishery below Bonneville.

In 1957-74 the upriver summer steelhead run averaged more than 200,000 fish annually, peaking at about 252,000 in 1962; as late as the early 1970's the run contained more than 220,000 fish.

The record low run of 84,100 fish occurred in 1975; the second smallest run on record — 105,000 fish — was in 1978.

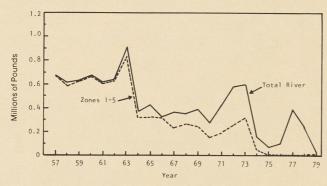
The commercial harvest of summer steelhead in main-stem gill net fisheries has been confined to Indian fisheries since 1975. In recent years Indian fishermen have agreed not to target fishing on summer steelhead, despite the fact that steelhead are perhaps the most valuable fish available in much of their fishing area, because most upriver salmon runs have been reduced below fishable numbers by juvenile mortalities at main-stem hydroelectric dams and reservoirs. Substantial numbers of summer steelhead are caught incidentally in Indian fisheries targeted



Estimated numbers of upriver summer steelhead entering the Columbia River and escapement above Bonneville Dam, 1957-79. ODF&W-WDF

on fall chinook which in recent years have been predominately of hatchery origin.

In 1979, Indian fishermen caught an estimated 3,100 steelhead (25,000 pounds) (predominately holdover summers) during the winter season which harvests upriver spring chinook in the Indian fishing area above Bonneville Dam. Another 6,100 summer steelhead (42,200 pounds) were taken in the Indian commercial gill net fishery targeted on fall chinook.



Main-stem Columbia River commercial catch of upriver summer steel-head, 1957-79. ODF&W-WDF

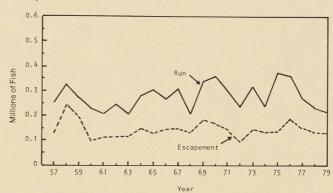
In recent years the bulk of the sport catch of summer steelhead has taken place in Columbia River tributaries. The 1968-77 catch basinwide averaged 84,900 fish, with roughly 75% being of upriver origin. Sportfishing on the upriver run has been sharply curtailed in very recent times, and in some years virtually eliminated.

The dramatic decline in the upriver summer steelhead run and the resultant impact on once-productive main-stem and tributary fisheries is the product of juvenile downstream migrant mortalities at mainstem Columbia and lower Snake River hydroelectric projects.

Upriver Fall Chinook

Upriver fall chinook enter the Columbia River in August with peak passage at Bonneville Dam in early September. The run is predominately composed of "upriver bright" falls which spawn naturally in the fifty-mile free flowing Hanford Reach of the mainstem Columbia below Priest Rapids Dam and hatchery "tules" from Bonneville pool tributaries.

The 1979 run contained an estimated 216,900 fish. Since 1957 the runs have ranged from 206,400 fish in 1961 to 372,000 in 1975. The 1968-77 average was 300,000 fish.



Estimated numbers of upriver fall chinook entering the Columbia River and escapement above Bonneville Dam, 1957-79. ODF&W-WDF

Major tule hatchery programs, predominately in the Bonneville pool area, have masked the precipitous decline in the number of far upriver bright fish. This decline is primarily the result of juvenile losses at main-stem dams and the virtual elimination of the tremendous number of Snake River-origin fall chinook by the four main-stem dams on the lower Snake River in Washington.

The majority of Columbia River fall chinook are caught in ocean fisheries. In 1979 an estimated 25,300 upriver fall chinook (578,000 pounds) were caught in the lower Columbia River non-Indian gill net commercial fishery. Another 65,400 upriver fall chinook (1.2 million pounds) were caught in the Indian setnet commercial fishery above Bonneville Dam.

In 1979, approximately 49,900 fall chinook were counted over McNary Dam enroute to upper Colum-

bia and Snake River spawning areas; the 1970-78 average was about 66,600. Fewer than 2,100 fall chinook passed over Ice Harbor Dam into the Snake, reflecting the virtual destruction of this once-productive run by main-stem dams.

Lower River Chinook

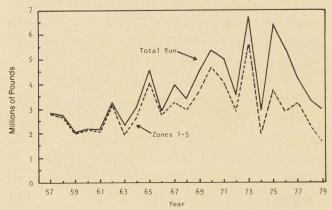
Lower river fall chinook enter the Columbia River from late August through October destined for tributaries and hatcheries below Bonneville Dam.

The number of fish in the lower river fall chinook run cannot be estimated due to extensive natural spawning in tributaries without counting facilities. The 1979 minimum run — a composite of commercial landings, hatchery returns and fishway counts — was approximately 123,300 fish.

The 1978 minimum run was estimated at 154,800, compared to 172,400 in 1977, 204,300 in 1976 and the 1966-75 average of 137,000.

In 1979 the lower Columbia River main-stem commercial fishery caught approximately 62,000 lower river fall chinook (1.1 million pounds). The 1970-78 average was 92,600 fish (roughly 1.6 million pounds). In-river sport fishermen catch comparatively few lower river fall chinook; very large numbers are caught in ocean sport fisheries.

The following graph displays the combined total main-stem Columbia River commercial catch of upper and lower river fall chinook.



Main-stem Columbia River commercial catch of upper and lower river fall chinook, 1957-79. ODF-WDF

Coho

The vast majority of coho salmon produced in the Columbia Basin are caught in ocean sport and com-

mercial fisheries. Coho enter the Columbia River from August through early November, virtually all destined for tributaries below Bonneville Dam.

As with lower river fall chinook, there is no way to accurately measure total run size. The run is largely supported by hatcheries; naturally spawning stocks have been seriously depressed by overfishing in the ocean and in-river.

The 1979 minimum in-river run size was estimated at 311,800 fish. The minimum 1970 run contained more than 1 million fish. The 1978 minimum run contained an estimated 373,300 compared to the 495,000-fish 1970-77 average.

Lower main-stem Columbia River commercial fishermen caught an estimated 123,000 coho (slightly more than 1 million pounds) in 1979. The 1970-78 average was 206,400 fish (more than 1.9 million pounds). In-river sport fishermen catch comparatively few coho; the 1978 catch was estimated at 4,300 of which 3,300 were jacks.



Main-stem Columbia River commercial catch of coho, 1957-79.

Chum

Chum salmon enter the Columbia River from mid October through November, predominately destined for lower river tributaries.

In the late 1920's lower river commercial fishermen took a record annual catch of an estimated 700,000 chum (8.4 million pounds). In 1942 they caught an estimated 425,000 (5.2 million pounds). The largest catch since 1957 was 7,400 fish (89,300 pounds). The catch in 1978 was an estimated 1,500 fish (20,300 pounds). Chum are rarely caught in sport fisheries.

The 1979 catch in the lower Columbia gill net fishery was virtually zero. Chum have few advocates

Comprehensive Plan for Production and Management of Columbia River Basin Anadromous Fish

The Columbia River Fisheries Council, composed of representatives of Columbia River Basin state, federal and Indian fishery agencies, will soon complete a draft long-term comprehensive plan for production and management of Columbia River salmon and steelhead.

The plan is being prepared by a core planning team under CRFC direction. State, federal and Indian fisheries specialists are providing technical support. A citizen advisory committee composed of representatives of all user groups is providing hands-on input throughout the planning process.

The long-term comprehensive plan is designed to serve five basic, interrelated purposes:

- Establish long-term salmon and steelhead production goals for the entire Columbia River Basin.
- Devise strategies for improved coordination among federal, state and Indian fishery interests.
- Improve the effectiveness of agencies charged with the responsibility for fishery resources.
- Facilitate constructive public involvement in salmon and steelhead and related resource decision making processes.
- Provide guidance and input to nonfishery interests whose planning and operational programs affect or portend to affect anadromous salmon and steelhead.

Outputs

The plan is expected to have four major interdependent components:

Long-term Production Goals — how many of what kinds of salmon and steelhead in what areas of the Columbia River Basin.

After analyzing several alternative production levels and alternative means of achieving them, the core team settled upon the approximate numbers and mix of fish present in the mid 1950's as the preliminary goal. With current ocean harvest rates on Columbia River fish, achieving this goal would more than double the total number of salmon and steelhead returning to the Columbia River in recent years.

An integral part of this plan component will be specific strategies for achieving whatever final production goal shakes out of the planning process. These strategies will deal with crucial flow/passage conditions at main-stem hydroelectric projects, mitigation for uncompensated loss of salmon and steel-head at private, public utility district and federal dams, rehabilitation of degraded salmon and steel-head habitat, and additional enhancement opportunities.

Coordinated Harvest Management/Production Goals — to achieve run-by-run production and management objectives and acceptable allocation of the allowable harvest.

Several alternative mixes of production, harvest management techniques and allocation formulae are being developed. Each alternative will be designed to conform to three overriding principles (in order of priority): 1) meet spawning escapement goals, 2) meet Indian treaty obligations, 3) provide productive non-Indian fisheries.

Harvest Management and Regulatory Authorities
— existing and alternative mechanisms will be examined for efficacy in achieving long-term production and harvest management goals.

Implementation Schedule — by five-year time frames 1980-2000 — for achieving interrelated goals for production, harvest management and management/regulatory authorities.

The long-term planning effort was funded by the Pacific Northwest Regional Commission² to chart a coordinated, regional course toward restoring valuable salmon and steelhead runs and the economies dependent upon them. The preliminary draft plan is expected to be ready for public review and comment in late June of this year.

¹Columbia River Inter-Tribal Fish Commission, Oregon Department of Fish and Wildlife, Washington Department of Fisheries, Washington Department of Game, Idaho Fish and Game Department, U.S. Fish and Wildlife Service, National Marine Fisheries Service.

²Governors of Oregon, Washington and Idaho and a co-chairman representing the federal government.



Columbia Basin Salmon and Steelhead

Number 20

April 30, 1980

NW Energy Bill

Fishery and Power Interests Propose Compromise Salmon and Steelhead Protection Language

[Ref. No. 18, p. 1]

On March 19 the House Committee on Interstate and Foreign Commerce passed out the Pacific Northwest Electric Power Planning and Conservation Act, its version of a companion bill to the regional energy bill (S. 885) passed earlier by the Senate.

This House bill is the product of the subcommittee on Energy and Power chaired by Congressman John Dingell of Michigan. It contains much more substantive fishery protection language than that inserted in the Senate Bill by Idaho Senator Frank Church; the Church language largely established intent, the Dingell language provides considerably more detail and safeguards for implementation.

The House Subcommittee on Water and Power chaired by Abraham Kazen, Jr. of Texas is also working on a regional energy bill. A subcommittee spokesman told the Report the last week in April that markup had not yet been scheduled, but that the subcommittee does expect to report out a bill this session to its parent Committee on Interior and Insular Affairs chaired by Arizona Congressman Morris K. Udall.

The House Committee on Rules will determine how to reconcile the two House bills or send both to the floor of the House for consideration. Once the House adopts its version of the regional energy bill, the House and Senate bills will be submitted to a House-Senate conference committee to reconcile the differences.

This is the final regular issue of the Report which has been funded by the Pacific Northwest Regional Commission as one part of a regional clearing house for public information on Columbia River Basin salmon and steelhead and related resource issues.

One additional issue will be produced prior to the end of July. It will be devoted exclusively to a summary of the comprehensive salmon and steelhead production and management plan being prepared by the Columbia River Fisheries Council.

"Fish" Controversy

Operation of the Columbia River Basin hydroelectric system is chiefly responsible for the current precarious condition of the salmon and steelhead runs produced in the upper 90% of the Columbia River Basin. Poorly designed and engineered juvenile downstream migrant bypass facilities at main-stem dams and the reluctance of project operators to provide compensatory flows and spill to reduce turbinerelated mortalities, predation and delay have reduced some of the largest, most valuable runs to the threshold of extinction.

The initial version of the northwest energy legislation failed to acknowledge the inseparable interrela-

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co-chairman representing the federal government.

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tionship between Columbia River Basin anadromous fish and energy production, an omission the Government Accounting Office, investigative arm of the Congress, called "ominous."

For more than a year, fishery interests have struggled to insure any northwest energy legislation enacted into law would contain fishery protection language which at least would not make it more difficult to get main-stem dam operators to comply with the intent of laws already on the books, and hopefully, make it easier.

These efforts met with stiff resistance from some energy interests. Much of that resistance has waned. Not because of any remarkable change in dogma, but in part because of the enormous and growing public support for fishery protection in the energy bill, and in part because the alternative would likely be litigation before the federal courts to achieve that protection under existing laws.

At this point in time, the Douglas and Chelan County Public Utility Districts, which operate mainstem dams on the upper Columbia River, are the principal opponents of fishery protection language in the bill—even though it would impose no obligation not already present under the Federal Power Act. These PUD's have traditionally resisted meeting the fishery obligations of their federal licenses. Some analysts suggest it would not be impossible to devise any fishery protection language to their liking.

Getting There from Here

The ultimate fate of the regional energy bill is still uncertain. Both the Senate and House versions con-

For an excellent analysis of how the fish and wildlife protection provisions of the Fish and Wildlife Coordination Act have been avoided in the Columbia River Basin, see Issue 6 of the Anadromous Fish Law Memo available from:

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Natural Resources Law Institute
Lewis and Clark Law School
10015 S.W. Terwilliger Boulevard
Portland, OR 97219
(503) 244-1181

tain some very controversial energy-related provisions.

Some hard-line energy interests have attempted — with some measure of success — to blame the fishery issue for the bills' difficulties to date. Some analysts suggest that this is merely camouflage for their real reasons for opposing the bill, and that this illusion will become increasingly difficult to maintain, particularly in light of recent compromise language proposed by the Ad Hoc Pacific Northwest Power/Fisheries Committee.

Despite the fact that the coordinated energy system operated in the past with little to no concern for the fish and the people who depend upon them, some energy interests illogically try to blame fish for projected near-term energy shortfalls. This makes about as much sense as blaming the buffalo for a lack of Indians, but it does accurately reflect the anti-fish mind-set in some quarters and clouds to some degree the energy producers' apparent failure to meet projected energy demands even when they were able to avoid meeting their fishery obligations.

Sponsored by the Columbia River Fisheries Council and Public Power Council, the committee¹ was formed to analyze the fishery protection language in the bill reported out of the Interstate and Foreign Commerce Committee and to attempt to devise compromise language acceptable to fishery and power interests.

The committee's charge was not to make substantive changes in fish and wildlife provisions of the bill, but to clarify and reconcile them with other provisions of the bill. The objective was to insure that fishery and power interests held a common understanding of the intent of the fish and wildlife provisions.

The fishery and power interests represented on the

¹Organizations represented include: Columbia River Fisheries Council, Public Power Council, State of Oregon, Washington Department of Fisheries, Oregon Department of Fish and Wildlife, National Marine Fisheries Service, Pacific Power and Light (representing investor-owned utilities), Chelan, Douglas and Grant County Public Utility Districts, direct service industries and Bonneville Power Administration. The Columbia River Inter-Tribal Fish Commission declined formal participation, but provided observers.

committee were not authorized to strike an agreement among themselves, but to draft a coordinated proposal that might serve as the basis for agreement among the entities they represent, as well as the various concerned publics.

In general, under the committee's proposed energy bill language, the regional electric power and conservation planning council to be established by the act would be required to adopt a program to protect, mitigate and enhance² fish and wildlife resources affected by the development and operation of Columbia River Basin power facilities.

This program would have four major elements:

- Measures to protect, mitigate and enhance fish and wildlife, including related spawning grounds and habitat, affected by the development and operation of hydroelectric projects;
- Objectives for the development and operation of such projects in a manner designed to protect, mitigate and enhance fish and wildlife;
- Funding for coordination of fish and wildlife management;
- Funding of fish and wildlife research and development designed to assist protection, mitigation and enhancement of anadromous fish at and between hydroelectric dams.

The program would be developed and adopted in the following manner:

- The council would be required to solicit from fish and wildlife agencies and appropriate Indian tribes their recommendations for measures to protect, mitigate and enhance fish and wildlife, i.e., recommendations for the elements of the program listed above.
- Utilities and other interested groups would be free to submit recommendations on protection, miti-

gation and enhancement, and to submit comments and information in response to the recommendations of the agencies and tribes.

- All recommendations are to be supported by detailed information and data.
- The council would be required to adopt as part of the program all recommendations which are not inconsistent with the purposes of the act, but the council would also be required to reconcile any such recommendations to the extent they are inconsistent with one another.
- If the council does not adopt any recommendation submitted by a fish and wildlife agency or Indian tribe, it would be required — as part of the program — to state its reasons in writing.
- The program would become part of the regional power and conservation plan when the latter plan is adopted, and new fish and wildlife recommendations would have to be solicited at the time of any major revision to that plan. As indicated above, however, the program would also have an independent existence and effect upon its adoption, even prior to the adoption of the power and conservation plan.
- The council's actions in adopting the program would be subject to judicial review.

No Quick Fix

If Congress is able to devise a regional energy bill acceptable to both houses and the President, rising public demand makes it almost certain that the bill will contain strong salmon and steelhead protection language. But this will not mean a quick or easy solution to the problems plaguing the upriver runs and the fisheries that depend upon them.

The current precarious condition of the upriver runs and the resultant traumatic social and economic impacts have occurred in spite of congressional intent and a host of federal laws to the contrary. Energy bill or no energy bill, the amount of fishery protection actually provided in the future will depend in very large part upon the amount of public demand for it.

And the Cow Jumped Over the Moon. "Power needs now take a back seat ... to fish protection."

— 1979 Annual Report, Bonneville Power Administration.

²The proposed definition of "protect, mitigate and enhance" is: "... maintaining, restoring, rebuilding, increasing naturally produced and artificially propagated stocks of fish and wildlife, improving the habitat of such stocks, and providing for improved survival of fish and wildlife through measures which (A) complement the existing and future activities of the Federal and the region's State fish and wildlife agencies and appropriate Indian tribes; (B) are based on and supported by the best available scientific knowledge; (C) achieve sound biological objectives at minimum economic cost; and, in the case of anadromous fish, (D) provide for improved survival of such fish at hydroelectric facilities located on the Columbia River system; and (E) provide flows of sufficient quality and quantity between such facilities to improve survival of such fish."

The ABC's of Columbia River Basin Anadromous Fish and the NW Energy Bill — A Primer

- a. Operation of the Columbia River Basin coordinated hydroelectric system without adequate consideration for anadromous fish and the people who depend upon them has reduced the largest, most valuable segments of the world's largest chinook salmon and steelhead runs to the threshold of extinction. The social and economic impacts have been traumatic and widespread throughout the Columbia Basin and along the Pacific coast from Alaska to California.
- **b.** The most valuable, productive salmon runs available to Native American Indian treaty fisheries have been unnecessarily reduced below fishable levels by operation of the coordinated hydro system; hard-won treaty fishing rights have been rendered virtually meaningless.
- **C.** In recent years there has developed a general public consensus that these impacts are politically unacceptable, and there is growing awareness that they are legally untenable. There is growing demand that the coordinated energy system be operated in a manner consistent with the multiple use purposes for which it was authorized and constructed.
- **d.** As currently written, the fisheries language in the House version of the regional energy bill (HR 6677) and compromise language proposed

ARRAGGH! In the last paragraph on page three, Issue No. 19 of the *Report*, the 1957-74 average main-stem Columbia River commercial catch of upriver spring chinook was reported as being 72,000 fish weighing 162,000 pounds. The number of fish is correct; the number of pounds should have read 1.1 million pounds.

- by the Ad Hoc Pacific Northwest Power/Fisheries Committee impose no obligations not *already* present in a variety of existing laws for federal projects and under the Federal Power Act for private and public utility district projects.
- changes in operation of the energy system to protect fish, many segments of the public sector advocate direct legal action. The specter of federal judicial intervention in Columbia Basin energy/fishery management is compounded by the potential application of the Endangered Species Act.
- **f.** The proposed northwest energy legislation provides an ideal vehicle and opportunity to develop a coordinated "multiple use act" for the Columbia River Basin. And, thereby, avoid the certain trauma of inflexible decrees resulting from adversary proceedings before the federal courts.
- **g.** The northwest energy bill could facilitate a truly coordinated approach to the operation of existing projects and the development of new projects in the future to the benefit of all uses of the river system. This mechanism to formalize the planning and operational linkages among all uses of the river system does not now exist, which is in large part the reason for current energy problems as well as fisheries problems.
- **h.** Providing the legally-required protection for salmon and steelhead will have no effects of consequence on projected near-term shortfalls in regional energy production. It is basically a question of facing these shortfalls with fish, or facing them without fish.
- **1.** Salmon and steelhead-dependent economies and lifestyles for decades subsidized the profligate use of Columbia River Basin hydroelectricity. Fishery interests argue that they should not now be required to pay for energy interests' purported inability to meet projected energy demands.

j. The regional energy savings possible via painless, profitable water and energy conservation could offset any hydroelectric production foregone to protect anadromous fish at main-stem hydro projects.

benefits can provide the pivotal economic justification for developing new storage capability which will benefit hydropower production, irrigation and other uses as well as fisheries. Indeed, in the long term, salmon and steelhead can replace in kind more water (with resultant hydro energy benefits) than they will require for safe passage at main-stem Snake and Columbia River hydro projects.

1. By assuring the long-term water needs of anadromous fish, the northwest energy bill could upon passage immediately protect the Northwest's valuable hydro energy base and effectively demonstrate once and for all there is no "surplus" water available for interbasin transfer to the Southwest.

Ben Franklin

The Seattle District, Army Corps of Engineers has released a second edition of the brochure on the Hanford Reach of the main-stem Columbia River. This edition includes public comments on five alternative futures for this last free-flowing remnant of the Columbia above Bonneville Dam at River Mile 146.1.

The brochure contains a brief description of each alternative management plan for the Hanford Reach, the probable effects of implementing each alternative, and a summary of public comments submitted since the first edition of the brochure was distributed in January 1980.

The Corps is using the brochure to solicit public comments on the future of the Hanford Reach. Copies are available from:

David Sweger
Seattle District, Army Corps
of Engineers
P.O. Box C-3755
Seattle, WA 98124

Yakima River Rehabilitation

The Yakima River system was once one of the most productive salmon and steelhead tributary drainages of the Columbia River. The salmon and steelhead runs were virtually eliminated by irrigation diversions and related activities.

In recent years, Columbia River Basin fishery interests proposed to restore the Yakima's salmon and steelhead runs by improving fish passage conditions at irrigation diversion dams and augmenting stream flows via enlargement of the existing Bumping Lake storage facility in cooperation with the Bureau of Reclamation (now Water and Power Resources Service).

The proposed Bumping Lake Enlargement was taken hostage in the Longworth House Office Building in Washington, D.C. by the Subcommittee on Water and Power Resources of the Committee on Interior and Insular Affairs. Meanwhile, back in the Northwest, rehabilitation plans for the Yakima languished.

After several unsuccessful diplomatic rescue attempts, in the summer of 1979 the Confederated Tribes of the Yakima Reservation decided to take action to begin rehabilitating the Yakima pending release of the hostage Bumping Lake Enlargement proposal. The tribe called for the formation of a Yakima River Rehabilitation Committee ultimately composed of representatives of the Washington State Departments of Game, Fisheries and Ecology, U.S. Department of Interior, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Water and Power Resources Service, Bureau of Indian Affairs and the Columbia River Inter-Tribal Fish Commission.

The committee decided to break rehabilitation of the Yakima into two phases and concentrate initially on Phase I — the improvement of fish passage conditions at main-stem Yakima water diversion facilities; Phase II would address instream flow augmentation.

In March of this year the committee submitted to Washington Congressman Mike McCormack a plan to improve fish ladders at several irrigation diversion dams — existing ladders are all more than a quar-

Yakima River (continued)

ter-century old — and to improve diversion screens to keep juvenile downstream migrant salmon and steel-head out of irrigation diversion ditches. The total cost in 1979 dollars is \$8.7 million.

The adult and juvenile fish passage improvements proposed in Phase I are an important first step toward restoring the Yakima's former productivity. New storage to supplement instream flows — such as proposed in the Bumping Lake Enlargement — is the essential next step proposed for Phase II.

The Report queried Bumping Lake Enlargement's captors the last week in April about the prospects for release of the hostage. The response was the same offered over the past year: no action is contemplated at this time.

Efforts Underway to Protect Juvenile Salmon and Steelhead at Main-stem Dams

The 1980 outmigration of juvenile salmon and steelhead from the Columbia River Basin is underway. Efforts are being made to protect a portion of the young downstream migrants at and between hydroelectric projects on the main-stem Columbia and lower Snake Rivers.

Because the main-stem dams lack adequate bypass facilities for juvenile downstream migrants, basin fishery agencies have recommended that 20% of the flow and a significant portion of the downstream migrant fish at each main-stem dam be spilled over the spillway¹ to avoid serious mortalities related to passage through turbines and predation above and below dams. In addition, tightly regulated river flows must be loosened sufficiently to pass the young fish through the series of reservoirs to the estuary.

This year, flows and 10% spill will be provided at public utility district dams on the upper Columbia under the terms of a five-year Federal Energy Regulatory Commission settlement agreement between the PUD's and basin fishery agencies. Additional studies mandated by the settlement agreement are designed to determine the extent of dam-related juvenile mortalities and to define measures necessary to protect downstream migrants.

The Army Corps of Engineers has agreed to provide flows in the main-stem Columbia below the confluence of the Snake and spill *up to* 10% at John day and McNary Dams. Last year at John Day Dam—the most notorious killer of downstream migrants—the *up to* turned out to be 1%-2%.

No spill will be provided at The Dalles Dam; biologists have found they can divert most downstream migrants from the turbines via the ice and trash sluiceway utilizing a comparatively infinitesimal amount of water. Until the new powerhouse at Bonneville Dam is operational, spill will occur automatically during the spring; the ice and trash sluiceway will be employed to bypass young fish here as well.

No spill will be provided at the two uppermost Corps dams on the lower Snake River. Biologists hope to collect and transport by truck and barge 60%-90% of all downstream migrants approaching the projects to a release site below Bonneville Dam. The Corps has agreed to provide *up to* 10% spill at the two downstream dams on the lower Snake if significant numbers of smolts are present.

Spilling is considered a short-term measure to protect downstream migrants at main-stem dams. It is required only because what bypass systems that do exist were so poorly engineered they are virtually, if not totally worthless. Some bypasses, at McNary Dam for example, have been modified to increase their effectiveness. New, effective bypass systems at main-stem dams could eliminate both the need for spilling and energy interests' annual lamentations over the kilowatts "wasted" to protect fish.

¹This would not constitute 20% of the entire flow of the Columbia River, for example, but 20% of the flow briefly at each dam sequentially as the young fish move downriver.

Lower Snake River Compensation Funds Survive Presidential Budget Cuts. President Carter's Fiscal Year 1981 budget submitted to Congress early this year contained \$25.2 million for continuing work on the lower Snake River compensation plan. The President subsequently recalled his budget for modifications to meet his new federal spending austerity plans. All \$25.2 million for lower Snake survived intact.

State of California The Resources Agency DEPARTMENT OF FISH AND GAME 1416 Ninth Street Sacramento, CA 95814 Committee on Threatened Trout Minutes of Meeting May 4-5, 1982 - Davis The eleventh annual meeting of the Committee on Threatened Trout convened at 1000 at the University of California at Davis aquaculture facility on May 4, 1982. Don Weidlein, Assoc. FB - Region 1 Members present: Dan Christenson, Assoc. FB - Region 4 Phil Pister, Assoc. FB - Region 5 Alternatives present: Eric Gerstung, Assoc. FB - HDQ Darrell Wong, FB - Region 5 Observers present: Randy Kelly, Assoc. FB - Region 4 Steve Robertson, USFS - Sonora Stan Stephens, FB - Region 4 Richard Hubbell, USFS - Reno Bill Loudermilk, FB - Region 5 Richard Standage, USFS - Porterville Larry Eng, Assoc. FB - HDQ Debby Stefan, USFS - San Francisco Richard Beland, FMS - Region 2 Graham Gall, UCD Jack Williams, USFWS - Sacramento Randy Smith, UCD Ed Lorentzen, USFWS - Sacramento Boyd Bentley, UCD Don Sada, USFWS - Reno Bob Pipkin, UCD Milton Kolipinski, NPS - San Francisco Karen Austin, Student - UCD Dick Irizarry, USFS - Redding Gary Combes, Student - Cal Poly, SLO Mary Bacon, USFS - Redding Phil Hartwick, Seasonal Aid - HDQ TROUT GENETIC STUDIES 1981 Activities UC Davis has completed electrophoretic analysis of all rainbow and golden trout

UC Davis has completed electrophoretic analysis of all rainbow and golden trout samples collected to date from streams within the drainages of the Upper Sacramento, Pit, McCloud, Klamath, and Kern rivers. According to Dr. Gall, biochemical-genetic data suggest that all of the various native populations identified are close enough to be considered as belonging to the same species, Salmo gairdnerii. Among these populations seven distinct groups can be recognized. The differences in biochemical-genetic profiles between the seven groups is at a level sufficient to warrant subspecies classification. 1

^{1/}Note: the taxonomy and systematics of western North American Salmo has been the subject of much discussion and study in recent years. Although biochemical-genetic data can identify and group populations on the basis of similarities and differences in various enzymes, the data should not necessarily be interpreted as representing actual phylogenetic or evolutionary relationships. Until Dr. Gall's findings are published and subject to review by taxonomists, the Department of Fish and Game will retain the taxonomic designations of Shapovalov, et al., "A List of the Freshwater and Anadromous Fishes of California", (Calif. Fish Game 67(1):4-38, 1981). However, the closely related groups of native Salmo identified by Dr. Gall's work will continue to be treated by the Department as pure populations of native Salmo for management or recovery purposes.

-2-

Group I

Coastal rainbow trout include the "typical" rainbow trout and their resident and anadromous forms which are characterized by high genetic variability including high levels of heterozygosity. Samples collected from the drainages of the Lower McCloud, Lower and Middle Pit, Upper Sacramento, and Klamath rivers fall into this subgroup. The subgroup also includes trout populations sampled in 1981 from Lost and Silver creeks within the Pit River system and Slate Creek tributary to the Upper Sacramento River.

Group II

Interior rainbow or "redband" trout include populations in the Upper Columbia drainage and the basins of south central Oregon and the Goose Lake region, including tributaries of the Upper Pit River. Trout collected in 1981 from Twelve Mile Creek, a tributary of the Warner Lake system in Oregon, fall into this subgroup.

Trout possessing characteristics of both coastal and interior type trout were collected from Halls Canyon and Ash creeks, tributaries to the middle reaches of the Pit River, and from the Middle Fork Sacramento River.

Group III

Upper McCloud trout, including all of the populations which we have been calling redband trout, found only in the McCloud River and tributaries above Upper Falls. These fish possess unique meristic as well as electrophoretic characteristics and may be the descendents of pre-ice age "rainbow-like" trout which became isolated in the Upper McCloud and Kern rivers. This group is sufficiently distinct from Group II trout to warrant its own common name.

Group IV

South Fork Kern golden trout differs from the Little Kern River and Golden Trout Creek groups. Pure stocks are currently limited to the South Fork Kern River and tributaries above Monache Meadows, except Mulkey Creek. Golden trout from Trout and Lower Fish creeks and other tributaries to the South Fork Kern River below Monache Meadows appear to be introgressed with introduced strains of rainbow trout.

Group V

Golden Trout Creek golden trout constitutes a single native population occupying Golden Trout Creek and its tributary, Volcano Creek. As a result of transplants this stock also occurs in Mulkey Creek, and in the Cottonwood Creek drainage of the Owens River drainage.

Some of the trout sampled in Golden Trout Creek near Tunnel Meadows appear to be introgressed with South Fork Kern golden trout, which apparently moved through the tunnel connecting the two streams around the turn of the century.2/

^{2/}It is difficult to imagine how the population in Mulkey Creek could be more closely related to Golden Trout stocks than to those in the South Fork Kern River, to which Mulkey Creek is a tributary. Even if Mulkey Creek historically was fishless, it is far more likely that it would have been stocked with fish from the South Fork Kern River than from Golden Trout Creek.

Group VI

Kern River rainbow trout have been identified as a native stock which occurs in the Kern River above Hell Hole Falls and in tributaries Rattlesnake, Soda, and Osa creeks.

Group VII

Little Kern golden trout are represented by populations in tributaries of the Little Kern River previously identified as pure stocks, and includes the transplanted population found in Coyote Creek, a tributary to the main Kern River.

Results of 1981 Sampling of Northern California Populations

Population	N	Drainage	Suggested classification
McCloud Falls	35	McCloud	Group I
Lost Creek	31	Pit	
Silver Creek	29	Pit	
Pit 4 (Pit River)	26	Pit	
Upper Sacramento	34	Sacramento	
Iron Gate Hatchery	59	Klamath	
Slate	30	Sacramento	Group I with some Group II
Hall's Canyon	30	Pit	characteristics
M. F. Sacramento	28	Sacramento	
Ash Creek	20	Pit	
Twelve Mile Creek	28	Warner Lake	Group II (Goose Lake)
East Nelson	25	Pit	Doesn't fit any pattern
Green Burney Creek	0	Pit	Only BN present
Beaver Creek	0	Pit	Sample (3 RT) too small
Washington Creek trib.	0	Pit	No trout observed
Horse Creek	0	Pit	No trout observed
Turner Creek	0	Pit	No trout observed
Willard Creek	- 1	Susan River	Collection cancelled

Results of 1981 Sampling of Kern Basin Populations

Population	N	Drainage	Suggested classification
Coyote Creek Lion Meadow Creek Lower Trout Creek Upper Trout Creek Lower Fish Creek S. F. Meadows Mulkey Creek Below Fairview Dam Above Fairview Dam	64 18 23 36 13 14 31 14	Main Kern Little Kern S. F. Kern Main Kern Main Kern	Group VII Introgressed Introgressed Introgressed Introgressed Group IV Group V Introgressed Introgressed

1982 Plans

Money is available for electrophoretic analysis of six trout populations. The following streams were suggested for sampling: Goose Lake adults (if available),

Fish population sampling in the Upper McCloud River area in 1981 was limited to Trout Creek. The trout population in Trout Creek was established in 1977 following chemical treatment and transplants of native trout from nearby Sheepheaven Creek. Electrofishing indicates that the trout density has reached 755 trout per mile, excluding young-of-the-year. The 5-mile reach of Trout Creek now occupied contains an estimated 3,700 trout, with 18% exceeding 7 inches. The management plan for Trout Creek recommends that the stream be opened to angling when the population reaches 500 trout per mile. Now that this objective has been reached Trout Creek has been reopened to angling.

The USFS has received \$30,000 of Sikes Act money for habitat improvement work on McCloud Flat streams. Fish barriers, bank stabilization, cattle exclosures, and pool-forming structures are all being considered.

1982 Plans

- 1. Work with USFS in selecting sites on Trout Creek and other McCloud Flat waters for habitat improvement.
- 2. Monitor trout populations in Swamp, Sheepheaven, and Edson creeks if time permits.

KERN RIVER RAINBOW TROUT

1981 Activities

Region 4

Electrophoretic analysis of trout samples collected from the Kern River between Kern lakes and the forks of the Kern, and tributaries Osa, Soda, and Rattlesnake creeks, indicate that the populations closely resemble one another and are distinct from fish of the South Fork and Little Kern. They also differ from "coastal" rainbow trout used in artificial propagation. In contrast, most of the rainbow trout collected from the Kern River at Fairview, 15 miles downstream from the forks, possessed definite hatchery rainbow trout characteristics. The river at Fairview has been planted with hatchery rainbow trout for decades.

Populations of Kern River rainbow trout that show no signs of introgression, electrophoretically, were compared meristically with samples collected in 1893 and 1904. The recent samples possessed slightly fewer lateral scales and slightly higher mean number of vertebrate—both tending toward hatchery rainbow trout. The disparity, however, is relatively small and might be explained by differences in sample size. Dr. Gall believes that little or no introgression has occurred in these Kern River rainbow trout populations.

-5-Since the presence of remnant populations of S. g. gilberti appears now to be confirmed, the Committee recommended they be classified as "sensitive" and that a letter of request be sent to the USFS. One of the best populations of S. g. gilberti occurs in Ninemile Creek, where extensive timber cutting is proposed. Special provisions for stream protection should be incorporated into the sales. Dan Christenson noted that the upper limit of S. g. gilberti on the mainstem of the Kern has not been determined and suggested additional surveys and sampling above Kern lakes. 1982 Plans 1. A letter requesting sensitive species designation for S. g. gilberti will be sent to the USFS regional forester. 2. If time permits additional sampling will be conducted in the upper reaches of the Kern Canyon to determine extent of S. g. gilberti distribution. GOOSE LAKE TROUT 1981 Activities Region 1 The Goose Lake trout population appears to have been severely depressed by the 1976 and 1977 drought when there was little or no natural reproduction in tributary streams. As in 1980, no spawning run was observed in any California tributaries. However, the Oregon Department of Fisheries reported a small number in Thomas Creek. The Yreka Screen Shop has assembled a steep pass fish ladder for the Lower Willow Creek barrier which can be installed when the lower dam is rebuilt. The DFG is working with the Soil Conservation Service to obtain funding for rebuilding the Lower Willow Creek dam and correcting the bank erosion problem below the dam. 1982 Plans 1. Continue to work with landowners and the SCS in correcting fish passage problems on Willow Creek. 2. If a spawning run occurs in Willow Creek, spawners should be collected below the barrier for artificial propagation. Also scales should be collected from adults in Willow and Lassen creeks to determine the number of seasons that the trout spend in these streams as juveniles before migrating to the lake. 3. Survey other California tributaries of Goose Lake to insure unimpaired upstream migration of spawners and to obtain an estimate of spawning run size.

1981 Activities

Region 4 personnel developed a public information plan to coordinate agency participation and encourage public understanding and acceptance of the GT-LK management program. The plan included periodic notices to area news media, landowners, interested individuals, and organizations detailing work plans, accomplishments, and purposes of the recovery efforts.

Region 4 staff conducted standard inventories of GT-LK populations on 17 stream sections within ten streams. Populations were sparse in Fish, Lower Deep, and Lower Tamarack creeks. Moderate population densities were observed on Upper Deep, Sheep, Willow, and Middle Soda Spring creeks while high densities were noted in Lower Wet Meadows, Trout Meadows, and Upper Soda Spring creeks.

Chemical treatment of the Little Kern River above Broders Cabin and of Lions, Lower Deadman, and Middle Soda Spring creeks (about 6 miles) was completed. The Trout Meadows Creek treatment was postponed. Downstream barriers must be improved.

The 1980 treatments of Deep, Soda Spring, and Tamarack creeks were evaluated and found to be successful. The streams received transplants of GT-LK from Fish, Upper Soda Spring, and Willow creeks, respectively. The 1981 Lion Creek treatment also appeared successful, consequently, the stream was restocked from Upper Wet Meadows Creek. Bullfrog and Silver lakes were planted with GT-LK.

Portions of Coyote Creek (tributary to the Kern River) were surveyed to determine the extent of fish populations, location of barriers, and habitat. The drainage was reportedly planted with GT-LK from Rifle Creek many years ago. GT-LK now occupy three lakes and 4 miles of stream habitat.

In 1981, 64 GT-LK were collected from three sites within the Coyote Creek drainage for genetic analysis. Electrophoretic analysis indicates that the Coyote Creek populations are not introgressed with rainbow trout.

Electrophoretic analysis of a sample (27 fish) collected from Lions Creek confirmed that the population was introgressed.

Further biochemical-genetic analysis has confirmed that the so-called "unique" trout of the North Fork Clicks Creek and the Mountaineer Creek drainage are descendents of typical, hatchery-stock rainbow trout. Since they pose a threat to GT-LK recovery efforts they will be removed from the Little Kern River drainage as provided for by the EA and USFWS biological opinion.

Salvage and relocation of GT-LKxRT conducted prior to chemical treatment in areas not accessible to packstock was determined too expensive and of only marginal value. The practicality of future fish salvage will be determined on a "case-by-case" basis.

About 75% of the willow slips planted along Fish Creek for erosion control in 1980 survived. Willow plantings are needed at Trout Meadow, Deep, Lion, Clicks, and Grey Meadow creeks to control erosion.

-7-Barriers constructed or modified last year at Tamarack and Lions creeks appear adequate. No unmarked fish were found above the Tamarack barrier. An evaluation of the barriers at the mouth of Trout Meadow Creek indicated that the lowermost barrier may be inundated by the Little Kern River at very high flows. Another barrier a short distance upstream may be suitable but should be improved to increase its effectiveness in preventing fish passage. Chemical treatment will be deferred until the barrier is improved. Other barrier needs include the completion of a barrier on the Little Kern River just above Rifle Creek and construction of two additional barriers on the Little Kern River: one above Soda Spring Creek and another below Mountaineer Creek. Suitable barrier sites have been identified by the USFS. Additional barriers on Lower Clicks Creek and the Little Kern River in the vicinity of Clicks Creek were suggested to facilitate lower basin treatments. Specific site identification is proposed for 1982. Because of the relative scarcity of naturally produced GT-LK, particularly Upper Soda Spring and Willow Creek stocks, artificial propagation has been proposed as a means of providing supplemental GT-LK for restocking. Facilities at Kern River Hatchery, UC Davis Hatchery, or Moorehouse Springs will be evaluated for this use. The USFS plans to increase cattle AUM's in the Flat Iron Burn area and decrease cattle grazing in sensitive areas. The USFS decided that access to Walker-Pine Tree Mine will be by trail machine ("army mule") instead of by truck road. The owners of private inholdings on Upper Pecks Canyon are building a lodge and cabins and have challenged portions of the GT-LK plan related to Pecks Canyon. Additional details regarding 1981 Little Kern golden trout management activities can be obtained from the "Annual report on the implementation of the Little Kern golden trout management plan for 1981" by Dan Christenson, DFG-Region 4. 1982 Plans 1. Continue public information program: Wilderness brochures, preseason press releases, advance public notices, treatment warning signs on trails, etc. 2. Inventory relative abundance of GT-LK in Fish, Deep, Willow, Sheep, Lion, Tamarack, Soda Spring, Wet Meadows, Deadman, Shotgun, and Trout Meadows creeks and if time permits check Silver and Hidden lakes. Restock the latter with GT-LK if NPS concurrence is obtained. 3. Chemically retreat the Little Kern River and tributaries above Broders Cabin and restock with GT-LK from Wet Meadows Creek. 4. Chemically treat North Fork Clicks Creek and if successful restock with GT-LK from Fish or Deep Creek. If North Fork Clicks Creek is not treated, substitute Trout Meadows Creek.

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- 5. Spot-check Pistol Creek to verify fishless status and if fishless restock with GT-LK from Wet Meadows Creek.
- 6. Plant Upper Bullfrog Lake with GT-LK from Wet Meadows Creek.
- 7. Postpone treatment of Twin Lakes and as a substitute, treat Alpine and Jacobson creeks. If successful stock the former with GT-LK from Deadman Creek and the latter with trout from Upper Soda Spring Creek. If barriers on Jacobson Creek are not adequate, substitute South Mountaineer Creek or Upper Mountaineer Creek.
- 8. Evaluate 1981 treatment of Lion and Tamarack creeks and if successful restock with GT-LK from Willow Creek.
- 9. Spot-treat Table Meadow Creek with rotenone to confirm barren status and if barren restock with GT-LK from Willow Creek.
- 10. Spot-check Upper Deep Creek and move GT-LK upstream if they have not already repopulated the area.
- 11. Spot-check Lower Deadman Creek and if barren restock with GT-LK from Upper Deadman Creek.
- 12. GT-LK (mostly introgressed populations) will be studied for a Master's Thesis project on trout fecundity.
 - A GT-LK migration study will be conducted on Coyote and Willow creeks for another Master's Thesis project.
- 13. Golden trout from Willow and Upper Soda Spring creeks will be artificially propagated at the Kern River Hatchery and the progeny will be restocked in Jacobson and Middle Soda Spring creeks.
- 14. Complete survey of Coyote Creek to determine availability of GT-LK for stocking Rifle Creek.
- 15. Move GT-LK from Fish Creek into barren headwaters.
- 16. Continue willow planting for erosion control at the Clicks Tourist Pasture and on Fish and Lions creeks.
- 17. The USFS will complete barrier construction on the Little Kern River above Rifle Creek. Additional barrier sites on Lower Clicks and on the Little Kern River below Clicks Creek will be surveyed (future construction may be funded by Sikes Act money).
- 18. Region 4 will work with the Forest Service in developing angling regulation recommendations for the Little Kern River drainage.
- 19. Region 4 will post voluntary harvest limit signs at Bullfrog Lake.
- 20. The USFS will complete construction of a barrier on the Little Kern River at Rifle Creek and will select additional barrier sites on Lower Clicks Creek, and on the Little Kern River near Clicks Creek.

-9-SOUTH FORK KERN GOLDEN TROUT 1981 Activities Region 4 The section of Fish Creek, tributary to S. F. Kern River, which was chemically treated in 1980 following an inadvertent plant of catchable RT-W was electrofished to detect surviving rainbow trout. No rainbow trout were observed. Only a sparse population of adult GT (stocked after treatment) and a few young-of-the-year GT were taken. Region 5 The CCC completed construction of a gabion-type fish barrier on the South Fork Kern River at Shaeffer Stringer. The South Fork Kern River between Ramshaw and Templeton barriers was chemically treated and replanted with 300 marked GT from the South Fork at Tunnel Meadows. Annual stream population monitoring was postponed to 1982 and will occur only every other year. Electrophoretic analysis of a golden trout sample from Mulkey Creek, tributary to the South Fork, indicates that the population is of probable Golden Trout Creek origin. Jerry Stefferud (USFS) plans to publish life history and spawning site study findings made on Mulkey Creek. South Fork Kern golden trout have not been designated as threatened or sensitive therefore do not receive any special consideration from the Forest Service when land use plans or timber sales are prepared. The consensus of the Threatened Trout Committee was that the Forest Service be requested to designate the South Fork Kern golden trout as "sensitive". The Committee also supported expansion of the Golden Trout Wilderness as proposed in a bill authored by Congressman Burton because it would provide better protection for many of the golden trout streams entering the South Fork downstream from the Shaeffer barrier. The USFS completed the Golden Trout Wilderness Management Plan. One of the provisions closes the Tunnel Meadows airstrip to aircraft. The Department has requested that a variance be granted to allow use of the airstrip for completion of chemical treatment work. 1982 Plans Region 4 1. Work with USFS to obtain better protection of golden trout streams south of Shaeffer barrier. Input will be provided during the early stages of timber sale preparation.

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Region 5

- 1. Evaluate 1981 treatment of South Fork Kern River above Templeton barrier and retreat if necessary.
- 2. Chemically treat South Fork Kern River and tributaries between Templeton and Shaeffer barriers. The work will be performed between September 8-18. This will be a big job so assistance from volunteers is welcome. Region 5 will pay cost of packing in personal gear (phone Phil Pister 714-872-1171 if you can help).
- 3. Monitor golden trout populations in established test sections on Cottonwood, Mulkey, and Golden Trout creeks.
- 4. USFS will continue gully erosion control work.
- 5. The DFG and USFS will explore methods of controlling cattle damage along streams, including solar-powered electric fences (single strand) and prescriptions for livestock herding.

Golden Trout Broodstock Study

Dr. Gall's staff continued to evaluate crosses of Cottonwood Lakes golden trout broodstock with rainbow trout broodstock. The F1 backcross worked well; many abnormalities were present in F2 eggs, and very low egg viability was noted among F3 eggs. This would tend to discourage development of a GTxRT hybrid swarm and may account for disappearance of obvious rainbow trout characteristics among the GT broodstock in Cottonwood Lakes.

Dr. Gall suggested that this experiment be repeated with cutthroat trout and rainbow trout backcrosses.

LAHONTAN CUTTHROAT TROUT

1981 Activities

Region 2

A 10-year Independence Lake CTL planting program was completed. From 20,000 fingerling, 52,000 yearlings, and 4,700 2-year-old CTL planted, less than 400 were landed by anglers, and spawning escapement did not increase above the preproject mean of 60. Angler success remained low (0.10 CTL/hour). It is concluded that hatchery-reared CTL are not able to effectively compete with the abundant kokanee and nongame fish. The existing bait prohibition and zero-bag limit remains in effect.

Forest Service efforts to remove beaver from Independence Creek above Independence Lake were not successful.

The CTL population in East Fork Creek (Austin Meadows) has become reestablished after nearly being eliminated during the 1977 drought.

Pole Creek which was treated and restocked in 1977, contained an abundance of yearling CTL.

-11-Poison Flat Creek, a tributary to the East Fork Carson River occupied by CTL, has been damaged by cattle. A bank stability survey revealed that 55% of the stream banks are broken down or bare of vegetation. Beaver have aggravated the situation. The stream section damaged by beaver contained 170 fish per mile compared to 1,000 per mile in undamaged sections. Martis Reservoir, which was chemically treated in 1977 and replanted with CTL from Independence Lake, continued to produce good cutthroat trout angling (6,273 CTL were landed by anglers fishing 11,300 hours) despite the fact that numbers of nongame fish, green sunfish, and nonnative brown and rainbow trout have significantly increased. Little reproduction of CTL occurred in inlet streams in 1981, possibly due to high water temperatures. The Angora Lakes were planted with Independence Lake CTL fingerlings in 1979 following treatment in 1978. A gill net survey revealed that tui chubs are still present in the lower lake and that moderate numbers of 8-9-inch CTL are present. Heavenly Lake was also planted with CTL fingerlings from Independence Lake in 1979. Good numbers of CTL 5-8 inches FL were observed. The CTL population in Murray Canyon Creek has declined from 100 to 44 trout >6 inches FL per mile. Poaching is suspected. Though closed to angling, the stream was not posted until the end of the summer. Region 4 The CTL population in Cow Creek is improving after being damaged by siltation from logging road erosion in 1976 (the population has nearly doubled since last year). The USFS continued macroinvertebrate sampling on Cow Creek. Young CTL were numerous in Portuguese Creek (West Branch) despite low stream flows. Sampling on the East Branch of Portuguese Creek indicated that fewer CTL are present (5 compared to 16 last year in 500 m of stream). Brook trout now outnumber CTL 9 to 1. An electrofishing survey of Wheats Meadow Creek indicates that the CTL population has virtually disappeared while brook trout remain abundant. Cattle gained entrance to the fenced portion of the meadow resulting in significant impacts to both meadow and stream. Region 5 Murphy Creek, tributary to the East Walker River, which was planted for the first time in 1977, was found to support a fair population of CTL (about 300). Beaver ponds in the fishless headwaters of the north and south forks of By-Day Creek were planted with 35 CTL 4-8 inches FL collected from the downstream reaches of By-Day Creek. CTL yearlings collected in By-Day Creek during the fall of 1980 and transported to the UCD hatchery are now about 9 inches long. About a dozen adults are on hand. -12-

Electrofishing surveys revealed that CTL were abundant in By-Day Creek and moderately abundant in O'Harrel Canyon Creek. In the latter, numbers of fish larger than 6 inches FL drastically declined (from 80 adults in April 1981 to 8 adults in December 1981). Since the number of smaller CTL did not decline, angling is suspected as being responsible for the decrease in larger trout.

Portions of Bodie and Rough creeks above and below the Nevada stateline appear to be fishless and suitable for CTL. Additional information will need to be collected before CTL are stocked.

Staff

1. A statewide survey of streams supporting pure self-sustaining populations of Lahontan cutthroat trout was completed in October. There are 15 known stream populations in California occupying 21 miles of habitat and supporting an estimated 10,000 cutthroat trout, of which over 2,500 exceed 150 mm FL. Lake populations use another 3 stream miles for spawning. The population estimates are as follows:

Stream	Miles occupied	Estimated trout over 150 mm FL	Estimated total trout
Cow Creek	1.5	126	1,019
Portuguese Creek	1.3	70	70
Pole Creek	0.8	45	50
Murray Canyon Creek	2.3	100	520
Poison Flat Creek	0.8	100	700
By-Day Creek	2.0	354	2,064
O'Harrel Canyon Creek	0.8	8	193
Disaster Creek	2.0	376	1,942
Flume Creek (East Fork trib.)	1.0	54	150
East Fork Creek	0.8	43	120
Murphy Creek	1.0	200	300
Wheats Meadow Creek	0.5	3	3
E. F. Carson River	5.0	500	2,000
Golden Canyon Creek	1.0	10	30
Macklin Creek	0.6	562	1,041
	-		-
Total	21.4	2,551	10,202

- 2. A Lahontan cutthroat trout status report and management plan was drafted and will be completed in 1982.
- 3. During a joint meeting with the USFS, USFWS, and Nevada Department of Wildlife it was decided that the Lahontan cutthroat trout outside the Humboldt River drainage should not be delisted until the CTL management plan is fully implemented.

1982 Plans

Region 2

1. Independence Lake. Post new informational signs. Caretaker will census anglers. Four spawner counts will be made on spawning stream. Remove brook trout from stream in late July. One gill net survey of the lake will be made during the fall. USFS will arrange beaver control.

-13-2. Monitor CTL populations in Macklin Creek and East Fork Creek tributaries. 3. Evaluate natural spawning of CTL in Martis Creek. 4. Evaluate Horsethief Canyon, Jeff Davis, and Charity Valley creeks and the Upper Truckee River including Meiss Lake as potential CTL restoration sites. The above streams will be electrofished and barriers will be mapped. Pending landowner approval, one of the waters will be chemically treated in 1982. EA's on these waters will be sent to the USFS in July. 5. Transplant CTL to the fishless one-half mile reach of the east branch of Disaster Creek. Survey upper limits of CTL in the west branch. 6. Inspect Poison Flat Creek with USFS to evaluate livestock damage and formulate plans to control damage by fencing or other means. Region 4 1. Monitor CTL populations in Cow, Portuguese, and Wheats Meadow creeks if time permits. Region 5 1. Evaluate Upper By-Day Creek transplant. 2. Chemically treat Mill Creek and if successful stock in 1983 with CTL fingerlings produced at UC Davis hatchery (from By-Day Creek broodstock). This chemical treatment will be postponed until 1983 if the N. F. Cottonwood Creek must be retreated. Remove irrigation diversions from Mill Creek in order to improve stream flows on this State-owned property. 3. Evaluate Sweetwater, Lost Cannon, Rough, Bodie, Slinkard, and By-Day creeks for CTL stocking. If water quality is suitable in Bodie Creek, stock with adults from By-Day or Murphy creeks in 1982. 4. Prepare for 1983 chemical treatment of Wolf or Silver creeks. 5. Monitor CTL populations in By-Day, Murphy, and O'Harrel Canyon creeks if time permits. Staff 1. Complete Lahontan cutthroat trout management plan. 2. The USFWS will incorporate California and Nevada plans in a species recovery plan. 3. Graduate student, Gary Combes, will complete CTL-habitat study for Master's Thesis.

PAIUTE CUTTHROAT TROUT

1981 Activities

Region 2

Electrofishing results from the 1,000-ft test section on Silver King Creek above Llewellyn Falls indicate that the population is still expanding. The stream was restocked with CT-P in 1976 following chemical treatment. The observed population of trout over 6 inches FL doubled since 1980 (from 175 to 350 per mile). The percentage of spotted fish has remained about 5%.

Coyote Valley Creek, which was chemically treated in 1977 and replanted with 50 adult CT-P in 1978, was electrofished above and below the trail crossing. Paiute trout appeared to be abundant; 63 >6 inches FL and 200-300 <6 inches FL were observed. In addition, large numbers of fry were noted. No spotted CT-P were observed.

Corral Valley Creek which was also treated in 1977 and replanted with 20 adult CT-P in 1978 was electrofished throughout its length. Nineteen CT-P >6 inches FL and 191 <6 inches FL were observed. None appeared to be spotted.

Five adult CT-P were collected from Four Mile Canyon Creek and transplanted to the UC Davis hatchery for broodstock purposes.

Fly Valley Creek was electrofished and found to contain at least 250 CT-P, nearly half adults.

Beaver removal was postponed.

Region 4

Stairway Creek (Madera County) was planted with 77 adult CT-P in 1972. In 1974 only 5 CT-P were observed. In 1977 a population density of 320 CT-P/100 m was noted (mostly <6 inches). In 1981 a population density of 114 CT-P/100 m (largely adults) was estimated. Reduced condition factor and low recruitment indicate that the population may be approaching a climax state. Even though fish are larger, the biomass has changed little since 1977. Expansion of electrofishing data collected from four test sections indicated a population of 800 CT-P in a 1-mile reach of occupied habitat; 85% were >6 inches FL and none were spotted.

Forty-two CT-P, 4-5 inches FL were collected in Stairway Creek and transplanted above an impassable barrier to extend the range 0.5 miles.

Eighty CT-P, 6-8 inches FL were transported from Stairway Creek to the UC Davis hatchery where broodstock will be developed to assist in restocking reclaimed waters (as of May 1982, 40 remained).

Region 5

A 2.2-mile reach of the North Fork Cottonwood Creek (Inyo County) was treated with Fintrol to remove introgressed CT-P. An estimated 655 CT-P (550 >6 inches FL) were killed (a density of 275 CT-P >6 inches FL/mile). Electrofishing on

-15test sections selected in meadow areas prior to treatment produced a population estimate 25% greater than that made from carcass counts. Time did not permit surveys of Cabin Creek or Birchum Lake. 1982 Plans Region 2 1. Measure CT-P population in Silver King Creek test section. 2. Trap and remove beavers from Fly Valley and the mainstem of Silver King Creek. 3. Electrofish Fly Valley Creek and record numbers of body spots on fish. 4. Make trout population estimates on Coyote and Corral Valley creeks and examine fish for evidence of hybridization. 5. Survey Silver King Creek from confluence of Coyote Valley Creek to the East Fork Carson River for presence of "rumored" natural barrier. Establish why BN and WF do not ascend Silver King Creek from the East Fork Carson River. 6. Gill net Tamarack Lake to determine relative trout abundance. Collect CT-P during electrofishing surveys of Silver King Creek above falls and transplant them to Tamarack Lake if packer or USFS agrees to haul fish at no cost to DFG. 7. Consider establishing fish population monitoring sections on Silver King Creek below falls and on Lower Tamarack Creek if time permits. 8. Prepare for 1983 chemical treatment of Silver King Creek. CT-P from Stairway Creek will be spawned by UCD so progeny will be ready for replanting Silver King Creek in 1984. Region 4 1. Survey Sharktooth Creek CT-P population and move fish downstream to barren reach. Region 5 1. Evaluate effectiveness of North Fork Cottonwood Creek chemical treatment and retreat if necessary. 2. Collect CT-P from Cabin Creek for electrophoretic analysis. 3. Survey CT-P population in Birchum Lake if time permits. Staff 1. Complete Paiute cutthroat trout management plan.

-16-COAST CUTTHROAT 1981 Activities Region 1 Fisheries personnel from the Six Rivers National Forest noted fair numbers of large coast cutthroat trout while skin diving in the South Fork Smith River. The NPS continued to collect data on cutthroat and other trout fisheries in the Redwood National Park. 1982 Plans Region 1 1. The AFB will be conducting a survey of salmon resources in the Eel River drainage including the Eel River delta. The location and size of coast cutthroat trout collected will be recorded and submitted to Region 1. 2. William Mitchell, Humboldt State University graduate student, plans to study the distribution and abundance of coast cutthroat in the Smith River drainage. BULL TROUT 1981 Activities Region 1 The Nature Conservancy personnel continued to creel census anglers fishing above and within the TNC McCloud River Preserve. Anglers reported catching 14 bull trout. Since the law requires that all bull trout caught be returned to the water, these reports could not be verified. Several potentially damaging timber sales involving extensive clear cutting on steep slopes adjacent to the McCloud River preserve are being prepared by the Forest Service and will require critical Department review. 1982 Plans Region 1 1. Sample pools on the McCloud River where bull trout were allegedly caught in 1981 and attempt collection of bull trout for captive breeding and subsequent river stocking. 2. If the latter is not successful, permission will be requested from Oregon to collect bull trout for transport to barren waters in Bunchgrass Creek (Lassen County) or Deer Creek (Siskiyou County). The broodstock established will be used to produce bull trout for the McCloud River. 3. Complete the bull trout status report, if time permits. 4. The TNC will continue to creel check anglers on McCloud River Preserve.

-17-5. Work with the Shasta-Trinity National Forest timber staff in developing measures for fisheries protection for incorporation into the Hawkins, Beetle-Dee, and Yellow Jacket timber sales. 6. Work with PG&E in the planning of the proposed McCloud Reservoir powerhouse to include provisions for improving conditions for bull trout and other fishes of the McCloud River. SPRING-RUN SUMMER STEELHEAD 1981 Activities Region 3 The adult summer steelhead count of 1,601 in the Middle Fork Eel River holding

area was the highest since 1974. The river below the summer closure area will be open to "catch-and-release" steelhead angling during the spring of 1982.

Young-of-the-year steelhead were nearly absent in the middle fork survey area in 1981. High water temperatures in the holding area in 1980 may have reduced egg fertility in gravid females. Water temperatures were equally high in 1981. The effects will be evaluated in 1982.

Region 1

The following estimates of summer steelhead abundance were obtained by skin diving:

Stream	Numbers 1980	observed 1981	Total stream estimate (1981)
Salmon River Drainage			
N. F. Salmon River S. F. Salmon River Salmon River below forks Wooley Creek	69 (b) 166 (a) 65 (a) 165 (a)		57 200
Trinity River Drainage			
New River N. F. Trinity River Canyon Creek	281 (a) 454 (a) 6 (a)		
Klamath River Drainage			
Bluff Creek Clear Creek Dillon Creek Elk Creek Tish Tang a Tang Creek Grider Creek Horse Linto Creek Scott River	37 (a) 241 (a) 268 (b) 90 (a) NS NS NS O (d)	270 (a) 187 (b)	

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Streams	Numbers observed 1980 1981		Total stream estimate (1981)	
Mad River Drainage				
Mad River	42 (b)	17 (c)		
Redwood Creek Drainage				
Redwood Creek	4 (c)	16 (b)		
Percent of habitat surveyed:	(a) 75-100, (b)	50-75, (c)	25-50, (d) 5-25	

NS - not surveyed

The Upper Mattole and Van Duzen rivers were not surveyed in 1981.

Brian Winter, graduate student at Humboldt State University (HSU), began work on a Master's Thesis project involving interaction of summer and winter steelhead progeny in rearing areas.

Lincoln Freeze, another HSU graduate student, completed a Master's Thesis on summer steelhead adult migration patterns.

Dr. Terry Roelofs (HSU) under USFS contract has completed a draft summer steelhead management plan.

1982 Plans

Region 3

- 1. Inventory adult and juvenile populations in Middle Fork Eel River.
- 2. Work with USFS in implementing the "Summer Steelhead Management Plan".

Region 1

- 1. Inventory summer steelhead adult populations in the following streams: Salmon River drainage including Wooley Creek; Clear, Dillon, Indian, Elk, Thompson, Grider, Blue, Bluff, Ukonom, Canyon, Red Cap, Camp, and Redwood creeks; and the South Fork Trinity, North Fork Trinity, New, South Fork Smith, North Fork Smith, Van Duzen, and Mad rivers.
 - The Upper Mattole River will be surveyed if access can be obtained from property owners.
- 2. The region will work closely with the Klamath National Forest timber staff to insure that summer steelhead habitat protection is provided during timber sale planning.
- 3. The region will critically review proposed hydroelectric projects on summer steelhead streams to assure that adequate fish passage and screening is provided and that adequate transportation and summer holding area flows are maintained.

5 bulletin



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"The Quality of Fishing Reflects the Quality of Living"

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POLITICS VS REAL WORLD

The battle was over. When the President signed the Boating Safety and Sport Fish Restoration Act (Public Law 98-369—Dingell-Johnson expansion) last November, we celebrated with the sure knowledge that national interest demanded aquatic resource replenishment and that those who benefitted most from this resource development would pay for it. A total of some \$162 million in new programs each year was said to be necessary to meet the states' collective boating and angling demands.

This new law says rather simply, let's take tax money paid for certain products purchased by boaters and anglers and use that money on a dedicated basis for improved aquatic resources and public boating and angling opportunities. The first year's funds are currently being collected from the boating and angling public through excise taxes on their fishing equipment, import duties on fishing equipment and boats and the federal fuel tax paid by the nation's boaters. The fund (Wallop-Breaux Fund) was expected to increase from the \$35 million range to \$100 to \$110 million, or more. (See the article "The Wallop-Breaux Fund" in *SFI BULLETIN* No. 356, July, 1984.)

But now we face a new battle. You have all heard about the federal deficit. You all know about David Stockman and the Office of Management and Budget (OMB). OMB has recommended, and the Secretary of Interior has agreed, that no new Wallop-Breaux monies will be allocated in fiscal year 1986 (beginning October 1, 1985). Responding to questioning from Senator Wallop at his confirmation hearing on February 1st, Secretary of the Interior designate Donald Hodel confirmed that OMB did plan to withhold Wallop-Breaux funding for FY 86. Hodel added that he was aware of the Administration's previous strong commitment to Wallop-Breaux, and that he "hoped" the issue would be favorably resolved before appropriations hearings begin later this month. The battle to overturn this short-sighted decision will now be joined in Congress.

The Administration supports greater reliance on user-pay programs, but apparently they mean only "user-pays" and not "user-pays for programs received." If this user fee is allowed to be impounded or diverted, the Administration will have a *very* difficult time implementing new, or additional user-pay programs in the future. Hopefully, Congress will not stand still for this proposal. Unfortunately, the Administration's list of proposed funding cuts will be overwhelmingly long during the coming Congress. Every interest group will be seeking relief. The burden is once again on the sport fishery and boating fraternity to see that their fees are used as required by the Public Law 98-369.

USER CONFLICTS ON ARTIFICIAL REEFS

While there is little argument that artificial reefs attract fish—and therefore fishermen—some controversy revolves around the vulnerability of fish populations to overfishing when they are concentrated in the vicinity of an artificial reef. The potential for over-harvest can be exacerbated when access by several user groups is uncontrolled. A letter from Dr. Paul Sandifer, Director of South Carolina's Marine Resources Division, to Mr. David Gould, Executive Director of the South Atlantic Fisheries Council, highlights these concerns.

"There are indications that artificial reefs off South Carolina are currently receiving heavy recreational fishing pressure and are often subjected to possible over-fishing. During 1977 catch rates on the reefs were found to decline for anglers as the season progressed. The effect of overfishing is also supported by angler's comments and by direct observations made by South Carolina Wildlife and Marine Resources Department SCUBA divers who have reported a general decline in catchable fish as the summer progresses. Increases are apparent in fish populations immediately following periods of inclement weather which prevent anglers from fishing on the reefs. Once the weather clears and anglers have access to the reefs again, the fish populations begin to decline in numbers and sizes available as they are again fished out. A study of two Murrells Inlet artificial reefs indicated that an obvious decline in catch per unit of effort on the reefs was a result of the heavy fishing intensity placed on the small reefs. An equal amount of effort over a nearby live bottom area did not have the same impact on the fish population due to the much broader expanse of this area."

Recreational fishing groups have donated generous amounts of time and labor to assist the state in developing its artificial reef program and have been rewarded with a substantial increase in fishing opportunities. The importance of artificial fishing reefs to South Carolina's sport fishery and its support industries has been documented by several studies.

Dr. Sandifer explains, "A 1977 study of the economic impact and fishing success of offshore sport fishing over artificial reefs and natural habitats in South Carolina estimated a total economic impact of \$47.03 million to the State of South Carolina per year from offshore sport fishing. Artificial reef fishing accounted for \$10.4 million, or 22.1 percent of the total. Of an estimated 131,504 fishing trips made offshore during 1977, approximately 25 percent occurred over South Carolina's artificial reefs. Thus, South Carolina's existing benthic artificial reefs currently provide a significant annual input (over ten times the total expenditures on all reef con-

struction to date) to the State's economy from offshore sport fishermen."

Recently, however, the South Carolina Department of Wildlife and Marine Resources (DWMR) has become increasingly concerned over effects of commercial fish trapping (primarily for black sea bass) on the offshore artificial reefs.

"The current frequency of utilization and harvest by these fish traps has not been documented" states Dr. Sandifer. "However, direct observation by DWMR employees, especially during winter months, has established that this activity is occurring at a rate which is having a severe impact on these reefs. Department SCUBA divers have reported a drastic decline in fish populations over artificial reefs following several days where fish traps were observed. Other reefs in the same general area but not trapped showed no significant change in numbers of fish available. In such cases, it is usually several weeks following trapping before a typical population of fish again appears.

"Since each of South Carolina's artificial reefs contain an average of less than 1,000 m³ of material, they are not designed to handle exploitation by fish traps. Thus the populations of fish supported by these small reefs are extremely susceptible to overfishing by even a small trapping effort.

"All of South Carolina's offshore artificial reefs which have been constructed to date, are outside state waters and thus control over fishing methods has not been possible by state law. These reefs have been promoted since their original construction, which in several instances was by sport fishing clubs, as recreational fishing areas. It was hoped that a minimal amount of trapping would be conducted on and around the reefs. Peer pressure and the desire to avoid conflict has in many instances been insufficient to keep such exploitation to a minimum.

"Should the utilization of fish traps be allowed to continue, it is doubtful that these reefs will remain economically valuable to the state. The market value of fish harvested from these reefs would not justify the \$40,000 to \$50,000 spent annually just to maintain the buoy system which marks the reefs for recreational fishermen. Many hook-and-line fishermen would not be willing to compete for the fewer number of fish that would remain available, meaning significant loss in the documented economic value of these reefs to the state. User conflicts between hook-and-line and trap fishermen will also increase as will the likelihood of overfishing such highly susceptible species as black sea bass.

"Therefore, it is requested that South Carolina's artificial reefs be set aside as special management zones and that the taking of fish from these zones be restricted by the South Atlantic Fisheries Management Council to hand-held hookand-line fishing and spearfishing by SCUBA divers."

The Sport Fishing Institute, through the Artificial Reef Development Center, has always advocated that artificial reefs are *management tools* and as such should be subject to carefully planned and researched management strategies. The steps taken by the South Carolina DWMR to eliminate user conflicts and fishing pressure through regulation is a commendable example of managing artificial reefs to the benefit of both the recreational fishermen and the fishery resource.

LAKE ONTARIO'S FISHING DERBY ECONOMICS

Periodic surveys conducted in conjunction with the Empire State/Lake Ontario (ESLO) Trout and Salmon Derby have shown that the ESLO Derby, in particular, and the sportfishing industry in general has had a significant and growing economic impact on counties which border Lake Ontario. Results from the most recent survey of the ESLO Derby, held April 26–29, 1984, indicated that the total economic impact of the Derby within the lakeshore counties was \$3,766,735. This was an increase of one-third over the last survey in 1982.

Questionnaires were mailed to six hundred anglers, selected randomly from the 11,143 anglers registered to compete in the 1984 Derby. Of the 599 questionnaires delivered, 476 were completed and returned for a response rate of 79.5 percent. Anglers from the seven lakeshore counties bordering Lake Ontario comprised 47.7 percent of the sample. Anglers residing in the next tier of counties (bordering the lakeshore counties) made up 21.6 percent; other New York counties, 14.9 percent; and, out-of-state residents, 15.8 percent.

Boats were used while fishing by 99.4 percent of the survey respondents. This included 46.3 percent who owned their boats, 45.4 percent who fished on boats owned by friends, 7.9 percent who chartered a boat and 0.4 percent who fished from a rented boat.

The Derby angler spent an average of \$217.19 while participating in the four-day event, for an average daily expenditure of \$54.30. Average daily expenditure included \$13.57 (25 percent) for fishing tackle, \$5.70 (10.5 percent) for auto service, \$15.74 (28.9 percent) for boat services, \$7.71 (14.2 percent) for bars/restaurants, \$5.40 (9.9 percent) for groceries and \$2.65 (4.9 percent) for miscellaneous items. In addition, it was estimated that the 2,340 anglers (21.6 percent) who purchased at least one night's lodging while participating in the Derby, spent an average of \$71.53 per day.

It is significant to note that \$1,824,229.60 (48 percent) of the total estimated revenues generated by the Derby (\$3,766,734.70) could be designated as tourist dollar revenues brought into the seven county area by non-residents.

A total of 91 percent of the Derby participants had fished previously for trout and salmon on Lake Ontario and almost all (99.8 percent) of the responding anglers indicated they would fish for trout and salmon in the future.

In reply to requests for suggestions on making the Lake Ontario fishing experience more enjoyable, 40 percent of the respondents indicated a need for expanded and improved access (boat launches, deepened channels, shore and stream access, marinas and dockage). Ten percent of the anglers asked for expanded parking facilities. Boating safety and education was of concern to 13 percent of the respondents.

The service areas (tourist information, lodging, hospitality, restrooms, restaurants, fishing information) were mentioned as concerns of 21.5 percent of the respondents.

Conservation matters (pollutants, shore cleanup, fishing regulations, stocking programs) were mentioned by only 15 percent of the respondents.

These 1984 survey findings are presented in a report prepared by the Wayne County Public Information Office in cooperation with the New York State Sea Grant Extension Service, SUNY College, Brockport, NY 14420.

FELLOWSHIP PROPOSALS INVITED

Proposals are invited for a limited number of graduate level (MS. or Ph.D. candidates) research fellowship grants to be awarded in May by the Board of Trustees of the Sport Fishery Research Foundation (SFRF), an affiliate of the Sport Fishing Institute (SFI). The SFRF grant program administered by the SFI staff is funded by a wide spectrum of corporations, associations, foundations, and individuals with an abiding concern for fish conservation. Priority will be given to research proposals which incorporate investigations of innovative aquatic resource management protocols, environmental and habitat concerns, fish life histories, and/or other projects pertinent to the enhancement of sport fishing opportunities in freshwater, estaurine or marine environments. Individual grant awards have ranged from \$2,500 to \$6,000 annually in past years. All proposals must be submitted prior to April 1st each year by the applicant's supervisory professor. No direct applications by students will be considered, no funds will be paid directly to the student or other individual and no awards will be made at the undergraduate level. Requests for applications should be addressed to the Sport Fishery Research Foundation, 1010 Massachusetts Avenue, NW, Suite 100, Washington, DC 20001.

SALMONID TRANSPORT PROGRAM

Transportation of steelhead trout and chinook salmon smolts to bypass eight hydroelectric dams on the Columbia and Snake Rivers in the Pacific Northwest has increased the number of juvenile fish that survive the downstream run. The present transportation system involves release of salmon and steelhead smolts from upstream hatcheries and their subsequent recapture at downstream dams. The recapture rate of smolts after release from the hatchery is 50–70 percent. Once collected, they are transported downstream 460 km below Bonneville Dam to a release site. Even though the smolts do not migrate through the lower Snake River and Columbia River, they successfully return to their (hatchery) natal areas.

In an effort to improve on the recapture rate of released hatchery smolts, various transport schemes have been tested. One approach was to transport smolts directly from upstream hatcheries to the lower Columbia River. These fish returned at only 25 percent of the rate of fish using the normal system. Thus, without any voluntary smolt migration, adult homing was impaired. Given these results, another approach has been tried.

A study by T.C. Bjornn and R.R. Ringe of the Idaho Cooperative Fishery Research Unit, asks the question how much smolt migration is necessary for successful homing and return of adult fish? Their study (Technical Report 84-1) is titled "Homing of Hatchery Salmon and Steelhead Allowed a Short Distance Voluntary Migration Before Transport to the Lower Columbia River." The philosophy behind this study is that fish allowed to migrate only a short distance from the hatchery might obtain sufficient cues for successful adult homing. Thus, nearly all the smolts may be recaptured and transported in comparison to the 50-70 percent recapture rate of the present system.

Short voluntary migration distances ranged from merely migrating out of a raceway, migrating across the hatcheries in discharge flumes, or moving down a river about 4 km.

The results showed varying degrees of homing efficiency with different smolt migration schemes. The authors conclude that "tests with steelhead trout and fall chinook (years of 1979 and 1981) are encouraging, and we believe the right combination of voluntary migration, sequential imprinting and mode of transportation that will allow successful homing of these fish can be determined with additional testing." Such work could lead to greater efficiency in the Columbia River-fish transportation system.

SFI RECEIVES ARTIFICIAL REEF DEVELOPMENT AWARD

On December 19, 1984, the Department of Commerce presented the Sport Fishing Institute with a certificate of appreciation "for outstanding contributions to the development of artificial reefs." SFI created and administers the Artificial Reef Development Center, a nationally-recognized information clearinghouse on artificial reef technology and development. A number of state and private groups involved in reef research and development were also recipients of the framed certificates signed by Commerce Secretary Malcolm Baldridge. These included: the State of Florida, Greg McIntosh, Bill Donaldson, Al Pflueger, Pflueger Marine Taxidermy, Merret Stierheim, the Jacksonville Sport Fishing Club, and Chevron USA, Inc.

The awards were presented in appreciation of these groups and to stimulate interest in the Department of Commerce's artificial reef program. The recently enacted National Fisheries Enhancement Act of 1984 directs the Department to develop, by December 1985, a National Artificial Reef Plan.

ACID RAIN: ECONOMIC IMPACT ON FISHERIES

Acid precipitation has emerged in recent years as a major environmental issue. Although there has been considerable research into the biological aspects of the problem, economic research has been relatively limited. A chapter from a recent book on acid rain (*Acid Precipitation Series*, John I. Teasley, Series Editor, volume 8) addresses this need for economic information. "Economic Perspectives on Acid Deposition Control" by Fredric C. Menz and John K. Mullen focuses on estimating the economic significance of damages due to the increased acidity in the Adirondack recreational fishery. This work yields a range of estimates for economic losses to anglers resulting from acid rain damage.

The loss to anglers was calculated in terms of the reduction in economic value from the decrease in visits to acidfied pond waters. These annual losses to licensed New York resident anglers were estimated to be \$1.7–\$3.2 million. Within this amount, two ranges were identified. The authors state several reasons why the lower range of estimates (\$1.7–\$2.0 million) may understate actual economic losses:

"First, they do not include diminished stream angling opportunities. Second, they are based only on specific waters found to be acidified in post-1976 surveys. The extent of acidification damage in the Adirondack fishery may be significantly greater than is indicated by current scientific information. It is possible, too, that some of the waters recently found to

exhibit a pH in the range of 5.0–6.0 may eventually exhibit a pH less than 5.0 because they are likely to have limited buffering capacity. Since waters in the pH range comprise approximately 30 percent of total acreage in the Adirondack fishery, the potential losses could be substantially higher.

"... to provide information about possible economic losses if acidification damage were greater than currently known, another estimate of losses was performed assuming a doubling of known acreage losses within the composite sites which currently have waters in the critical state.

"These estimates (\$2.6-\$3.2 million) are the figures defining the higher end of the range. Thus, the reported estimates depend on the projections about the degree of habitat loss, and are based on the assumptions that there is no diversion of anglers away from the Adirondack fishery, and that substitutions within specific fishery classifications (i.e., ponds, streams) occur as anglers become aware of acid damage to particular sites.

The estimates in this study were based on the following assumptions: 1) the value of the Adirondack fishery is based on licensed New York resident anglers fishing in public fishing waters; 2) the angler is aware of acid rain damage to particular fishery sites and subsequently alters his visits in response to diminished angling opportunities; and 3) estimates consider only present economic losses and do not take into account that damage may be irreversible, thus affecting future anglers.

Beyond the specific application of economic modeling to the effects of acid rain on the Adirondack fishery, the research of Mullen and Menz has more widespread implications. Their work highlights the nature of the acid deposition problem and identifies a number of significant conceptual and empirical parameters that relate the effects of acid rain to recreational fisheries. Given the importance of economic considerations at the policy making level, the role of economic analysis in examining the acid rain problem must be understood.

FISHERY MANAGEMENT SUCCESS STORY

According to an interesting article, "Those Dam Salmon," by Burt Calkins, in the November issue of North Dakota Outdoors, North Dakota anglers no longer need to plan extended trips to the Great Lakes or the Pacific Northwest to fish for salmon. Chinook salmon fishing is great and promises to be even better in the future in Lake Sakakawea, a 375,000-acre, multipurpose Missouri River reservoir which meanders throughout the western third of the state.

Today's excellent recreational fishery represents the culmination of an extended 17-year research and management program initiated by the North Dakota State Game and Fish Department under the guidance of former Fish Chief and currently Game and Fish Commissioner, Dale L. Henegar.

Initial attempts to establish a salmonid fishery in the late 1960's were thwarted by the lack of adequate forage. Growth of coho salmon (the first salmonid species stocked) was disappointing, although survival was considered adequate. After extensive evaluation of potential forage species, rainbow smelt obtained from the Great Lakes were introduced in the early 1970's. The selection of smelt proved to be a wise choice. Reproduction was extensive from the original stocking of only

7,000 smelt and growth rates of predator species improved substantially within a few years.

Trial introductions of chinook salmon in the mid and late-1970's indicated this species was a better choice than the slower growing coho salmon. Consequently, stocking of coho was discontinued and substantial plants of chinook were made in 1981 (43,000), 1982 (272,000), 1983 (1,100,000) and 1984 (750,000). Fish stocked in 1981 are now in the 20-pound plus range, fish stocked in 1982 range between seven to fifteen pounds and salmon from the 1983 plants range between four to six pounds. Survival of the stocked fish has been exceptionally high; recent information suggests a survival rate approaching 70 percent.

The North Dakota Game and Fish Department is gearing up hatchery production facilities to enable stocking of approximately 1,000,000 chinook salmon annually (2.7 per acre) in future years. Other salmonid species, including lake trout, steelhead rainbow and brown trout have also been introduced successfully in recent years. Lake Sakakawea also provides exceptionally good walleye fishing. Many trophy-size walleye are creeled annually.

Albeit on a smaller scale, the spectacular recreational fishery provided by Lake Sakakawea parallels this century's premier fishery management success story—the fabulous salmonid fishery developed in the Great Lakes. The success of both programs is attributable to the judicious melding and application of fishery research and management principles by imaginative and capable fishery managers.

SOUTHEASTERN SOFTWARE AND MESSAGE EXCHANGE

The SouthEastern Software and Message Exchange (SESAME) is a new service of the Southern Cooperative Wildlife and Fisheries Statistics Project. SESAME is an electronic software exchange and bulletin board system available free to any user of microcomputers. SESAME was developed to disseminate information and user-developed (or public domain) software related to microcomputer applications of interest to wildlife and fisheries professionals. SESAME is "open" 23.6 hours daily at telephone number (919) 737-3990. After making telephone connection to SESAME, log on by tapping your [RETURN] key slowly until SESAME matches the baud rate, parity and signal length of your microcomputer system and begins to prompt you. For more information, either connect to the system itself or contact Wayne Cornelius (system operator) by telephone (919/737-2531), or by mail (North Carolina State University, Box 8203, Raleigh, NC 27695-8203).

CHINESE DELEGATION VISITS SFI

SFI recently hosted a group of seven scientists visiting from the People's Republic of China who were interested in learning about artificial reef programs in the United States. They were briefed on SFI's role in promoting recreational fishing in this country and informed of the functions and services of the Artificial Reef Development Center (ARDC).

The visit was part of a nationwide tour by the Chinese to study the construction, design, economics and management of fish shelters. The group hopes to apply this knowledge to the development of artificial reefs for the improvement and development of Chinese fisheries.

The scientists were particularly interested in gathering information and statistics on a nationwide basis. The computerized information management system currently being developed at the ARDC will provide baseline data of this type.

DU PONT TO PAY FOR MERCURY CONTAMINATION

E. I. Du Pont de Nemours & Company this summer agreed to pay the State of Virginia \$1.98 million as settlement for damages to natural resources caused by mercury discharges from the company's Waynesboro, Virginia plant. Between 1929 and 1950, the plant used mercuric sulfate in its manufacture of acetate fiber. In 1977, Du Pont discovered and reported mercury contamination in the soil surrounding the plant and later in the South and South Fork of the Shenandoah Rivers.

The voluntary agreement stipulates that \$1.5 million of the payment be used by the state for work on water quality and other water resources problems. The remaining \$480,000 is to be placed in a state-managed trust fund, and with accrued interest, should support monitoring activities in the two mercury-contaminated rivers for about 100 years.

The agreement releases Du Pont from liability for harming a state resource and from future claims or actions linked to environmental damage from the mercury pollution. It does not release the company from private claims or responsibility for cleaning up the contamination should a feasible technology be developed for doing so. Du Pont has already spent \$500,000 studying the problem and is paying another \$500,000 for a five-year monitoring program.

FISH HABITAT VALUE

The September issue of the National Wildlife Federation's newsletter *The Leader* contained an interesting article titled "Fish Habitat—How Much is it Worth?" by Dr. Rudolph Rosen. An excerpt of Dr. Rosen's analysis of the value of fish habitat is reproduced below.

"Let's look at a fictitious largemouth bass lake in Wisconsin we'll name Laurel Lake. The lake covers about 100 acres and is roughly oval shaped with a maximum depth of 35 feet. The contours are moderately steep.

"By a survey of bass spawning nests, it has been found that most bass in Laurel Lake spawn in waters one to four feet deep. About five acres of the lake's bottom is at a suitable depth for spawning. A bass population estimate shows that there are about 18 legal-sized largemouth bass per acre in the lake. That means 360 catchable bass were produced per acre of spawning habitat. (State fishery agencies regularly survey lakes and streams to estimate numbers of catchable sport fish present).

"The direct monetary value of bass 12 inches or longer is estimated to be about \$4 each (1982 dollars) by the American Fisheries Society (AFS). The AFS monetary values of fish are based primarily on the cost of replacing each fish by

another fish of equal size produced in a hatchery.

"About \$1,440 of catchable bass are available per acre of spawning habitat in Laurel Lake.

"That's a lot of money, but the value of spawning habitat is not just measured by flesh and bone. Anglers spend a lot of cash to visit their favorite fishing hole. According to the U.S. Fish and Wildlife Service's 1980 National Survey of Fishing and Hunting, the average freshwater angler spends about \$11 per day per fishing trip. This amount includes transportation, any tackle or bait purchased on the trip, and meals and refreshments bought along the way to the fishing hole.

"Let's say, just as an example, that Laurel Lake's yearly angler pressure averages about 50 trips by bass anglers per week. That's a total angler-expenditure of about \$550 per week, or \$28,000 per year to fish for bass. This works out to anglers spending about \$5,720 per acre of bass spawning habitat.

"Total value of each bass spawning acre in Laurel Lake is about \$7,160 in a given year. That's a lot of money per acre, but also consider the other game fish in Laurel Lake: 200 catchable-sized (average 6 inches) bluegill per acre (AFS value \$1.30 each); 12 catchable-sized black crappie per acre (AFS value around \$1.50 to \$2 each); and three northern pike over 14 inches per acre (AFS value \$4.42 each).

"Of course, all these fish don't spawn in the exact same areas in which largemouth bass spawn. But when you add up the value of all the spawning grounds, in terms of the total value of catchable sport fish produced (\$36,626) and the money pumped into the local economy by bass anglers alone (\$28,600), it becomes clear that fish spawning habitat is worth a lot of money.

"In fact, some anglers would argue that spawning grounds are priceless. The fish must think spawning grounds are pretty valuable too—they would disappear without them."

TEXANS SPEND BIG \$ ON FISHING TRIPS

Texans spent more than \$1 billion on travel for fishing trips between July 1982 and July 1983, according to the Texas Agricultural Experiment Station of Texas A&M University.

Researcher Allan Mills said fishing trips were second only to sightseeing in the amount of money spent on recreational

Mills directed a statewide telephone survey to estimate the amount Texans spend on travel associated with outdoor recreation. He found that Texans spent a total of \$9.3 billion during the one-year period on travel in the state to participate in the 20 most popular outdoor activities, which run the gamut from jogging and tennis to picnicking and camping.

The four activities requiring water (swimming, fishing, water skiing and boating) accounted for more than \$2.25 billion of the total travel expenditures.

The report said in addition to the \$1.1 billion for travel to their favorite fishing holes, Texans annually spend \$583 million on swimming trips; \$300 million on travel for boating, and \$181 million to go water skiing.

Mills said the average family taking trips for fishing spends \$583 annually on travel associated with the sport.

MICHIGAN DIOXIN LEVELS DECREASING

According to the October issue of *Water Impacts*, the Department of Natural Resources (DNR) and the U.S. Environmental Protection Agency (EPA) report that a comprehensive study of Michigan rivers shows low or non-detectable levels of dioxin in fish from 12 of the 13 streams sampled.

Except for the Tittabawassee River at Midland, the concentrations of dioxin in Michigan river fish are below 25 parts per trillion (ppt) and are comparable to levels found by EPA for other locations in the Midwest. Values for the Michigan rivers are much lower than results reported in March, 1983, by a researcher at Michigan State University for fish from the same waters.

Bass and walleye fillet samples from the Tittabawassee River had dioxin concentrations of 5 ppt or less. The U.S. Food and Drug Administration (FDA) has recommended that fish containing 25–50 parts per trillion of 2,3,7,8-TCDD should not be eaten more frequently than twice a month, and that fish with more than 50 ppt should not be consumed. In the Tittabawassee River, individual carp fillet samples ranged from 12 to 530 parts per trillion. Five of the 33 samples exceeded 50 ppt.

Upon review of the combined analyses of the FDA and the new EPA data, the Michigan Department of Public Health (MDPH) advised that the precautionary wanings issued in March, 1983, against frequent consumption of carp and suckers from major rivers in the lower peninsula can now be lifted, with the exception of the Tittabawassee and Siginaw Rivers, or where contaminants other than dioxin are known to be a problem.

With some of the fish from the Tittabawassee River still showing very high levels of dioxin, the advisory that has been in place since 1978 against consumption of fish from that river should remain in effect, according to MDPH.

The DNR and EPA will continue to monitor dioxin levels in fish from the Tittabawassee River through an agreement with the Dow Chemical Company. The State of Michigan has issued a permit to Dow Chemical which directs the company to install wastewater treatment facilities to control dioxin. Through an agreement with the EPA, the company will be monitoring dioxin levels in fish from the Tittabawassee River through 1991 to determine trends in dioxin levels and the effectiveness of the wastewater treatment facilities.

One further note, the detection levels at the EPA's Duluth Research Laboratory, where the analyses were performed, ranged from 0.2 to 2.5 ppt. This represents an increased level of analytical sensitivity from past studies. Generally, the level of detectability has been greater than 10 ppt in past studies.

RESEARCH INTERNS JOIN SFI

The Sport Fishing Institute welcomed two research interns to its staff recently. The interns, Joseph McGurrin and Steven Moyer, will be working on new and expanded SFI projects for 1985.

Joseph McGurrin received a B.S. in biology from the College of William and Mary, and an M.S. in fishery science from the University of Maryland. Joe will be working exclusively in SFI's Artificial Reef Development Center (ARDC).

His duties include maintaining the ARDC's reference library and computerized bibliography, running searches on an IBM XT Personal Computer to answer information requests; researching and updating the literature references; and investigating available data on existing artificial reef sites for input into a computerized data base management system.

Steven Moyer obtained a B.S. in wildlife management from the University of Maine in 1980 and an M.S. in fisheries science from Virginia Tech in 1984. He has worked for several aquatic consulting companies, and recently was a research specialist for the Department of Fisheries and Wildlife Services at Virginia Tech before coming to SFI. Steve will be assisting with various aspects of SFI's fishery conservation programs with particular emphasis on monitoring the conduct and administration of federal aid projects funded by the provisions of the Wallop-Breaux Fund (Sport Fish Restoration and Boating Safety Act).

STRIPED BASS UPDATE

The epic struggle to insure the survival of Chesapeake Bay striped bass continues to unfold. The latest episode involves the tremendous pressure exerted by the commercial fishery during the waning days of 1984 on the already ravished stocks. Abetted by an unusually warm fall and early winter, fishermen came out in force during November and December. Their principal target, the 1982 year class of striped bass, had only recently (by early fall) attained the legal minimum size limit of 14 inches (total length). Fisheries managers had counted heavily on the relatively abundant 1982 year class to serve as the keystone for rejuvenating decimated striped bass brood stocks in the Chesapeake Bay. The 1982 year class is the largest since the phenomenal 1970 year class which supported recreational and commercial fisheries during the halcyon 1970's. However, this is now an unlikely scenario because of the tremendous harvest from the 1982 year class throughout Chesapeake Bay this past fall and winter. 1984 harvest records compiled by the Potomac River Fisheries Commission indicate that approximately 85 percent (536,050 pounds) of the striped bass commercial harvest estimated for the entire year in the Potomac River accrued during the last three months (85,545 pounds in October, 240,505 pounds in November and 210,000 pounds in December). This late fall and winter surge resulted in a total harvest minimum of 631,000 pounds of striped bass from the Potomac River during 1984, some 3.8 times more than the harvest recorded in 1983 (164,246 pounds) and over 4.6 times the 136,053 pounds recorded in 1982.

Although final harvest figures compiled by Maryland and Virginia agencies have not as yet been tabulated, preliminary estimates indicate a similar temporal harvest pattern as in the Potomac River (i.e., a relatively modest spring and summer harvest followed by rapid escalation during the fall and winter). Assuming rates of increase in 1984 over the 1983 harvest in Virginia and Maryland waters are comparable to those in the Potomac River (3.8 times greater), the total harvest of striped bass from Chesapeake Bay in 1984 may well exceed 2.2 million pounds. The dramatic decline which occurred in the price of striped bass is further evidence of the increase in Bay-wide harvest in the fall and winter of 1984 (primarily 1982 year class fish). Dockside prices for striped bass plummetted from \$4 per pound in the spring to less than 60

cents per pound in November. This deplorable, although not entirely unexpected, decimation of the 1982 year class of striped bass constitutes a severe set back to on-going efforts to augment woefully deficient broodstocks in Chesapeake Bay. It is essential that as many fish from this 1982 year class (the largest in recent years) be allowed to spawn at least once before harvest in order to insure the future viability of striped bass stocks in Chesapeake Bay.

The politically courageous and ecologically imperative action by Maryland imposing a moratorium on the harvest of striped bass effective January 1, 1985 was an essential first step in the enhancement of future striped bass brood stocks in Chesapeake Bay. Also, the adoption of substantial minimum size limits (24 inches, fork length) by many states north of Maryland will provide additional protection during preand post-spawning migrations of Chesapeake Bay stocks. Another hesitant step in the right direction was taken recently by the Potomac River Fisheries Commission. By a margin of 4 to 2, the commission voted January 14, 1985, to close the Potomac River to striped bass fishing for an additional six weeks from February 16th through March 31, 1985. This action effectively closes the river to striped bass fishing from January 1st through May 30, 1985. Fishing previously was prohibited during the period January 1st through February 15th and from April 1st through May 30th by existing regulations. However, fishing could commence June 1st and continue through the remainder of the year as usual. For all practical purposes, the six-week extension of the closed season will have little, if any, effect on the total annual harvest of 1982 striped bass year class. This action merely postpones the potential harvest anticipated in February/March to later in the year.

Although commendable, these collective actions are not sufficient to insure the redemption of Chesapeake Bay striped bass stocks reeling from years of essentially laissez-faire harvest regulation. Immediate action is required to provide additional protection for the already diminished 1982 year class of striped bass. Without immediate positive action by both the Potomac River Fisheries Commission and Virginia, the prognosis for a rapid recovery of striped bass spawning stocks in Chesapeake Bay is dim indeed. Unless current harvest regulations in effect in these jurisdictions are changed drastically, the 1982 year class must continue to circumvent a veritable gauntlet of nets for the foreseeable future in the Potomac River and Virginia portions of Chesapeake Bay.

It appears to be amply evident from the 1984 harvest data that the 14-inch minimum size limit, modest restrictions on seasons and gear and prohibited fishing areas adopted by Virginia and the Potomac River Fisheries Commission, will not effectively reduce the harvest of the 1982 year class of striped bass to an acceptably low level. These superficial, stop-gap measures have affected only peripheral harvest issues and failed to address the urgent concerns of eliminating or severely curtailing the harvest of the 1982 year class. Much more drastic action is required to restore depleted striped bass spawning stocks.

Also, it seems probable that the level of harvest reduction achieved by these currently enforced regulations is not sufficient to accommodate compliance with the harvest reduction (50 percent) as intended by the current Atlantic States Marine Fisheries Commission Management Plan. Failure to meet the Management Plan's harvest reduction target may be expected to trigger provisions of the recently enacted "Atlantic Striped

Bass Conservation Act" (HR 5492), which mandates that non-compliance with the Interstate Fisheries Management Plan for Striped Bass will result in the declaration by the Secretary of Commerce of a moratorium on all fishing for striped bass within the coastal waters of non-complying states.

In the absence of a total moratorium, it would be only prudent for Virginia and the Potomac River Fisheries Commission to consider a substantial increase in the minimum 14-inch size limit now in effect. A minimum size limit of 20 inches would protect most of the remaining 1982 year class through May of 1986. At this time, the fish will be four years of age, and on average, most of the males and approximately one-fourth of the females will be sexually mature. Approximately half of the females may be expected to be sexually mature at five years of age in May of 1987. By May of 1988, almost all of the females from the 1982 year class will have had a chance to spawn at least once. Therefore, enforcement of a minimum size limit of 26 inches (total length) would restrict harvest to fish that will have spawned at least once, thereby achieving the essential objective of restoring the brood stock

Immediate and responsible action on the part of Virginia and Potomac River Fisheries Commission, in either voluntarily imposing a moratorium or by enacting effective minimum size limit restrictions, is essential until such time as the depleted striped bass brood stocks have increased to a viable level throughout Chesapeake Bay. Anything less will be akin to closing the proverbial barn door after the horse is gone.

OHIO CREEL CENSUS STUDIES

The results of comprehensive creel census studies conducted by the Ohio Department of Natural Resources' Division of Wildlife on 30 Ohio water areas during 1983 were recently released.

The creel census studies were conducted on 13 reservoirs, four tailwater areas, Lake La Su An Wildlife Area lakes, 11 Lake Erie tributary streams and Lake Erie. To gather the data, creel clerks interviewed fishermen in the field and recorded their catches.

Some notable statistics came from inland reservoirs. On the 13 reservoirs studied, boat anglers accounted for 63.4 percent of the effort. It was also determined that about half of all fish caught by fishermen were returned to the water. Crappies and bluegills made up 75.7 percent of the total estimated catch. The estimated total number of fish caught from these reservoirs during 1983 was 1,565,513.

The four tailwater areas studied were O'Shaughnessy, Deer Creek, Dillon and Paint Creek. Collectively, saugeyes and walleyes made up 23 percent of the fish kept from these four tailwater areas, followed by bluegills (18 percent), channel catfish (12.2 percent) and crappies (8.7 percent).

Lakes of the La Su An Wildlife Area are open to fishermen on a permit basis only. Access to the area is strictly controlled, which allowed a direct count of each fisherman's catch. The total catch rate for largemouth bass at La Su An was substantially greater than for any other water area surveyed in 1983, but average length of the bass was smaller. Bluegills harvested at La Su An averaged 6.9 inches in length, larger than bluegills kept from all but one of the surveyed reservoirs.

Salmon and trout fishing on 11 Lake Erie tributary streams were also surveyed during 1983. Coho salmon made up 61

percent of the catch, chinook salmon 5.5 percent, steelhead trout 33.5 percent and brown trout less than 1 percent.

The 1983 comprehensive creel census studies showed that Lake Erie was once again the most popular place for Ohio fishermen. Anglers spent 1,273,848 hours on the big lake last year. These fishermen were seeking, in order of preference, walleye, yellow perch and white bass. It is estimated that fishermen caught more than 1.6 million walleyes from Lake Erie in 1983.

TVA CHIEF CALLS FOR ACTION ON ACID RAIN

Legislative action should be taken to reduce the adverse environmental impact of acid rain according to TVA Director John B. Waters.

"I am satisfied that there is sufficient evidence of a causal connection between fossil fuels and acid deposition to warrant further restraints on sulfur emissions," Waters said, "and I hope that Congress will take appropriate action." He cautioned that with environmental problems, absolute certainty about causes and effects frequently comes "only when our resources are absolutely destroyed." Citing the apparent acid rain damage to forests in West Germany and lakes in Scandinavia, Waters said that we cannot "wait until our own forests are blighted and our lakes are dying before we take steps to protect them."

TVA has already shown that sulfur pollution control can be achieved at a reasonable price to the power consumer.

Waters' speech dealt with a variety of current Tennessee Valley environmental problems. Along with acid rain, Waters referred to:

- Soil erosion problems, primarily in west Tennessee, that are "limiting farm productivity and filling streams and rivers with sediment."
- A report by Governor Alexander's "Safe Growth Team" which had identified 89 Tennessee communities in which substandard wastewater treatment plants are producing regular water quality violations.

OFF THE PRESS

Proceedings of the International Workshop on Age Determination of Oceanic Pelagic Fishes: Tunas, Billfishes and Sharks, edited by Eric D. Prince and Lynn M. Pulos, is partitioned into sections by species and provides an overview of the state of the art, including innovative approaches to resolving the difficult problem of aging oceanic pelagic fishes. Each item in these proceedings was referred by at least three workshop participants and includes 16 full-length papers, nine summary papers, two round table discussions and a glossary. A list of workshop participants is also provided. The volume consists of 211 pages with over 130 figures and plates. The report is free, as long as the supply lasts, and is available from: Eric D. Prince, Southeast Fisheries Center, Miami Laboratory, 75 Virginia Beach Drive, Miami, FL 33149–1099.

Artificial Reef Maintenance, by DeWitt O. Myatt, describes the selection of appropriate types of buoys and approximate costs of buoy systems. Other long-term maintenance requirements include updating buoy condition information, renewing Corps of Engineer's reef construction permits and ensuring the artificial reef is charted. Also discussed are alternatives for controlling maintenance costs, possible avenues for funding long-term expenses and recommendations to insure that an appropriate entity assumes maintenance responsibilities.

This is Report No. 2 of the Artificial Reef Development Center's Technical Report Series. It is available for \$5 from the Publications Department, Sport Fishing Institute, 1010 Massachusetts Avenue, NW, Suite 100, Washington, DC 20001.

Liability Concerns in Artificial Reef Development, by Patricia R. Collins, identifies potential situations of liability throughout the artificial reef process and makes some recommendations to overcome these concerns. Potential liability for injuries, loss or damage resulting from construction or maintenance of a reef will involve many different parties: material donors, reef contractors, volunteer transporters, permittees, as well as state and federal permitting agencies. Since there is a dearth of case law involving artificial reefs, this study seeks to analogize artificial reef scenarios to similar situations which give cause to legal actions in negligence, nuisance and strict liability.

This is Report No. 3 of the Artificial Reef Development Center's Technical Report Series. It is available for \$8 from the Publications Department, Sport Fishing Institute, 1010 Massachusetts Avenue, NW, Suite 100, Washington, DC 20001.

Transportation Costs of Artificial Reef Materials, by Richard T. Christian, reviews artificial reef projects in 17 states to identify the costs of transportation for various types of reef materials. There are several factors affecting the overall cost of deploying a reef, but transporting materials offshore from the dockside staging site to a permitted artificial reef site is typically where the majority of the cost will be incurred. This cost depends on the type and amount of materials to be used as well as the type of equipment required for transporting the specific material.

This is the Artificial Reef Development Center's Technical Report No. 4, available for \$5 from the Publications Department, Sport Fishing Institute, 1010 Massachusetts Avenue, NW, Suite 100, Washington, DC 20001.

Aeromonas Hydrophila and Motile Aeromonad Septicemias of Fish, by Rocco C. Cipriano, G.L. Bullock and S.W. Pyle, is a revision of Fish Disease Leaflet 40, "Diseases of freshwater fishes caused by bacteria of the genera Aeromonas, Pseudomonas, and Vibrio," by S.F. Snieszko and G.L. Bullock. The new edition is Fish Disease Leaflet 68 and is available free from: Technical Information Services, National Fisheries Center, Box 700, Kearneysville, WV 25430.

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Mysid Research Group Newsletter Volume 9, No. 1 April 1987 Dear Colleagues: I am sorry for the long delay between newsletters, but Eric Bergersen and I have been working to promote the creation of another Mysid symposium. We have encouraging developments to report here. Eric and I have been designated as program chairpersons for two symposia, both associated with meetings of the American Fisheries Society. One will be a 1 or 2 day symposium preceding the Colorado/Wyoming AFS Chapter meeting in Fort Collins, Colorado, USA in March 1988. The second symposium will be a concurrent session within the national AFS meeting in Toronto, Canada in September 1988. We have sponsorship support from the Colorado/Wyoming AFS Chapter, the AFS Fisheries Management Section, and the AFS Western Division. The theme of both symposia will concern the interactions between fish species and mysids, with emphasis upon subsequent impacts to fisheries. We would like the symposia to include: 1.) case history summaries of lake fisheries where mysids have been detrimental or beneficial, 2.) investigations of how mysids and associated fish species interact as predators and competitors, 3.) how the ecology of mysids poses special problems for fisheries management, and 4.) what are the potential alternatives open to managers that must cope with these problems. We anticipate that the Fort Collins meeting will deal exclusively with this theme due to the widespread impact of Mysis relicta introductions in western salmonid fisheries and the emerging problems resulting for fisheries management. The Colorado/Wyoming AFS Chapter

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has agreed to support this meeting through providing the necessary arrangements and facilities. For the annual Chapter meeting immediately following the symposium, we are tentatively arranging a program dealing with the use of exotic forage organism introductions in fisheries management projects. Hopefully, the Chapter meeting program will be sufficiently interesting to permit symposium attendees to justify extending their visit to include all or part of the 2-day Chapter meeting.

We expect the Toronto meeting may be more diversified, including papers on the role of mysids in their respective ecosystems, life history aspects, bioassay uses, etc, as well as fish species interactions. We have been permitted a whole day to conduct this session, and thus have a considerable time frame within which to plan the program. One consideration is to use a panel discussion format dealing with mysid-gamefish interactions as well as individual papers.

Eric and I are in the process of contacting people or agencies that deal directly with waters containing mysids to solicit contributions. Through this newsletter, we are inviting all of the MRG members interested to participate in one or both of the above meetings. We are relying on the expertise within this group to provide a significant portion of the contributed papers. What we need to know now is how many of you are willing and able to attend one meeting (which one?), or both meetings; and whether you intend to contribute a paper(s)? If you can provide us with a title and an informal abstract, we would also like to see those, but that is not necessary at this early date. We need to establish the degree of participation expected for each symposium to justify to our sponsors that the programs will be worthwhile. We have also been encouraged to check with the editors of <u>Transactions</u> and the <u>North American</u> Journal of Fisheries Management regarding publishing the combined proceedings of the two symposia. Please let us know at your earliest convenience if you will attend and paper titles. We would also encourage you to spread the news of these meetings to others who may be interested in participating.

Bibliographia Invertebratorium Aquaticorum Canadensium

I would also like to make you aware of the above titled publication produced by the Zoology Division of the National Museums of Canada. Volumes 1, 2, and 6 contain specific information on Mysidacea authored and edited by Diana Laubitz, Ian Sutherland, Nishi Sharma, Penelope Adams, and Chang-tai Shih. If interested in obtaining copies, write to National Museums of Canada, Zoology Division, Ottawa, Ontario, K1A OM8.

News from MRG Members

I have received letters from Lars Rudstam in Sweden, and from Gheorghe Voicu in Romania. They include their recent activities, results, and publications. I have inserted their correspondence in this newsletter for your information so please read them through.

To the Mysid Research Group Newsletter

A note from the Baltic Sea

Mysids have too long been neglected by Baltic researchers. Fortunately, they are now becoming increasingly popular as study objects; an interest that has been inspired by the observed changes in zooplankton faunas in lakes were mysids have been introduced. The open water mysids (Mysis relicta and Mysis mixta) are studied at the marine laboratories of the University of Stockholm (Askö Laboratory) and of Helsinki University (Tvärminne Zoological Station). Our investigations have shown that these mysids are an important component of the Baltic ecosystem with densities of 30 -300 \inf/m^2 in areas with oxygenated bottoms. There is a change in the dominant Mysis species from Mysis relicta in the less saline northern Baltic to Mysis mixta in the region south of Stockholm. In the north these species have a one or a two year life cycle; in the south most individuals mature in one year. We are currently investigating effects on zooplankton with experiments and stomach analysis. Preliminary calculations show that Mysis mixta may consume up to 50% of the zooplankton production in the Stockholm region.

The ecology of the literal Neomysis integer is studied at Rostock University, DDR. Results from bioenergetic experiments, feeding experiments, stomach analysis, and extensive field sampling have been combined to give a comprehensive view of the possible importance of this mysid as a zooplantkon predator in a chain of semi-enclosed bays in the southern Baltic Sea.

Three papers recently appeared in Ophelia, supplement 4 (the proceddings of the Baltic Marine Biologist's meeting in Abo, 1984):

Rudstam, L.G., S. Hansson and U. Larsson: Abundance, species composition and production of mysids shrimps in coastal area of the Baltic Proper, p 225-238, (address: Lars Rudstam, Askö Laboratory, University of Stockholm, S-10691 Stockholm, Sweden);

Salemaa, H., K. Tyystajärvi-Muuronen and E. Aro: Life histories, distribution and abundance of Mysis mixta and Mysis relicta in the northern Baltic Sea, p 239-247 (address Heikki Salemaa, Hydrobiological Laboratory, University of Helsinki, Fabianinkatu 24A, SF-00100 Helsinki, Finland);

Arndt, E.A. and W. Jansen: Neomysis integer (Leach) in the cahina of Boddens south of Darss/Zingst (Western Baltic) - Ecophysiology and population dynamics, p 1 - 15 (address: Ernst Albert Arndt, Department of Biology, Wilhelm Pieck University, Freiligrathstr. 7/8, GDR-2500 Rostock 1, GDR)

Please contact the authors if you are interested in reprints or further information.

Lars Rudstam, address above.

Loes Fuch

Dear Mr Nesler,

I was very satisfacted to receive MRG - Newsletter, vol. 8, No. 2, of

December 1985. Thank you very much for your kindness and for your nice thought

I was very interested in the content, statring from the Workshop Summary

and finishing with your recommendations which will undoubtedly constitute a

I, Gheorghe Voicu, one of the co-authors of the communication presented at the symposium of Sweden: "Importance of statoliths for the study of mysid ecology, paleontology and systematics", am a geologist-paleontologist; I was a researcher in the oil, coal and salt industries from Romania. My researches, having in view geological-economical data, have identified for the first time the statoliths of fossil mysids - previously attributed to different animal and vegetal groups and even to minerals -, I have deciphered the statolith structure (previously unknown) of two fossil taxa: Paramysis mihaii, P. vancouveringi and of four recent taxa: Paramysis kroeyeri, P.kessleri sarsi, Mesopodopsis slaberi and Praunus flexuosus.

I congratulate you of all my heart that you have given Prof.A.P.Ariani, from the University of Naples and his co-workers the opportunity to present for the first time in the Mysidologist world, this relatively recent chapter of neo- and paleozoology, the "Statolithology". Its scientifical and practical consequences are still unknown. It is thus sufficient to look at the SEM micrography of figure 3a and 3b (Plate 6 of the study "Upper Miocene and recen Mysid statoliths...", Micropaleontology, 27/3 1981) which presents a vast neural system, still unelucidated.

I shall be very interested in problems concerning statoliths: ecology, paleontology, systematics, phyllogeny etc., presented in MRG - Newsletter.

Now, partly answering your recommendations, I am joining to my letter the bibliographic list of works published on fossil and recent statoliths, starting from the data when the statolithology was elaborated (1972) and up to February the 1st, 1986.

Thank you very much,
Yours faithfully

Yours faithfully, Show Gheorghe Voicu

My address is: Dr. Gheorghe Voicu str. Masina de Pîine 2 Bl.32 A, sc.B, ap.56; 72214 <u>București</u> 10 Romania Europa

LIST OF WORKS ON RECENT AND FOSSIL MYSID STATOLITHOLOGY, FROM ITS ELABORATION (1972) AND UP TO FEBRUARY THE 1st. 1986

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Another Mysis Meeting

The 15th Annual Kokanee Conference was held March 31-April 1 in Kalispell, Montana, and emphasized the study and management of kokanee fisheries, particularly where kokanee compete with introduced mysid shrimp. Proposed sessions included:

- Changes in zooplankton community structure associated with mysid shrimp introductions.
- Age and growth of kokanee in large lakes; techniques and interpretation; mortality estimates of juvenile kokanee; abundance estimation techniques.
- Enhancing declining kokanee stocks.

We do not know if any summary of the proceedings of this conference will be made available, but interested persons should contact Will Beattie, Fisheries Biologist, Montana Department of Fish, Wildlife and Parks, P.O. Box 67, Kalispell, Montana, 59903, USA.

The Membership List

The 1987 list of members associated with the Mysid Research Group is included at the end of the newsletter.

Mysis in a tailwater trout fishery - T. Nesler

Mysis relicta were planted in Ruedi Reservoir, Colorado, USA in the early 1970's as a potential forage organism for the lake's trout and salmon populations. The success of these plants were not verified until 1983, when I first sampled Mysis in quantity. Now, in 1986, the tailwater fishery in the Fryingpan River below Ruedi Dam is being described as a world class fishery, producing 18-inch rainbow trout that are 5-6 lb. The cause of this successful fishery is being attributed to the entrainment of dense concentrations of Mysis relicta in the discharge flows from Ruedi Reservoir. The trout are exploiting Mysis as an easy food source.

MYSID RESEARCH GROUP 1987 Allen, Dennis Behnke, Robert Marine Field Laboratory Dept. Fish & Wildl. Biology P.O. Box 1630 Colorado State Univ. University of South Carolina Ft. Collins, CO 80523 USA Georgetown, SC 29442 !(Mysis relicta introductions)! !(estuarine Mysid population dynamics)! Almeida Prado-Por, Dr. M.S. (Mrs.) Bergersen, Eric Dept. Zoology Colo. Coop Fish. Unit Hebrew Univ. of Jerusalem 201 Wagar, Colo. State Univ. Ft. Collins, CO 80523 USA Jerusalem, ISRAEL Astthorsson, Dr. O.S. Bhattacharya, S.S. Hafrannsoknastofnunin Marine Res. Inst. Dept. Zoology P.O. Box 390 Siddharth College Skulagata 4. 121 Reykjavic, Iceland Univ. of Bombay Bombay 400 023, INDIA !(Biology of Mysids in Icelandic waters)! !(estuarine Mysid ecology)! Ariani, Sign. Prof. Dr. Antonio P. Boothe, Billy, B., Jr. Natural Encounters Instituto E Museo di Zoologia Della Universita di Napoli P.O. Box 49274 Via Mezzocannone, 8 Sarasota, FL 33578 USA 80134 Napoli, ITALY !(Mysidaces cavernicoles; development! ! of statoliths)! Attramadal, Yngve Oye Havbruk A/S Bowers, Jim Great Lakes Research Div. P. O. Box 66 Univ. Michigan N-4484 Oyestranda NORWAY Ann Arbor, MI 48109 USA !(Ecology, behavior, functional! !morphology & culturing of marine mysids)!

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!(feeding of Neomysis)!

Raddum, Gunner Univ. Bergen Zoology Museum 5014 University Bergen, NORWAY

Nero, Dr. Redwood W. Dept. Zoology, Erindale College Univ. of Toronto Mississauga, Ontario, CANADA L5L 1C6

Reynolds, James
Alaska Coop Fish. Res. Unit
211 Irvin Bldg.
Univ. Alaska
Fairbanks, AK 99701 USA
!(mysid use in fish management)!

Nesler, Thomas
Colo. Div. Wildlife
317 West Prospect
Ft. Collins, CO 80626 USA
'(Mysis/gamefish/zooplankton interactions):

Richards, Bob
Tahoe Research Group
U.S. Davis
P.O. Box 633
Tahoe City, CA 95730 USA
!(behavior and migration of Mysis)!

Nimmo, Del Wayne
U.S. EPA, Reg. VIII
1860 Lincoln St.
Denver, CO 80295 USA
'(mysid toxicity testing):

Riddoch, Bruce Dept. Human Sciences (Ecology) Univ. of Technology Loughborough, Leics', U.K

Panampunnayil, Dr. S.U. Regional Centre Nat. Inst. of Oceanography B.P. No. 1913 Cochin 682018, INDIA

Rieman, Bruce Idaho Fish and Game 2320 Government Way Cour d'Alene, ID 83814 USA !(kokanee-mysid interactions)!

Roff, John Dept. Zoology Udrescu, Aurel Musee D'Histoire Naturelle Univ. Guelph Guelph, Ontario; CANADA N1G 2W1 1. Chaussee Kisselef Bucuresti 79744 ROMANIA :-!(mysid taxonomy-phylogeny): Rudstam, Lars Van Duyn, Josee A. Asko Lab. Dept. Biology, Trent Univ. Inst. for Marine Ecology Petersborough Univ. of Stockholm, S-106 91 Ontario, CANADA K9J 7B8 Stockholm, SWEDEN !(Mysid feeding ecology, role in: sediment/water transfer of heavy metals): Salemaa, Heikki Vainola, Risto Hydrobiol. Lab. Dept. Genetics Univ. Helsinki Univ. of Helsinki, Fabianinkatu 24 Arkadiankatu 7 SF-00100 Helsinki, FINLAND SF-00100 Helsinki, FINLAND Sanford, Gordon Vijverberg, J. Antigua Shimpery, Ltd. Limnological Institute P.O. Box 216 8536 VD Oosterzee, NETHERLANDS St. Johns, Antigua, WEST INDIES Seale, Diane Voicu, Gheorghe Center or Great Lakes Studies Masina de Piine St. nr. 2 Univ. of Wisconsin-Milwaukee Post Office 10 Milwaukee, WI 53201 USA 72214 Bucharest, ROMANIA Stout, Vida Waite, Roger Dept. Zoology Dept. Zoology Univ. of Canterbury Univ. of Canterbury Christchurch, NEW ZEALAND Christchurch 1, NEW ZEALAND !(Tenagomysis feeding and pop. dynamics)! Toda, Hideshige Ward, Stephen H. Inst. Biol. Sciences Univ. Tsukuba Regional Office 11 Sakura-mura, Ibaraki 305, JAPAN Edison, NJ, 08817 USA !(ecology of Neomysis)! !(Mysid culture, ecology, use in: !acute/chronic toxicity testing)! Tyystjarvi-Muuronen, Kati Wittmann, Dr. Karl Dept. Limnology Institut fur Allgemeine Biologie Univ. Helsinki Viikki der Universitat Wien SF-00710 Helsinki, FINLAND Schwarzspanierstrasse, 17 A-1090 Wien, IX, AUSTRIA Wooldridge, Tris Dept. Zoology Box 1600 Univ. Port Elizabeth Port Elizabeth 6000, SOUTH AFRICA

May & 7 Mysids —— Owy A75 Spmp -08

Behnke, Robert
Dept. Fish & Wildl. Biology
Colorado State Univ.
Ft. Collins, CO 80523 USA

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NEWSLETTER

OF

SYSTEMATIC ICHTHYOLOGY

Number Twelve



Department of Ichthyology California Academy of Sciences Golden Gate Park San Francisco, California 94118

Newsletter of Systematic Ichthyology

This is the twelfth issue of the annual Newsletter. Its purpose is to increase communication between persons engaged in systematic studies of fishes. It is definitely informal, not a publication. Our definition of systematics is very broad, such that any study (e.g., ecological) that might provide information useful in systematics can be included.

Forms are distributed in September. Participants provide a synopsis of their current research activities and bibliography of recent publications and manuscripts in press. Announcements of general ichthyological interest are encouraged. We assemble, photo-reduce, and index these to produce the final copy.

The next issue will be about December 1991. All who participated this year will receive a form for the 1991 issue. Anyone else wishing to participate should send their name and address to: Newsletter, Department of Ichthyology, California Academy of Sciences, Golden Gate Park, San Francisco, California 94118 USA.

Cost: United States participants \$3 donation (cash or check to "California Academy of Sciences"). Non-United States participants free, unless you can send dollars, or checks drawn in U.S. dollars. Cost to non-participants \$4 per issue.

We have been pleased with the many non-U.S. participants who have provided dollars or checks drawn in U.S. funds. Several persons contributed extra amounts for which we are grateful.

We retyped the literature section again; we apologize for any typographical errors that may have been introduced. For the 1991 issue, we hope to be able to retype everything and produce camera-ready copy using desk-top publishing software (we used Ventura for the Literature and Index this year).

Assistance for production of this issue was provided by Mysi Dang Hoang, Pearl Sonoda, David Boughton, and other Dept. of Ichthyology staff. Pearl also is the treasurer.

William N. Eschmeyer

Tomio Iwamoto

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GOMES, U. L. Professor. Universidade do Estado do Rio de Janeiro. Instituto de Biologia. Departamento de Biologia Animal e Vegetal. Rua Sao Francisco Xavier nº524 CEP 20550. Rio de Janeiro, RJ. Brasil

Current work: Redescription of Schroederichthys tenuis Springer, 1966 (Scyliorhinidae) with M. R. Carvalho. Description of the head morphology, musculature and head skeleton of Odontaspis noronhai Maul, 1955 (Odontaspididae) with A. E. Medina.

Tomas, A. R. G., L. A. Zavala-Camin and U. L. Gomes (1988). Ocorrência de espécies da família bramidae (Teleostei) no sudeste e sul do Brasil. B. Inst. Pesca 15 (2):229-235

MORALES, A. (Professor of Zoology) & ROSELLO, EUFRASIA (Laboratory Assistant), Dept. Biologia (Facultad Ciencias), Universidad Autonoma de Madrid - E - 28049 Madrid, Spain. Tel. (1)3974546

Current work: (1) Study of the medieval fishes from La Cartuja Monatery (Sevilla, Spain); (2) osteology of mugilids from Spanish waters; (3) analysis of paleolithic fishes from a freshwater site (shelter) in the Basque country; (4) modern fish middens from Senegal; (5) fishes from Maya sites. Long-range studies include: (1) Analysis of fish faunas from Spanish archaeological sites; (2) analysis of exploitation strategies in Spanish archaeological sites as evidenced by studies of sizes, taxonomic diversity, butchering & processing techniques (also with historical documentation) and skeletal representativity; (3) comparative and phylogenetic osteology of Spanish fish faunas; (4) skeletochronological studies of modern and subfossil fishes; (5) biogeographic and evolutionary studies of Spanish endemisms and fish faunas in general; (6) computerized and morphotypical approaches to fish osteomorphology.

Rosello, E. (1988) Contribucion al atlas osteologico de los teleosteos ibericos, I. dentario y articular. - Publicaciones de la Universidad Autonoma de Madrid. Coleccion Estudios nº14, 388 pp.

Morales, A. & E. Rosello (In press) Commentaires au sujet de la determination de l'occupation saisonniere dans deux gisements paleolithiques du nord de l'Espagne. - l'Anthropologie 93 (3):111-116.

Rosello, E. & A. Morales (1990) - Global patterms of skeletal abundance in Spanish ichthyoarchaeological assemblages. In: Fernandez, S. (ed) "Reunion de tafonomia y fosilizacion". Dept. Paleontologia, Universidad Complutense. Madrid: 319-325.

SYNOPSIS OF RESEARCH ACTIVITIES

ABE, TOKIHARU University Museum, University of Tokyo, Hongo, Tokyo, Japan 113

Current work: (1) study of ichthyofauna of Sagami Bay; (2) systematics of the family Tetraodontidae; (3) systematics of the family Exocoetidae; (4) identification of garden eels of Japanese waters.

ACERO P., A. Profesor Asociado, Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Apartado 1016 (INVEMAR), Santa Marta, Colombia (954) 230530, 235410

Current work includes: (1) description of five new species of Caribbean fishes in the following genera: Ogcocephalus, Chaenopsis (2 spp) and Emblemaria (2 spp); description of three new species of Pacific fishes (Alectis, Lutjanus and Opis'ognathus); preparation of a large manuscript on the Colombian Caribbean reef fishes.

ÅHLANDER, ERIK I. Collection Manager. Swedish Museum of Natural History, Department of Vertebrate Zoology, Box 50007, S-104 05 Stockholm, Sweden. Tel. X46-8-6664118, Telefax X46-8-6664212.

My biography of NRM collectors will take some more years to finish. A new species of <u>Laetacara</u> (Cichlidae) will be described (with Sven O. Kullander). A revisional study of small <u>Channa</u> species (Channidae) is planned.

AKTHITO. Akasaka Imperial Palace, 2-1-8, Moto-akasaka, Minato-ku, Tokyo 107, Japan

Taxonomical studies continue on species of the genera $\underline{\tt Cristatogobius}$ and $\underline{\tt Ophieleotris}$.

ALLEN, GERALD R. Senior Curator, Dept. of Ichthyology, Western Australian Museum, Perth, W.A. 6000, Australia. (09) 328-4411; FAX (09) 328-8686

Current work includes: (1) FAO species identification sheets for E. Pacific Lutjanidae; (2) review of freshwater electridid genus Mogurnda of New Guinea (with D. Hoese); (3) survey of fishes of the Ramu River, Papua New Guinea (with L. Parenti); (4) mangrove fishes of Bintuni Bay, Papua New Guinea; (5) revision of Plotosidae (with N. Feinberg); (6) fieldguide to reef fishes of northern New Guinea; (7) preparation of book on reef and shore fishes of the tropical eastern Pacific (with D.R. Robertson). Recently completed projects include two books: Fishes of the Great Barrier Reef and Coral Sea (with J. Randall and R. Steene) and Fieldguide to freshwater fishes of New Guinea. Field work in 1991 will consist of marine fish collecting on the Kimberley coast of northern Western Australia during September.

ALLEN, M. JAMES. Senior Scientist, MBC Applied Environmental Sciences, Costa Mesa, CA 92627. (714)-646-1601.

Current and recent work includes: 1) ecology of early life history stages of demersal fishes of the lagoon and nearshore habitats of southern California; 2) ecology of California halibut (Paralichthys californicus); 3) community ecology and functional morphology of demersal fishes of the Bering Sea and southern California; and 4) distribution and zoogeography of common fishes in the Bering Sea and Northeastern Pacific.

ALMACA, C. Professor, Director of Museu Bocage, Museu Bocage, Faculdade de Ciencias, Rua da Escola Politecnica. 58, 1200 Lisboa, Portugal.

Taxonomy, evolution, biogeography and conservation of freshwater and amphibiotic fish.

Almeida, A. J. Professor, Departamento de Zoologia a Antropologia, Seccao de Biologia Maritima e Oceanografia Biologica, Faculdade de Ciencias de Lisboa, C-2 1700 Lisboa, Portugal.

Current work includes: (1) Systematics of Blenniidae; (2) ichthyofauna of the eel-grass ($Zostera\ marina\ and\ Z.\ noltii)$ in Portugal.

ANDERSON, M. ERIC. Senior Ichthyologist, J.L.B. Smith Institute of Ichthyology, Pvt. Bag 1015, Grahamstown 6140, South Africa. Tel. (0461) 27124.

I am making good progress on my tome on the Zoarcidae, with several new characters and new interpretations discovered since 1983. This is a beast, though. Other projects to focus on in 1991 include a new Antarctic Lycenchelys, actually start the Parabrotulidae study, start the eastern Pacific Lycenchelys review, look at the macrourids of South Africa seriously, and finish the South American zoarcid review with A.E. Gosztonyi (out in April-May??).

Non-systematic research for the near future includes a look at deep-sea benthic fish communities off the western coast of SA and some Paleozoic fossil hunting among the Devonian to Permian strata of SA.

ANDERSON, WILLIAM D., JR. Professor of Biology, Grice Marine Biological Laboratory, College of Charleston, 205 Fort Johnson, Charleston, South Carolina 29412 (803) 795-7754 or 795-3716; FAX (803) 795-6412

Current work includes: Revision of the Cal anthiidae with G. D. Johnson and C. C. Baldwin.

ARRATIA, Gloria, Museum of Natural History, The University of Kansas, Lawrence, Kansas 66045-2454; Tel. (913)864-3279, Fax (913)864-5335.

Current work includes: (1) phylogenetic relationships of primitive teleosts, fossil and living; (2) continuation of the description of the caudal skeleton of teleosts; (3) development and homology of the suspensorium of ostariophysans; (4) description and phylogenetic studies of trichomycterines; (5) revision of Cheirolepis (with R. Cloutier); (6) the plesiomorphic sister group of teleosts (with G. Lauder and H.-P. Schultze); (7) ontogeny and osteology of Lepidosiren (with J. Casciotta); (8) the palatoquadrate and its ossification: development and homology within osteichthyans (with H.-P. Schultze, submitted).

AZEVEDO, JOSE MANUEL. Dept. Biologia, Univ. dos Açores, 9502 Ponta Delgada Cedex, Açores, Portugal. Tel. 096.35320 FAX 096.35370.

Continuing work on the ichthyofauna of Azores, Portugal, in collaboration with Ana I. Neto.
Current work includes: (1) revision and updating of the collections of the Museu Carlos Machado; (2) study of the role of fishes on the littoral food chains.

BALART, EDUARDO F. Professor, Laboratorio de Zoología, Instituto Tecnológico de Los Mochis. Apdo. Postal 766, Los Mochis, Sin., Mexico 81200. (681) 25858

Current work includes: (1) Osteological development of teleost fishes; (2) study of the coastal ichthyofauna of North of Sinaloa, Mexico 8; a survey of Gulf of California (south part) ichthyoplankton is being carried out.

BALDWIN, CAROLE C. Graduate Student, College of William and Mary, Virginia Institute of Marine Science, Gloucester Point, VA 23062 (804) 642-7338

Currently working on dissertation entitled "Larvae and Relationships of Indo-Pacific Anthiinae" under the direction of G. D. Johnson (USNM) and J. E. Olney (VIMS). I anticipate the following papers resulting from this study: (1) "Phylogeny of the Epinephelinae" (with Johnson), to be included in the proceedings of the ASIH 1990 Percomorph Phylogeny Symposium); (2) "Anthiine Genera: An Analysis of Current Concepts"; (3) "Descriptions of Larvae of Indo-Pacific Anthiinae" and (4) "A Preliminary Hypothesis of Anthiine Phylogeny Based on Cladistic Analysis of Larval and Adult Morphology."

BANARESCU, PETRU M. Institute of Biology, Laboratory of Evolutionary Biology, Str. Frumoasa 31, Corp. B, R. 78116 Bucuresti, Romania

Current work: (1) Elaboration of addenda and alphabetic Index for all J vols. of Zoogeography of Fresh Waters, to be published in vol. 3; (2) finishing of elaboration of vol. 5 of Fresh Water Fishes of Europe and beginning of vol. 4; (3) Regional distribution of fish species in the Danube River basin; (4) with T. Nalbant: description of a new Leuciscus from southern Romania; (5) with M. Goren and T. Nalbant: issue Fresh water fishes in "Fauna Palaestina"; with T. Nalbant, systematic status of Black Sea Trachurus.

BAST, HANS-DIETER Biologist, Karl-Marx-Strasse 65, Rostock 1, D - 2500, Germany

Because of the ongoing restructuring of scientific institutions, I am not in the state now to make propositions for my future work. Probably my collection will be given mainly to the Zoological Museum, Berlin.

BATH, H. Luisenstr. 45, 6780 Pirmasen, West Germany.

Current work includes: (1) Tribus Blenniini and Parablenniini, genus <u>Praealticus</u> Schultz and Chapman 1960; genus <u>Salarias</u> Cuvier 1817.

BAUCHOT, Marie Louise, Sous-Directeur, Laboratoire d'Ichtyologie générale et appliquée, Muséum national d'Histoire naturelle, 43 rue Cuvier, 75231 Paris Cedex 05, France.

Current work includes :

- 1) Catalogue of types of the sub-order Gobioidei ;
- 2) Historical research on the ichthyology in France in early XIX century, specially on collectors.

BEGLE, DOUGLAS P. Division of Fishes, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079 (313) 747-2192 Bitnet USER6CLJ@UMICHUB

Current work includes study of the intrarelationships of Argentinoidei, specifially the relationships of families within the Argentinoidea and Alepocephaloidea; analysis of the evolution of branchial morphology in the Argentinoidei; study of the evolution of caudal skeletal morphology in osmeroids and argentinoids; analysis of the relationships of osmeroids, argentinoids, salmonoids, neoteleosts and other euteleosts. I am now in the writing stage and plan to complete my dissertation in the spring of 1991.

Behnke, Robert J. Dept. fo Fishery and Wildlife Biology, Colorado State University, Fort Collins, CO 80523. (303)491-5320.

Completed revision of monograph on western North American trouts ($\underline{Oncorhynchus}$, formerly \underline{Salmo}) and submitted manuscript to American Fisheries $\underline{Society}$.

Bentivoglio, Antonio A. Ph.D. Student, Dept of Biology University of California, Los Angeles, CA. 90024-1606.

Will continue work on <u>Coryphaena hippurus</u> in the Gulf of Mexico starting on the population genetics of proposed local populations. Will also start work on the systematics of the Serranids.

Major professor: D.G. Buth

BEN-TUVIA, ADAM, Professor Emeritus, Department of Zoology, The Hebrew University of Jerusalem, 91904 Jerusalem, Israel tel. (02)585873; FAX 666804

Current work includes: (1) systematics of the eastern Mediterranean fishes; (2) the impact of Red Sea immigrants on the eastern Mediterranean fish communities; (3) review of fisheries management of Lake Tiberias.

BERRA, TIM M. Professor of Zoology, The Ohio State University, Mansfield, OH 44906 (419) 755-4011.

Current work includes: (1) population structure and development of Lepidogalaxias, (2) natural history notes on megamouth shark, Megachasma; (3) Notropis cornutus and N. chrysocephalus in sympatry; (4) resource partitioning among darters, Etheostoma, in Ohio stream; (5) historical distribution of rockbass, Amploplites, with Bob Cashner and Dan Cloutman; (6) book ms "A Natural History of Australia (for Yanks)". I am hoping to get to the Northern Territory of Australia within the next few years to study life history of nurseryfish, Kurtus gulliveri.

BERTiMAR, GUNNAR. Department of Animal Ecology, Umea University, S-901 87 Umea, Sweden.

Current work includes: orientation mechamisms in river lamprey $\underline{\mathsf{Lampetra}}$ $\underline{\mathsf{fluviatilis}}$, brown trout $\underline{\mathsf{Salmo}}$ $\underline{\mathsf{trutta}}$ and whitefish $\underline{\mathsf{Coregonus}}$ $\underline{\mathsf{lavaretus}}$.

BIANCO, PIER GIORGIO. Dipartimento di Scienze Ambientali Università, 67100 L'Aquila, Italy tel. 0862/433238

Current work includes: (1) Taxonomy and Zoogeography of freshwaterfishes from Italy and SE Europe; (2) Conservation of freshwater fishes and vanishing species in Italy; (3) Use of ichthyological indexes for the evaluation of safety status of fish species at local or regional level; (4) several species description for the books on freshwater fishes of Europe.

BOESEMAN, M. Emeritus Curator of Fishes, Rijksmuseum van Natuurlijke Historie, Raamsteeg 2, POB 9517, 2300 RA Leiden, Netherlands

Research on 17th century pictures of Brazilian animals from the Archives of the USSR Academy of Sciences in Leningrad was completed with the collaboration (for mammals, reptiles and crustaceans) of colleagues of the Leiden Rijksmuseum. It is hoped to be published before the end of this year. Title: Seventeenth century drawings of Brazilian animals. In: Zoologische Verhandelingen, Leiden.

Some research on South American catfish continues.

BOHLKE, EUGENIA B. Museum Specialist, Department of Ichthyology, Academy of Natural Sciences, 19th and The Parkway, Philadelphia, PA 19103 (215) 299-1025

Continuing research on Indo-Pacific morays, especially <u>Gymnothorax</u>. Continuing updating of ANSP types and collection information.

BORNBUSCH, ALAN H. Dept. of Biological Sciences, Smith College, Northampton, MA, 01063, 413-585- 3819.

Ongoing projects include some listed in 1989 Newsletter and new ones: (1) preparation of a ms. on silurid relationships, based on dissertation & new work; (2) revision of the silurid genus Kryptopterus: (3) pectoral musculatures of catfishes; (4) phylogenetic studies of bullhead catfishes (Ictaluridae), using allozyme data (w/ J.G. Lundberg); (5) SEM studies of gill raker morphology & development in engraulids (w/ M. Lee, Smith '92).

BOR, TACO J. P.A. de Genestetstraat 102, 3362TH Sliedrecht, The Netherlands.

Current work includes: (1) study and description of elasmobranch teeth from the Upper Cretaceous and Tertiary of The Netherlands and Belgium; (2) study of modern shark and ray teeth.

The description of a new species of fossil mobulid ray, <u>Plinthicus kruibekensis</u>, from the Oligoceme Boom Clay of Belgium has been published this year.

BRIGGS, JOHN C. 1260 Julian Drive, Watkinsville, GA 30677 (404) 725-1402. Professor Emeritus, University of South Florida, Department of Marine Sciene, St. Petersburg, FL 33701

I have retired and moved to Georgia. This location is close to Athens and the University of Georgia. The fine library facilities at this institution are a boon to my research in biogeography. My long-term project is a book on global biogeography which will give an equal emphasis to marine and terrestrial distributions. Smaller projects which have resulted in papers being considered for publication are: (1) Antitropical Patterns in Biogeography: Origin and Significance, (2) The Marine East Indies: Center of Origin?, and (3) Cretaceous-Tertiary Mass Extinction?

BRZOBOHATY, R. Professor, Dept. Geol. and Paleontology, Masaryk University, Koltarska 2, 611 37 Brno. CSFR

Current work: (1) The systematic revision of otoliths of the west Carpathian Miocene, (2) long-range studies of Miocene and Oligocene otolith fauna from Austria and Moravia.

BUCKUP, PAULO A. Doctoral Student, Division of Fishes, Museum of Zoology, University of Michigan, Ann Arbor, Michigan 48109-1079, U.S.A. Phone: (313)747-2192 FAX:(313)747-0884. E-mail: USER6AFM@UMICHUB.BITNET

The phylogenetic and systematic revision of the Characidiinae (Characiformes), my Ph.D. dissertation under the direction of Dr. W.L. Fink, will be completed early in 1991. Progress has been made on the phylogeny of major groups Characiformes, and this line of research will be intensified in 1991. Pending approval of support, a major project to build an international database of specimens in Neotropical collections will be started in 1991. The database system will incorporate an interactive computerized mapping feature. As a preliminary step I have already developed a mapping program called FishMap which produces publication-quality distribution maps. Investigation on the systematics of Heptapterus (Pimelodidae) continues slowly as a side project. Still of interest: ostariophysan biogeography and plate tectonics (with B.S. Dyer).

BÜRGIN, TONI, Ph.D. c/o Paläontologisches Institut und Museum der Universität Zürich Künstlergasse 16, CH-8006 Zürich, Switzerland

I am presently finishing a manuscript on the Middle Triassic actinopterygian fishes of Monte San Giorgio (Southern Switzerland). This study will contain the description of about 45 species classified under more than 30 genera. Many of the individual taxa will be new to science. Besides this main study I am preparing a review article on the jaw mechanism in soleid flatfishes.

BURR, BROOKS M. Professor and Curator of Fishes, Dept. of Zoology, Southern Illinois University, Carbondale Illinois 62901-6501; (616) 453-4112

Current work includes: (1) description of the palezone shiner (with M. L. Warren, Jr.); (2) biology of the bluehead shiner (with Dean E. Fletcher; (3) drainage relationships of Kentucky and Tennessee based on selected fish distributions (with M. L. Warren, Jr.); (4) relationships of Phenacobius (with W. W. Dimmick); (5) another look at the Notropis ardens species group (with K. L. Fiorino and W.W. Dimmick). I am presently on sabbatical (until 30 June 1991) at: Dept. of Biology, Museum of Southwestern Biology, University of New Mexico, Albuquerque, NM 87131; (505) 277-6725.

BUSBY, S. MORGAN. Fisheries Biologist, National Marine Fisheries Service, Alaska Fisheries Science Center, 7600 Sand Point Way NE Bin #C15700, Building 4, Seattle, Wa. 98115. (206) 526-4113.

Current work includes: 1) Descriptions of early life history stages of northeastern Pacific agonidae. 2) Assisting in field and laboratory work of the Fisheries Oceanography Coordinated Investigations (FOCI) program. 3) Completing research on the feeding ecology of juvenile chinook salmon in a small coastal lagoon in northern California.

BUTH, DONALD G. Associate Professor. Dept. of Biology, University of California (UCLA), Los Angeles, CA 90024-1606 (213) 206-6084

Our comparative morphometric study of the cyprinid genera Mylopharodon and Ptychocheilus is now in press (Mayden et al.); an allozyme study of these genera is in progress. Several studies of Gasterosteus are being prepared for publication. Other current work includes (1) morphometric and allozyme studies of Western North American cyprinids, including allozyme studies of the Gila robusta complex, and (2) allozyme studies of western catostomids, esp. endangered forms, e.g. razorback sucker and cui-cui.

CAPPETTA, HENRI Laboratoire de Paleontologie, Institut des Sciences de l'Evolution, U.S. T.L., Case courrier 64, Place E. Bataillon, F3409 Montpellier Cedex 5 France

Current work: (1) The study of cretaceous selachian faunas collected in the phosphate deposits of Egypt (Nile Valley and Red Sea); (2) the description of new batoid genera from Maastrichtian of Morocco; (3) the study of the lower Danian selachians from the "Fish-Clay" of Denmark. The long-range studies include the dentition of recent selachians and the cretaceous-tertiary assemblages from Africa, north and south America.

CARPENTER, KENT E. Applied Marine Research Laboratory, Old Dominion University, Norfolk, Virginia 23529-0456.

I am very relieved to be able to report a change of address. My wife and I escaped from Kuwait on August 16, driving across the desert into Saudi Arabia in a four-wheel drive vehicle while dodging Iraqi tanks. It was important that we carried as much water as possible and therefore I had to leave all my specimens and most of my scientific notes (not to mention our life's possessions) in Kuwait. Consequently, further work on the Caesionidae, Lethrinidae, the labrid genus Xyrichtys, and larval fishes of the Persian Gulf, is on hold until my life's work can be extricated from the insidious grip of Saddam Hussein or, I learn that my research paraphernalia has been destroyed or looted. I recently began working on the Sparidae with a view to shedding some light on the higher order relationships of the Sparoidea and a world revision of the family.

CARUSO, JOHN H. Tulane University Museum of Natural History, Belle Chasse, Louisiana, 70037, USA (504) 394-1711 (w), 866-5110 (h)

Work still continues on the systematics and distribution of Indo-Pacific anglerfishes of the families Chaunacidae and Lophiidae.

CASCIOTTA, JORGE R. PRESENT ADRESS: MUSEUM OF NATURAL HISTORY, UNIVERSITY OF KANSAS, LAWRENCE, KANSAS 66045-2454

Current work includes: (1) study of jaws and pharyngeal dentition of an ontogenetic series in South American cichlid-fishes; (2) fossil cichlid-fishes and their relationships with living taxa; (3) external morphology and osteology of an ontogenetic series of Lepidosiren paradoxa (Lepidosirenidae) (with G. Arratia).

CASTLE, PETER H. Reader in Zoology, School of Biological Sciences, Victoria University of Wellington, PO Box 600, New Zealand tel (04) 721-000; FAX 04-712-070.

Current work includes: (1) Completion of "Eel Atlas" (an identification handbook of families and genera of eels); (2) review of garden eels (Heterocongrinae) - with John E. Randall; (3) description of new genera and species of Indo-Pacific Ophichthidae; (4) description of Alcock's Investigator Congridae from Indian Seas. These have been on the back-burner during 1989-90 but I hope to turn up the flame during 1991-92.

CASTRO, RICARDO, M. C. Docente, Dept. de Biologia, Fac. Filos. Cienc. Letras, Ribeirao Preto - USP, Av. Bandeirantes 3900, CEP 14049, Ribeirao Preto, SP, Brasi!

Current research: (1) phylogenetic studies of the family Prochilodontidae (revisionary studies completed); (2) systematics and phylogenetic relationships of the characid genera Engraulisoma and Clupeacharax; (3) phylogenetic and revisionary studies of the family Chilodontidae (with R. P. Vari); (4) ecology of the fishes in a small headwater stream in the upper Parana river system (southeastern Brazil).

CASTRO-AGUIRRE, JOSE LUIS Senior scientist. Division de Biologia Marina, Centro de Investigaciones Biologicas de Baja California Sur, A. C. La Paz, Baja California Sur 23000 MEXICO (Apdo. 128; tel. (682) 5 3633; fax. (682) 5 3625

Current work: (1) Fish stocks assessment off the western coast of Baja California (mainly soft bottoms populations) is in progess. (2) Co-authoring several papers, derived from (1), on biology and population dynamics of some fish species (gurnards, flounders, lizard-fish, and hake). (3) Studying the fish populations of Bahia Magdalena-Almejas with R. Torres-Orozco. (4) A large paper dealing with new records of mesopelagic and benthic fish species from Golfo de California is now accepted for publication (it includes: Maulisia argipalla, Benthalbella linguidens, Anotopterus pharao, Lestidium ringens, Lestidiops jayakari, Cynoscion nannus, Synchiropus atrilabiatus, Zaniolepis frenata y Eumecichthys fiski. (5) Another paper on biology and zoogeography of flounders. (6) Checking FAO sheets on Centr. Pac. Fish Sp.

CAVALLUZZI, MARTIN R. Graduate Student. Virginia Institute of Marine Science, School of Marine Science, College of William and Mary, Gloucester Point, Virginia 23062. (804) 642-7335.

Thesis topic is the taxonomy of larval Blennioidei of Belize, Central America. This work includes the identification, description, and illustration of Belize blennioid larvae from ichthyoplankton collections of VIMS and USNM. To aid in the identification of these larvae a species list and meristic data tables are being constructed for all species of blennioids known to occur in the Caribbean, the Gulf of Mexico, and the western Atlantic off Florida. A larva (Gillellus jacksoni) of the family Dactyloscopidae has been identified and larvae of the families Chaenopsidae, Labrisomidae, and Tripterygiidae have been tentatively identified.

del CERRO, Lluís; Doctoral Fellow; Institut de Ciències del Mar; Passeig Nacional, s/n; 08039 Barcelona; Spain.
Phone: (3) 310.64.50; Telefax: (3) 319.98.42

Current work includes: (1) World-wide Revision of the Triglidae (Pisces, Scorpaeniformes) as Ph. D. Thesis directed by Dr. D. Lloris (Barcelona, Spain) and Dr. A. van der Heiden (Mazatlán, Mexico) included in a E.C. Project in the mexican Pacific Ocean. (2) Systematic studies of Elasmobranch fishes off Namibia and (3) long-line improvement for deep water sampling.

CHAO, NING LABBISH Professor, DPVA-FCA, Univ. do Amazonas, Manaus, Amazonas 69.068 Brazil Tel. (092) 237-5171 Fax (092) 233-7223

I moved to Amazon! Current work includes: (1) ornamental fishes of Rio Negro; a long term study on fishes of flooded forests. Our goal is to understand this renewable fishery resource and to suggest an alternative on sustainable development for the region. We have 4-6 expeditions per year, we need specialists to help us to identify many "undescribed" fishes. Bring your grant down and join us! (2) continue the systematic study on freshwater Sciaenidae, over 30 species now. Many complete their entire life cycle in freshwater, with very fine meat like Pseudosciaena and Cynoscion, a good candidate for aquaculture. (3) try to set up a non-profit organization on Neotropical fish research and environmental education (with a "floating bar"). If I can survive the chaos in Manaus, we will start a new indigenous "fish-tribe" in the Amazonia.

CHAPLEAU, FRANCOIS Assistant professor, Department of Biology, University of Ottawa, Ottawa, Ontario, Canada K1N 6N5. (613) 564-4735

Current work: (1) Description of new species of flatfish from Australia and New Guinea (with Claude Renaud and Patricia Kailola), (2) completion of a manuscript on the first cladistic analysis of higher taxa within the Pleuronectiformes, (3) completion of manuscripts on species interrelationships within the Rhombosoleinae, (4) study of the geographic variation in the Johnny darter (Etheostoma nigrum) (5) study of the impact of fish introductions on the ichthyodiversity of small lakes in the Gatineau Park. I am looking for graduate students to collaborate on my present research program on the ontogeny, the phylogeny and the evolution of life history traits in the Pleuronectidae.

CHAVEZ, HUMBERTO. Comisión de Piscicultura, Consejo Rural. Ruben Romero 404, Camelinas, 58290 Morelia, Michoacan, MEXICO

I am currently collecting fishes in the numerous reservoirs located in the vicinity of Morelia City, in conjunction with a project sponsored by the Presidencia Municipal for stocking them with carp alevins.

CHEN, XIAOPING Graduate Student, Dept. of Zoology, Duke University, Durham, NC 27706 tel. (919) 684-5128

Current work includes: (1) Phylogenetic and biogeographic studies of amblycipitid catfishes; (2) Comparative studies of catfish barbel morphology and function; (3) Studies of quantitative character coding procedures. Long-term studies include phylogenetic systematics and historical biogeography of Asian catfishes. I used to work in the Institute of Zoology, Academia Sinica, Zhongguancun, Beijing, P. R. China.

CHEN, XINYU. Museum of Natural History, the University of Kansas, Lawrence, Kansas 66045-2454,

Current work includes: (1) study on the morphology and phylogenetic relationships of <u>Phoxinus</u> (Cyprinidae) and (2) study on the olfactory organs of <u>lower Actinopterygii</u> (with Dr. Gloria Arratia).

CHEN, YIN-RUI. Dept. of Vertebrate, Kunming Institute of Zoology, Academia Sinica, Kunming, Yunnan, The People's Republic of China.

Current work includes: (1) study of the phylogeny of the cyprinid genus <u>Spinibarbus</u>; (2) the biology and fishery problems of the fishes from Fuxian Lake of Yunnan.

CHU, XIN-LUO. Professor of Ichthyology, Dept. of Vertebrate Taxonomy, Kunming Institute of Zoology, Academia Sinica, Kunming, Yunnan, China.

Current work includes studying relationships between changes of ancient geography and phylogeny of some endemic genera in Yunnan.

COAD, BRIAN W. Curator of Fishes, Canadian Museum of Nature, P.O. Box 3443, Station "D", Ottawa, Ontario, Canada K1P 6P4 (613) 996-1755 Fax: (613) 996-9915

The writing of popular books on "Atlantic Sport Fishes", "Sharks of Canada" and an "Encyclopaedia of Canadian Fishes" should be essentially complete by the beginning of 1991. In the new year I expect to finish several shamefully neglected collaborative studies on the white stickleback, Iranian cyprinids and hot spring fishes and start revisionary studies on Middle East taxa, principally cyprinids.

COELHO, MARIA MANUELA. PROFESSOR, Departamento de Zoologia e Antropologia, Faculdade de Ciêcias, Campo Grande 1700 Lisboa, Portugal. Fax (351) 1 7597716.

Current work includes: 1) Systematic and evolution of Cyprinids. 2) Genetic variation and ecology of the species of the genera $\underline{\text{Chondrostoma}}$ and Rutilus.

COHEN, DANIEL M. Chief Curator, Division of Life Sciences, Natural History Museum of Los Angeles County, 900 Exposition Blvd., L. A., CA 90007, (213) 744-3367.

Completed work on FAO gadiform guide; continued work on identity of ophidiid genus "Bassobythites" (with D. Hensley); studied the taxonomy of the ophidiid genus Monomitopus.

COLLARES-PEREIRA, MARIA J. Professor, Dep. Zoologia e Antropologia, Faculdade de Ciências, Campo Grande, Bloco C2, 3º Piso, 1700 Lisboa, Portugal. Fax (351) 1 75 97 716

Current work includes: 1) Taxonomy and ecology of Iberian Cyprinidae and Cobitidae: karyological and morphological characterization of Portuguese populations; evolutionary aspects (with M. M. COELHO); 2) Hybridization, unisexuality and polyploidy in fishes; 3) Portuguese continental fisheries: status and perspectives.

COLLETTE, BRUCE B. Director, National Marine Fisheries Service Systematics Laboratory, National Museum of Natural History, Washington, D. C. 20560 (202)357-2524

Current work includes: (1) revision of the frigate tunas Auxis; (2) revision of the double-lined mackerels Grammatorcynus (with G.B. Gillis); (3) preparation of sections on Belonidae and Hemiramphidae for Fishes of the western North Atlantic; (4) revision of the halfbeak genus Hemirhamphodon (with W.D. Anderson III); (5) phylogenetic position of the wahoo, Acanthocybium; (6) faunal study of the fishes of the West Wind Drift islands and sea mounts; (7) hermaphroditism in Serranus novemcinctus (with C. Roberts); (8) completion of a type-catalogue of beloniform fishes at USNM (with N. V. Parin and M. Nizinski); and (9) revision and up-dating of Bigelow and Schroeder's "Fishes of the Gulf of Maine" (with G. Klein-MacPhee). Long-range studies continue on the systematics of the Scombridae, Belonidae, and Hemiramphidae.

COSTA, W.J.E.M. Dept. Biologia Marinha, Universi dade Federal do Rio de Janeiro, CCS - Cidade $Un\overline{\underline{1}}$ versitária, CEP 21941, Rio de Janeiro, Brazil.

Current work includes: (1) description of four new species of the family Rivulidae; (2) taxonomic revision of the subgenus Lebistes; (3)taxonomic revision of the tribe Cnesterodontini (with Ricardo Rosa); (4) taxonomic revision of the family Gymnotidae (with Ricardo da Paz). Long range study: Freshwater fishes of eastern Brazil coastal plains.

CUI, GUI-HUA. Department of Vertebrate Taxonomy, Kunming Institute of Zoology, Academia Sinica, Kunming, Yunnan, China.

Current work includes: (1) Red Book; (2) study on phylogeny of genus $\underline{\text{Discogobio}}$; (3) differentiation of sucking disc of genus $\underline{\text{Discogobio}}$.

DAS, MRINAL K. Dept. of Zoology, University of Alberta, Edmonton, Alberta T6G 2E9, CANADA Telephone: (403) 492-1298 E-Mail: USERMDAS@MTS.UCS.UALBERTA.CA

I have been continuing with my Ph. D. research project on the systematic revision of the percophid genus *Bembrops* (Perciformes) under the supervision of Prof. J. S. Nelson. Other areas of interest are: 1) hybridization in cyprinids; 2) morphometrics in systematic and evolutionary biology.

DELMASTRO, GIOVANNI B. Curator of Ichthyology and Herpetology, Museo Civico di Storia Naturale, Cascina Vigna, Cas.Post. 89, 10022 Carmagnola (TO) - Italy.

Current work includes: (1) in collaboration with G.A.C. Balma I am rearranging and computering our freshwater fish collection; (2) I am working at distribution and ecology of Cobitidae living in an area of the Po River drainage.

DERIJST Eddy, Aquariumwereld B.B.A.T. Werfstraat 6, B-9500 GERAARDSBERGEN (Belgium) 054/58.93.59

Continuing on the 'Catalogue of the ichthyological publications of Dr. Max POLL'. Publications research with Dr. J.P. GOSSE (IRSNB) for the CLOFFA III.

DeWitt, Hugh H. Department of Zoology, University of Maine, Orono, ME 04469-0146, USA; (207) 581-2559.

Current work includes: 1) a review of the Zeiformes of the Gulf of Maine, and 2) description of fishes collected from Admiralty Bay, South Shetland Islands.

DINGERKUS, G. Maître de Conférences, Ichtyologie Générale et Appliquée, Muséum National d'Histoire Naturelle, 43, rue Cuvier, 75231 Paris Cedex 05 Tel: 40.79.37.52 FAX 40.79.34.84

We have recently finished a computerized key for identifying French freshwater fishes. Anyone desiring a copy, send us 4 high density discs, either 3.5 or 5.25 inch discs. It works on all IBM compatable PCs, and needs a graphics card and a VGA screen. Work is under way to prepare an English version to cover all European freshwater fish species. In February 91, Bernard Séret, Eric Guilbert and myself will be attending the shark conference in Sydney, and then go on to New Caledonia for a month or so of collecting fishes, principally freshwater. Other work continues on genetics and taxonomy of European freshwater fishes, and finishing up some chondrichthyan studies with Bernard Séret and Ramón Muñoz-Chápuli.

DITTY, JAMES G. Research Associate, Coastal Fisheries Institute, Center for Wetland Resources, Louisiana State University, Baton Rouge, Louisiana 70803-7503 (504) 388-6374

Current work includes: preparation of a manuscript on the morphological development of <u>Sardinella aurita</u> larvae with notes on separation of other clupeids from the Gulf of Mexico. I am also compiling early life history and descriptive data on stromateids, clupeids, sciaenids, ephippidids, rachycentrids, lobotids, and pomatomids for a larval identification guide of the western central North Atlantic (with Bill Richards). Services are available for ichthyoplankton consulting and larval identification.

DONALDSON, TERRY J. Fisheries Supervisor, Division of Fish and Wildlife, Commonwealth of the Northern Mariana Islands, Saipan, MP 96950 USA (670) 322-9095

Current work includes: (1) aspects of the biology of Cephalopholis and Epinephelus groupers in the Mariana Islands; (2) comparative analysis of cirrhitid habitat utilization, and cirrhitid and pinguipeid social and mating systems (alone and with Y. Sadovy and P. Ryan); (3) analysis of color variation in cirrhitids.

(3) analysis of color variation in cirrhitids.

Long range studies include: zoogeography of Mariana and Izu islands fishes (with R.F. Myers and J.T. Moyer); early life history and population biology of Cephalopholis and Epinephelus groupers (with S.G. Nelson and S.S. Amesbury), and cirrhitids; monogamy in burrowing gobies, especially Valenciennea.

DUHAMEL, GUY. M.N.H.N. Lab., ICHT. generale & appl. 43 rue Cuvier, 75231 Paris, Cedex 05 (FR). Tel. (1) 40 79 37 55, FAX (1) 40 79 34 84.

Current work: (1) early life history of the Kerguelen plateau fishes. (2) identification and study of mesopelagic and deep-sea species collected around St. Paul and Amsterdam islands (Indian O.), (3) taxonomic study of Antarctic Liparidae from the Weddell sea and Kerguelen plateau, (4) registration in the MWIN collection of fishes from Falklands area, Pacific O. (equatorial and tropical mesopelagic f.).

DYER, BRIAN S. Doctoral Student, Fish Division Museum of Zoology, University of Michigan Ann Arbor, MI 48109-1079; (313) 747-2192 FAX: (313) 747-0884 Internet: brian dyer@ub.cc.umich.edu

Current work includes:(1) Dissertation research on the evolutionary relationships, biogeography and taxonomy of the temperate South American atherinopsine silversides (Atherinidae Sorgentininae). (2) Ostariophysan biogeography and Plate Tectonics (with P.A. Buckup). (3) Systematic revision of Basilichthys Girard, with description of a new species. (4) Taxonomy of the marine species of Austromenidia, with comments on the latidudinal variation of meristics (with A. Gosztonyi & M. García). (4) Phylogeny of the Old World silversides (with B. Chernoff). (5) Systematic revision of the Odontesthes perugiae species-group, with description of a new species from southeastern Brazil (with L.R. Malabarba & Jan). Major Professor: W.L. Fink

EAKIN, RICHARD R. Professor of Biology, Division of Arts and Sciences, Westbrook College, Fortland, Maine 04103 (207) 797-7261

Current work includes continuing study of genus Pogonophryne from German and Australian collections.

EDWARDS, ALASDAIR J. Centre for Tropical Coastal Management Studies, Department of Biology, The University, Newcastle upon Tyne NEl 7RU, U.K. Tel, (091) 222-6663; FAX (091) 261 1182

Book on <u>Fish and Fisheries of Saint Helena Island</u> is now published. Intend to prepare work on eastern Atlantic pomacentrids for publication in near future.

EITNER, BLAISE J. Department of Biology, University of California, Los Angeles, California 90024-1606 (213) 206-6084

Current research includes: (1) genetics and systematics of elasmobranch fishes using isozymes, allozymes, and mitochondrial DNA restriction enzyme analysis; (2) assessment of stock structure of commercially harvested species of elasmobranchs using genetic techniques. I am currently devoting most of my efforts to the determination of stock structure of thresher and short-fin make sharks.

ELVIRA, BENIGNO Professor, Department of Animal Biology, School of Biology, University of Madrid, 28040 Madrid (Spain) tel.: (91)5491318 FAX: 91-5447426

Current work includes: (1) Researches on the taxonomy and biogeography of the Iberian freshwater fishes. (2) Edition (with I. Doadrio) of the volume "Iberian Fauna. Freshwater Fishes" (in Spanish). Scheduled to be published in 1991. (3) Long range studies include a project on the revision of the south European species of Rutilus and some related genera (Cyprinidae).

ENGELS, THOMAS M. Dept. of Zoology, University of Texas at Austin, Austin, Texas 78712 (512) 471-7619

Current work includes: (1) commencement of dissertation research analyzing cladistic methods using the cichlid genus *Cichlasoma* (section Archocentrus); (2) estimation of rates of evolution in Central American cichlids; (3) modes and mechanisms of speciation in cichlids; (4) the applicability of the biological species concept to rapidly evolving fishes. My supervising professors are L.A. Fuiman and C.M. Pease. In January 1991 I will leave on a three week collecting trip to Costa Rica with Daniel W. Fromm and Wayne S. Leibel.

ESCHMEYER, WILLIAM N. Senior Curator, Department of Ichthyology, California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118 USA (415) 750-7049. Fax (415) 750-7346.

The "Catalog of the Genera of Recent Fishes" was published in October 1990 (a book notice is included with the newsletter). It is expected that a second printing will be done in about 2 years -- I would appreciate it if you bring to my attention any errors you locate. Work on the catalog of species and on fossil genera and on family-group names continues. I may pull out some systematic manuscripts and have a go at them in early 1991. Tomio Iwamoto rotates in as Chairman of Ichthyology on I Jan. 1991, so please direct pertinent departmental correspondence to him (and to Collection Manager Dave Catania).

FERNHOLM, BO. Professor. Swedish Museum of Natural History. Department of Vertebrate Zoology. Box 50007, S-104 05 Stockholm, Sweden Tel. x46-8-6664110, Telefax x46-8-6664212.

Work on the systematics of hagfish continues.

FERRARIS, CARL J., JR. Department of Herpetology & Ichthyology, American Museum of Natural History, New York, N.Y. 10024, USA

Current work: A catalog of USNM catfish types (with R. Vari); a report on a collection of fishes from Cerra Guaiquinima, Venezuela (with A. Machado-Allison); descriptions of various new catfishes; and sending my dissertation off to press.

FOLLETT, W. I., Curator Emeritus, Department of Ichthyology, California Academy of Sciences, Golden Gate Park, San Francisco, California 94118. (415) 750-7050.

Current work includes: 1) analysis of fish remains from archaeological sites on and near the shorelines of ancient Lake Cahuilla, Riverside and Imperial counties, California; 2) analysis of fish remains from prehistoric adze quarries at elevations approximating 12,400 feet on Mauna Kea, Hawaii; 3) study of the recurrence of steelhead trout, Oncorhynchus mykiss (Walbaum), in a high, intermittent tributary of the Carmel River system, Monterey County, California; 4) (with Lillian J. Dempster and Carl L. Hubbs) completion of an annotated list of the fishes of California

FRICKE, RONALD Curator of Fishes, Department of Tchthyology, Staatliches Museum für Naturkunde, Rosenstein 1, D-7000 Stuttgart 1, Federal Republic of Germany (0711) 8936 256

Current work includes: (1) callionymid and draconettid fish systematics, including zoogeography and descriptions of new species; (2) Indo-Pacific Tripterygiidae, mostly Enneapterygius and Helcogramma, including a revision of Tripterygiidae of the Maldives (w/ J.E. Randall); (3) SMNS type catalogues: 1st part, Bleeker types, in press; 2nd part, Klunzinger types; 3rd part, other types; (4) ZMB type catalogues (w/ H.J. Paepke); (5) Turkish freshwater fishes (w/ I. Koch); (6) freshwater fishes of Mid Europe (w/ H. Brunken); (7) Mediterranean Gobiesocidae; (8) editing the monograph series THESES ZOOLOGICAE.

FRIEL, JOHN P. Graduate Student, Dept. of Zoology, Duke University, Durham, NC 27706. (919) 684-5128 FAX (919) 684-6168

Current work includes: (1) dissertation research (under the direction of Dr. John Lundberg) on a phylogenetic revision of the banjo catfishes, family Aspredinidae; (2) descriptions of several new aspredinid taxa from Venezuela; (3) scanning electron microscopy of the skin of catfishes.

FUIMAN, LEE A. Assistant Professor and Research Scientist, Marine Science Institute, University of Texas, Port Aransas, Texas 78373 (512) 749-6775

Current work includes: (1) ontogenetic changes in vulnerability of red drum larvae to predators; (2) development of sensory function in larvae; (3) ontogeny of evasive behavior in clupeids and sciaenids; (4) temperature effects on evasive behavior and vulnerability of larvae. Graduate students working on: (5) central American cichlid taxonomy (T.M. Engels); (6) elemental analysis of red drum otoliths for life-history reconstruction (G.R. Hoff); (7) morphological constraints on habitat use by larvae (D.M. Higgs).

GAEMERS, PIETER A. M. Guest scientist, Nationaal Natuurhis-corisch Museum, Postbus 9517, 2300 RA Leiden, The Netherlands, tel. 071 - 143844.

The main project remains the systematics, evolution and biostratigraphy of fossiland recent Gadidae and Merlucciidae, mainly based on their otoliths. Current work furhtermore includes: (1) study of otolith faunas from several Oligocene and Neogene deposits in Europe; (2) study of otoliths from stomachs of porpoises and other cetaceans; (3) study of fos-

sil and recent otoliths of Cichlidae (N.B. Eurotilapia appears to be a channid, not a cichlid!); (4) publishing the third number of the Palaeoichthyological Newsletter (at last!).

There was less time for research last year, because I gave lectures on geology and paleontology to biology students at the Catholic University in Nijmegen. This will also be the case this year, so that most of my time between December and April will be devoted to preparing and giving courses.

GAIDA, INGO H. Dept. of Biology, University of California (UCLA), Los Angeles, CA 90024-1606 (213) 206-6084

I am currently examining as part of my Master's thesis gene expression and population structure in the Pacific angel shark, Squatina californica, in the Santa Barbara Channel area. In the future I plan to study various aspects of squatiniform systematics. I will also begin work on pleuronectid and/or bothid systematics and population genetics (for my doctoral dissertation). My major professor is Dr. Donald G. Buth; he will probably continue in this capacity when I begin my doctoral study in mid-1991.

Garavello, Julio Cesar, Departamento de Ciências Biológicas ÚFSCar, 13.560, São Carlos, São Paulo, Brazil

Current work includes: Revision of genus Leporinus Spix in continuation with the southeastern brazilian species and descriptions of amazonian forms. Revision of genus Schizodon Agassiz is in progress with the amazonian species.

Taxonomic revision of subfamily Hypoptopomatinae: genus Microlepidogaster (with Dr. H.A. Britski) and genus Otocinclus (with Dr. S.A. Scheffer) and remaining genera after Parotocinclus. Revision of genus Steindachneridion of the Pimelodidae just started.

Multivariate analysis of quantitative characters continues on several infraespecific problems of brazilian freshwater fishes (with Drs. S.F. dos Reis and R.E. Strauss). Also is continuing the ichthyological studies on the fish fauna of the Rio Iguaçú basin at Parana state, Brazil.

GILL, ANTHONY C. Ichthyology Section, Division of Vertebrate Zoology, The Australian Museum, P.O. Box A285, Sydney South, N.S.W. 2000, Australia.

My Ph.D. thesis, a revision of the Pseudochrominae, was submitted mid-1990.Other research includes: (1) revision of the Pseudoplesiopinae (with A.J. Edwards); (2) higher relationships of pseudochromoids (with R. Mooi); (3)phylogenetic relationships of electridids (with D.F. Hoese); (4) description of a new xenisthmid genus (with D.F. Hoese); (5) revision of Xenisthmus and xenisthmid relationships; and (6) relationships of gerreid genera (with D.J. Woodland). My address for 1991 will be: Division of Fishes, National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A.

GOLANI DANIEL, Zoology Dept., The Hebrew University of Jerusalem, 91904 Jerusalem, Israel. Tel: (02) 585872 Fax: 972-2-666804

Current work includes: (1) the ichthyofauna of the eastern Mediterranean with emphasis of the Red Sea colonizers; (2) taxonomy and ecology of deep water fishes in the Red Sea and the Mediterranean; (3) genetics and ecology of Mullidae; (4) taxonomy of Holocentridae.

GOREN, MENACHEM. Dept. of Zoology, Tel Aviv University, Ramat Aviv 69978, Israel. Tel: 03-5459042; Fax: 03-6425518

Current research:

1) The Gobioidei of the Indo-Pacific. Taxonomy, Zoogeography and Ecology. 2) The Freshwater Fishes of Israel: Taxonomy, Zoogeography and Ecology. 3) A preliminary research on the fish communities of eastern Mediterranean (incl. deep sea fishes). 4) Computerization of scientific collections.

GREFNFIELD, David W. Dean, Graduate Division, Univ. of Hawaii, 2540 Maile Way, Honolulu HI 96822 (808) 956-7541

Work continues on a revision on the toadfish genera, as well as on a revision of the gobiid genus Gnatholepis with Peter Miller. Studies on community structure of cryptic fishes continue, with exploratory comparative collections having been made at Saipan and American Samoa this year. Jamie Thomerson and I are busy completing the manuscript for our book on the Inland Fishes of Belize.

GUILBERT, E. Ichtyologie Générale et Appliquée, Muséum National d'Histoire Naturelle, 43, rue Cuvier, 75231 Paris Cedex 05. Tel: 40.79.37.52. FAX: 40.79.34.84.

I am a graduate student working with G. Dingerkus on taxonomy, evolution and ecology of European freshwater fishes. In February 91 I will be going with him and B. Seret to attend the shark conference in Sydney and then on to New Caledonia, where we will do an inventory of the freshwater fishes and study their taxonomy, evolution, and ecology.

HAGLUND, THOMAS R. Department of Biology, U.C.L.A. Los Angeles, CA 90024-1606 (213) 206-6084

Current research area: Biochemical Systematics of the Gasterosteidae, Cyprinidae and Catostomidae. Specific studies in progress: 1) Relationships among unarmored populations of Gasterosteus; 2) Biochemical systematics of the family Gasterosteidae; 3) Relationships among North American, European and Asian populations of Gasterosteus; 4) The status of Gasterosteus aculeatus in Baja California del Norte; 5) Population genetics of Gila orcutti; 6) Relationships of southern California Rhinichthys; 7) Biochemical systematics of the genus Rhinichthys; and 8) several studies on endangered catastomids.

HARRISON, I.J. c/o 12 Deakin Leas, Tonbridge, Kent, TN9 2JU, U.K.

While currently without an 'official' base, I am conyinuing my ichthyological work. Current commitments include: completion of a manuscript concerning ontogeny of Mediterranean mugilids (with M. Serventi, P. Torricelli: Universita di Parma, Italy); taxonomic studies on Caribbean mugilids and on Eastern Central Pacific mugilids (initially for publication with FAO); completion of a revision of West African sicydiine gobies.

HATUUKA, KIYOTAKA. Suita-Higashi High School, 16-1 Aobaoka-Minami, Suita, Osaka 565, Japan.

Current work includes: (1) continuing systematic work of the muraenid eels; (2) preparation of a key to the fishes of the Japanese Archipelago (T. Nakabo and T. Yoshino eds) Squaliformes, Rajiformes (Rajidae etc.), Anguilliformes, Perciformes (Percichthyidae, Bramidae, Gerreidae, Pempherididae, Mullidae, Champsodontidae, Echeneididae, Stichaeidae, Pholididae, Zoarcidae, etc.), etc. Longrange studies include revision of the anguilliformes fishes of Japan.

HERZIG, BARBARA Curator of Fishes, 1. Zool. Abt., Naturhistorisches Museum Wien, A-1014 Vienna, Postfach 417, Austria; FAX 93 52 54

Current work includes: (1) study of rare and endagered fish in Austria; (2) preparation of the chapter <u>Leucaspius delineatus</u> and co-authorship in some other cyprinid species for"The Freshwater Fishes of Europe". Long-range studies include the preparation of type catalogues of the fish collection of the NMW.

HIERONIMUS, HARRO. Nachtigallenweg 52, P. O. Box 170243, D-W-5650 Solingen 1, tel.: (212) 819878

Current work includes: (1) Description of two new species of Corydoras; (2) Continuing the study of the mollys (Poeciliidae), especially Pacific Coast of Mexico; (3) Revision of Priapella (Poeciliidae); (4) Continuing last year's work not finished yet.

HODA, S. M. SHAMSUL Associate Professor, Centre of Excellence in Marine Biology, University of Karachi, Karachi, Pakistan

Current work: (1) Studies on the functional morphology, osmoregulatory and reproductive organs of *Euryglossa* orientalis Bl. Schn. (Family, Soleidae) from Karachi coast; (2) studies on the morphometry and length-weight relationship in *Valamugil cunnesius* Val. and *Liza klunzingeri* Day from Karachi-Sind waters.

Hosoya, Kazumi. Chief Researcher, Breeding Section, Fish Genetics Division, National Research Institute of Aquaculture, Nansei-cho, Mie Prefecture 516-01, Japan.

My 1990 work is currently projected: (1) Taxonomic review of the cyprinid genus <u>Zacco</u> (2) Comparative osteology of <u>Hemigrammocypris rasborella</u> and its related species.

Howe, Jeffrey C. Museum Specialist, Division of Fishes, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560 (202)357-2610

A manuscript dealing with intestinal biting as a cause of mortality in captive carcharhinid sharks will be submitted very soon. Current research includes: 1) The anatomy, histology, and ultrastructure of the esophageal papillae of <u>Genicanthus personatus</u> (Pisces: Pomacanthidae), 2) Revision of the <u>Helcogramma ellioti</u> (Pisces: Tripterygiidae) species complex (with J.T. Williams), and 3) shark type specimen catalog (USNM).

HOWES, GORDON J. Senior Scientific Officer, Division of Lower Vertebrates, Zoology Dept., Natural History Museum, Cromwell Rd. London SW7 5BD, England. tel 071 938 9486

Research still focuses on Gadoidei; a paper is being prepared on gadoid distribution and biogeography; anatomical work involves 'lower' gadoids (eg Moridae, Melanonidae)

HUREAU, Jean-Claude. Sous-Directeur, Museum national d'histoire naturelle, Ichtyologie générale et appliquée, 43 rue Cuvier, 75231 Paris Cedex 05, France. Tél 33 1 40793756 FAX 33 1 40793484; BITNET: HUREAUatFRMNHN11.

Last year studies included edition of the "Checklist of the Fishes of the eastern tropical Atlantic" (Clofeta). Current work includes: (1) study of the ichthyofauna of the Weddell Sea (Antarctica) collected during the European Polarstern Study (EPOS) in 1989; (2) revision of the Pogonophryne genus (Artedidraconidae); (3) maintenance and correction of the GICIM database (Fish collection of the Museum national d'histoire naturelle); (4) osteology and myology of the head of some Scaridae species.

HUTCHINS, J BARRY. Curator, Dept of Aquatic Vertebrates, Western Australian Museum, Francis St, Perth, Western Australia 6000.

I am presently preparing papers on 1. Recruitment of tropical reef fishes in temperate areas of the southern hemisphere; 2. Descriptions of new gobiesocids from southern Australia; and 3. Checklist of types in the Western Australian Museum. Field work is centred on surveys of the shallow water seagrass fishes of south-western Australia.

ISBRÜCKER, Isaäc J. H., Department of Ichthyology, Institute of Taxonomic Zooloy, P.O. Box 4766, 1009 AT Amsterdam, The Netherlands. Telephone (0)20-5256615, FAX +31-205257238 (see NIJSSEN)

ISHIHARA, HAJIME. Marine Biologist, Institute of Skatology, 10-11-203 Minamifujisawa, Fujisawa, 251, Japan Tel. 0466-23-5550 Current works include: Systematic study of the superorder Batoidea; reproductive biology of skates and rays; systematics and physiology of the freshwater elasmobranchs.

Have finished my PhD. program in June, 1990. With Drs. Toru Taniuchi and Mitsuhiko Sano, I went to the Western Australia for the investigation of the freshwater elasmobranchs in Aug. to Sept. I met Dr. Richard Holst of the Univ. of W.A. in Perth and talked about the Rabl's Rule in the skates. Peter Last of the CSIRO and his wife Jaine joined our investigation in the W.A. and he and I talked about the systematics of the Indo-Pacific skates and rays.

IVANTSOFF, WALTER Senior lecturer, School of Biological Sciences, Macquarie University, 2109, N.S.W., Australia

Current work: Study of possible extinctions of freshwater fishes in Australia; systematics of Telmatherinidae (collaborating with Maurice Kottelat); biogeography of freshwater fishes (with Lucy Crowley); histology of acellular bone (with Diane Hughes) and effects of pollutants on fish tissue (with Margaret Shepherd). Still trying to write up revision of the genus *Iso* (with Basim Saeed).

Iwamoto, Tomio Curator, Dept. of Ichthyology, California Academy of Coiences, Golden Gate Park, San Francisco, CA 94118 Tel.: (415) 750-7054; FAX 415-750-7346 or -7106

Studies of Indian Ocean Macrouridae continue with Yuri Shcherbachev. We have submitted a paper on the subgenus *Chalimura* (6 Indian Ocean spp., 2 new), and are now working on other members of *Coryphaenoides*. After a two-year hiatus in correspondence from my co-author Yuri Sazonov, it seems we are again on track with our work on grenadiers of the Nazca and Sala-y-Gomez ridges. (Sazonov has transferred from the Shirshov Institute of Oceanology to the Zoological Museum of Moscow State University.) We now have 26 spp. (about 11 new) from those ridges. Macrourid contribution to the FAO Gadiformes Catalogue finalized with visit of Walter Fischer in Sept. Maybe we'll see it out next year?? Finally getting off as editor of Scientific Publications at year's end. This'll free a lot of time for research, but then, I'll be encumbering the burdens of the department chairmanship.

JARDIM, ALDO DA S. Student, Laboratorio de Ictiologia, Museu de Ciencias da PUC-RS, P.O. Box 1429, 90620. Porto Allegre, Brasil. Tel. 512 391511, ext. 3138.

Working currently on the study of occurrence, diversity and abundance of fishes in a sandy beach of the Rio Guaiba Rio Grande do Sul, Brazil (with Hugo Heinrichs). (With financial support of the Pontificia Universidade Catolica do Rio Grande do Sul).

JAYARAM, K. C. Emeritus Scientist, Zoological Survey of India, 100, Santhome High Road, Madras 600 028. INDIA

Bioresources Survey of the Krishna River System in its entirety completed, a report prepared (425 pages, typescript). Taxonomic account of fish is being made ready for publication. Revision of the fishes of the genus *Puntius* from the Indian region is likely to be published before the year is out. It is a Technical Monograph of ZSI. Actively engaged in completing Book on Catfishes of India.

JEON, SANG-RIN Prof. of Dept. of Biol. Sang Myung Women's Univ. Seoul 110-743, Korea. (02) 737-0291

Current work: (1) Study of the ichthyofauna and zoogeography of Korean Peninsula; (2) revision of the Gobiidae and Callionymidae from Korea.

JOHNSON, G. DAVID, Curator, Division of Fishes, National Museum of Natural History, Smithsonian Institution, Washington, D.C., 20560. (202) 357-4140

Recently submitted - Monophyly of the euteleostean clades Neoteleostei, Eurypterygii, and Ctenosquamata; A larva of the rare serranid fish, Jeboehlkia gladifer (with C. Baldwin). The Symposium on Percomorph Phylogeny at the ASIH meetings in Charleston was a success, and the proceedings will be published as a single volume of Bull. Mar. Sci. Much of my time for the next year will be devoted to editing submitted manuscripts (with Bill Anderson's help) and completing my own. The latter include: Percomorph phylogeny - progress and problems; Schindleria - a paedomorphic goby (with E. Brothers); A generic phylogeny of epinephelline serranids based on larval and adult morphology (with Carole Baldwin); Relationships of Lampriformes (with J. Olney & C. Baldwin). Additional work includes completion of manuscripts on: Osteology and relationships of Pseudotrichonotus altivelis (with M. Okiyama & Y. Tominaga); Larvae of Rondeletia and Barbourisia (with J. Paxton); A new genus and species of aploactinid (with S. Poss); A remarkable new pseudamine apogonid from Australia, with considerations of apogonid intrarelationships. Still hope to get to those revisions of Percophididae and Ephippididae someday.

JOHNSTON, CAROL E. Graduate Student, Center for Biodiversity, Illinois Natural History Survey, Champaign, Illinois 61820 (217) 333-2844

Current work includes: (1) study of nest association among North American minnows; (2) electrophoretic analysis of the genus <u>Semotilus</u>; (3) zoogeography and conservation of the fishes of the Southern Appalachians; (4) behavioral ecology and alternative mating tactics of <u>Semotilus</u> atromaculatus.

KAWAMURA, KOUICHI. Scientific Researcher, Breeding Section, Division of Genetics, National Research Institute of Aquaculture, Fisheries Agency, Nansei, Mie, 516-01 Japan.

My post and address have recently changed as above mentioned. Please check my address in communicating with me.

I have newly begun to do biochemical systematics, using allozymes and mt-DNA, together with Dr. Okazaki. I'm now studying the interspecific relationships of the Japanese dace, the *Phoxinus* species complex. I'm greatly interested in the species of the family *Leuciscinae*. So I hope to exchange the Japanese freshwater fishes (especially around Lake Biwa) for your dace specimens.

Kendall, Arthur W., Jr. Fishery Biologist, NOAA, NMFS, AFSC, 7600 Sand Point Way N.E., Seattle, WA 98115. (206)526-4108; FTS 392-4108, FAX (206)526-4004.

Continuing work on systematics of <u>Sebastes</u> and descriptions of their larvae, and <u>computerized</u> meristic and literature data bases for northeast Pacific fishes (with Doug Markle, OSU).

KIDO, KAORU. Ishikawa High School of Fisheries, 106-7 Ushitsu, Noto-machi, Ishikawa Prefecture 927-04, Japan.

Work continues slowly on the phylogeny of the family Cyclopteridae.

KIM, IK-SOO Professor, Department of Biology, Chonbuk National University, Chonju 560-756. Republic of Korea. (0652) 70-3354

Current work: (1) studies on the unisexual Cobitid fish Cobitis sinensis-longicorpus and its related sexual species in Korea; (2) revisionary works in Korean endemic freshwater fishes; (3) the taxonomic review on the families Tetraodontidae, Blenniidae and Stichaeidae of Korea. I am mainly interested in the systematic and ecology of the freshwater fish from Korea.

Kinoshita, Izumi. Assistant Professor of Fisheries Research Station, Kyoto University, Maizuru, Kyoto 625, Japan tel. (0773) 62-5512; FAX 0773-62-5513

Current work includes: (1) study of morphologies of fish larvae; (2) studies on process of migration to nursery in larval fihes; (3) study on surf zones and estuary for nursery of juvenile fishes.

KLAUSEWITZ, WOLFGANG, Research-Institute and Museum Senckenberg, Senckenberg-Anlage 25, D-60000 Frankfurt/M. 1, Germany (069) 7542349

Current work includes: (1) redescription of the type specimens of Saurenchelys fierasfer, S. cancrivora and Nettastoma elongatum, compared with material from the Red Sea; (2) description of the adult forms of two Facciolella species from the deep Red Sea; (3) comparative studies on specimens from different populations of Gorgasia sillmeri from the Gulf of Aqaba and the Red Sea.

KOTTELAT, MAURICE Ichthyology Section, Zoologische Staatssamm'ung, Muench-hausenstr. 21, D-8000, Muenchen 60, Germany. Tel x49-89-8107-111 Fax x49-89-8107-300

Current work: (1) Revisionary works in Balitoridae (Homalopteridae), Cobitidae and Gyrinocheilidae; (2) work on freshwater fishes of Sulawesi (Hemiramphidae, Gobiidae); (3) fish biodiversity in Indonesia; (4) descriptions of new taxa in Cyprinidae, Cobitidae, Balitoridae, Akysiidae, Belontiidae and chaudhuriidae from Borneo and Cambodia; (5) work on freshwater and estuarine fishes of Sri Lanka (with R. Pethiyagoda). The identification guide on western Indonesian freshwater fishes (with A. J. Whittem) should appear in 1991. My collaborator in Sri Lanka, R. Pethiyagoda, has completed a book on Sri Lankan freshwater fishes which appeared in Dec. 1990 and the description of a new Monodactylus should appear soon. I will be out for fieldwork in Viet Nam and Indonesia (Sulawesi, Borneo and Sumatra), and possibly Burma. A long range project in Indonesia might start by the end of the year.

KRAMER, BERND. Professor of Zoology, Zoological Institute, University of Regensburg, D-8400 Regensburg, West Germany. Tel. 0941-943 2263 (or: 2262).

Current work includes the study of the mormyrids of the Ivory Coast (together with P. Moller, The American Museum of Natural History, New York).

KRAMER, SHARON HENDRIX. Senior Scientist, MBC Applied Environmental Sciences, Costa Mesa, CA 92627. (707) 839-4207. S.KRAMER/OMNET

Current and recent work includes: 1) habitat specificity, movements, and population dynamics of juvenile California halibut (<u>Paralichthys californicus</u>); 2) distribution, ecology, and life history of demersal fishes in embayment and nearshore coastal habitats of southern California; 3) age and growth of larval and juvenile demersal fishes.

KRUPP, FRIEDHELM. Forschungsinstitut Senckenberg, Ichthyologie I, Senckenberganlage 25, 6000 Frankfurt 1, F.R. Germany. Tel.: (069) 7542-255, fax: (069) 746238

Current work includes: (1) systematics of Red Sea fishes with fieldwork in Jordan, Saudi Arabia and Sudan; (2) fishes of the South China Sea with fieldwork on Hainan Island; (3) systematics and ecology of freshwater fishes in the Middle East; (4) hybridization in fishes; (5) co-editing FAO Species Identification Sheets for the Eastern Central Pacific.

KULLANDER, SVEN O. Curator of Fishes, Department of Vertebrate Zoology, Swedish Museum of Natural History, PO Box 50007, S-104 05 Stockholm, Sweden, Tel X46-8-666 4116, Fax X46-8-666 4212.

Work on the systematics and distribution of South American cichlids continues. To the list of projects I added a revision of the Nandidae,

an inventory of Kashmir fishes (A. Silfvergrip doing the field work), and smaller projects on rapids cichlids, including one together with Carlos Lucena, PUCRGS. On July 1 I resumed my position as curator of the alcohol collection (fish, herps, and hairy and feathery animals) in this museum. I collected in the Zambian Zaïre, including Lake Tanganyika August-September 1990.

LAMILLA, JULIO Instituto de Zoologia, Universidad Austral de Chile, Casilla 567, Valdivia, Chile

I complete a staying in the Instituto de Ciencias del Mar, Barcelona , Spain, in June, revising exemplars of rays of that collection.

I am finishing my thesis to obtain the Master Degree in genus $\frac{Psammobatis}{Chile.}$ of Guafo Island and Golfo Corcovado, south of $\overline{Chile.}$

I finished a manuscript on Geotria australis

I am still working in a revision of Bathyraja of Chile.

LANGEANI, FRANCISCO. Depto. Zool., IBILCE - UNESP, CEP 15055, São José do Rio Preto, SP, Brasil.

Current work: (1) Systematic revision of the Hemiodontidae (Ostariophysi, Characiformes), as doctoral thesis under the sponsorships of Dr. Heraldo Britski (MZUSP - SP); (2) Neoplecostomus relationships within Loricariidae; (3) descriptions of some new Loricariidae species from Southeastern Brazil, genera Pareiorhina and Ancistrus.

LARSEN, HELEN K. Curator of Fishes, Northern Territory Museum, GPO Box 4646, Darwin, N. T. 0801, Australia

Work on Mugilogobius, Pseudogobius, Tamanka, and their relatives is progressing at a variable rate. A description of a new freshwater Mugilogobius is being prepared for publication (with Maurice Kottelat). Several other projects, some with Doug Hoese, are making very slow progress. And as soon as the Pleurosicya revision rolled off the press, several people sent me specimens representing new locality records for several species.

LAST, PETER Fish taxonomist, CSIRO Division of Fisheries Research, GPO Box 1538, Hobart, Australia 7001

Current work: (1) The continued studies of Australian batoids, particularly rajids (with M. Stehmann and J. McEachran) and dasyatidids. (2) A brief study of Australian freshwater elasmobranchs (with T. Taniuchi) was completed recently. (3) A monograph on Australian chondrichthyan fishes will be published early in 1991.

LEE, SEUNG-HWI Ph.D. Department of Biology, Honam College, Kwangju, 506-090 Republic of Korea. Tel (82-62) 941-0370 (ext. 342), Fax (82-62) 941-0378

Current work: (1) Study on the appendicular skeleton of hermaphroditic rivulus Rivulus ocellatus marmoratus; (2) developmental osteology of this fish. This species is well adapted and cultivated in laboratory condition. Our final purpose is to establish this species as an experimental animal in ichthyology. My current interest is on the osteology of endemic species in Korea.

LEIBLE, MARIO. Dept. Marine Biology, Pont. Univ. Catolica, Sede Talcahuano, Box 127, Talcahuano, Chile.

Current work includes taxonomic studies on the skates and chimaeroids off Talcahuano, Chile; taxonomic studies on deep sea sharks off the continental slope (800 m) obtained near Talcahuano, Chile.

LEIS, JEFFREY M. Senior Research Scientist, Division of Vertebrate Zoology, The Australian Museum, PO Box A285, Sydney South, NSW 2000, Australia. Tel (02) 339-8111; fax 360-4350.

No real changes from last year. I'm working on larval lutjanids with S.E. Reader, larval fishes from the Coral Sea with J.H. Choat and larval fishes from French Polynesia with R. Galzin and T. Trnski. I hope to make AFS Early Life History Section meetings in Los Angeles and ASIH meetings in N.Y. in June.

Li, Si-zhong Research professor, Fish Museum, Dept. of Vertebrates, Institute of Zoology, Academia Sinica, Zhongguancun Str., Haidian, Beijing 100080, China

Current work includes:
(1) study of the codfishes (Gadiformes),
(2) of the cusk-eel-like fishes(Ophidiiformes),
(3) of the soldierfishes (Beryciformes),
(4) of the flatfishes(Pleuronectiformes), and
(5) of the ichthyofauna of the huanghe R.(Yellow R.) and the geographical distributions of Chinese freshwater fishes.

LLORIS, DOMINGO. Scientific Officer. Instituto de Ciencias del Mar Passe Nacional s/n 08039-BARCELONA (Spain) tel (3) 310-64-50 fax (3) 319-98-42 telex 59-367 inpb-e

BIOICTIOS project (Bio-ecology of the Fish Resources of the Beagle Channel Tierra del fuego, Argentina) has ended; many papers are published or are in press, including a large monograph.

BATIMAR project (Ichthyofauna of deep western Mediterranean, from 1000 to 2500 m depth) is also finished; publication of papers is waiting for the acceptation of three doctoral thesis of fellows involved in such research.

During 1989 and 1990 a revision of zoogeographical conception concerning the fish species inhabiting the MACARONESIA area has been undertaken; paper is nearby to be submitted for publication.

During 1989 and 1990, an approach to the shore ichthiology of the southeastern Pacific has started, being Dr G. Pequeño the chilean counterpart.

During 1990 has finished my collaboration to the volume related to FISHES of the "HISTORIA MATURAL DEL PAISOS CATALANS", writing about thirty families and drawing about fourty species, some of them at full colour.

LOBEL, PHILLIP S. Associate Scientist, Dept. of Biology, Woods Hole Oceanographic Institution, Woods Hole, MA 02543 (508)548-1400, ext. 2634

Current work includes 1) collecting fishes in the African Congo for systematic and biogeographic analysis; 2) description of 4 new species (including one new genus) of mormyrid fishes collected in Congo; 3) systematic study of the serranid, *Hypoplectrus* using mDNA analysis and comparative analysis of the courtship sounds produced by various color morphs; 4) I am continuing my study of marine fishes reproduction, larval development and recruitment at Johnston Atoll, Central Pacific Ocean.

LOFTUS, WILLIAM F. Research ecologist, Everglades National Park, P. O. Box 279, Homestead, FL 33030. (305) 245-1389

Current work: (1) Research on ecology of Everglades marsh fishes continues, especially the responses and recovery of the community following two years of record drought. (2) Completing the analysis of the hybrid status of *Lutjanus ambiguus*. (3) Completing an annotated inventory of fishes of Everglades National Park. (4) Completing a study of the reasons for overland movements by Clarias

LUCENA, CARLOS A. S. de. Laboratorio de Ictiologia, Museu de Ciencias da Pontificia Universidade Catolica do Rio Grande do Sul, Av. Ipiranga 6681, Caixa Postal 1429. 90620. Porto Alegre, RS-Brasil. FAX (0512) 39-15-64.

I'm continuing the study about the relationships in the family Characidae. It's my project for the doctoral thesis ${\cal P}$ at the Universidade de Sao Paulo (Dr. Naercio Menezes is my sponsor). The taxonomic revision and relationships of the genus <u>Theringichthys</u> is beginning (with Margarete Lucena, Roberto Reis and Luiz Malabarba).

LUCENA, Z.M.S. de Pesquisadora, Laboratorio de Ictiologia, Museu de Ciencias, Pontificia Universidade Catolica do RS., Av. Ipiranga 6681, Caixa Postal 1429. CEP 90620. FAX (0512)39-15-64.

Current works: (1) I am continuing the taxonomic study of the genus Deuterodon (Characidae) from southern Brazil (with Carlos Lucena); (2) taxonomic revision and relationships of the genus $\underline{\text{Iheringichthys}}$ is beginning (with Carlos Lucena, Luiz Malabarba and Roberto Reis).

MABEE, PAULA M. Dept. of Biology, San Diego State University, San Diego, CA 92182-0057 (619) 594-7828

Current work includes: 1) Experimental study of the developmental interaction between neuromasts and dermal bone in anabantoid fishes; 2) Phylogenetic interrelationships of anabantoids; 3) Phylogenetic interrelationships of centrarchids with J.M. Humphries, R.C. Cashner, and J. Grady.

MACHIDA, YOSHIHIKO Professor, Department of Biology, Faculty of Science, Kochi University, Akebono, Kochi 780, Japan

Current work: (1) taxonomy of carapids from Japan. (2) review of the genus Hoplobrotula (with J. G. Nielsen). (3) taxonomy of <u>Dinematichthys</u> species from Japan. (4) continuing deep-sea ophidiids from the western Pacific. (5) continuing local fauna around Shikoku, Japan.

MALABARBA, LUIZ R. -Professor, Departamento de ALABARBA, LUIZ R. -Professor, Departamento de Zoologia, Universidade Federal do Rio Grande do Sul; Av. Paulo Gama s/n, CEP 90049, Porto Alegre, RS, Brasil. -Curator of Fishes, Museu de Ciências da PUCRS; PO.Box 1429, CEP 90620, Porto Alegre, RS, Brazil. FAX (512)391564. BITNET: "MALABARBA SBU.UFRGS.ANRS.BR"

Current work includes: (1) Phylogenetic study of those genera assigned to Cheirodontinae;(2) Descrition of some new Gymnogeophagus species (Cichlidae): (with R.Reis); (3) Taxonomic revision and phylogenetic assessment of the Pimelo didae genera Bergiaria, Iheringiichthys and Conorhynchus (with R.Reis, C.A.Lucena and Z.M. Lucena).

MARTINI, ERLEND. Prof. Dr., Geologisch-Paläont. Institut Univ. Frankfurt am Main Senckenberganlage 32-34, D-6000 Frankfurt a.M.

Current work includes: (1) Recent otoliths found in pellets of gulls at Heligoland, North Sea. (2) Fish remains especially otoliths in sediments of the Salton Sea, California.

MATARESE, ANN C. Alaska Fisheries Science Center, 7600 Sand Point Way NE, BIN C15700, Seattle, WA 98115-0070 (206) 526-4111 FTS 392-4111

During 1990, two projects that dominated my systematic-related research for the last several years were finally completed: a laboratory guide to the early life history stages of Northeast Pacific fishes and a study of the systematics and zoogeography of the Bathymasteridae. Work on the larval development and systematics of the Northeast Pacific Stichaeidae is in progress.

MATSUURA, KEIICHI Senior Curator, Dept. of Zool., National Science Museum (Nat. Hist.), 3-23-1 Hyakunin-cho, Shinjuku-ku, Tokyo 169, Japan (03) 364-2311

Current work includes: (1) revision of the puffer-fish genera Arothron and Takifugu; (2) revision of the boxfish family Aracanidae; (3) review of Australian triacanthodids (with J. R. Paxton). The book "Fishes Collected by the R/V Kaiyo Maru around New Zealand" is now available (see announcements) announcements).

McDowall, R.M. Freshwater Fisheries Centre, Box 8324, Christchurch, New Zealand. Tel (03) 348-8939, Fax (03) 348-5548

- 1 Continue study of nature of cucumber odour in fishes, looking at retropinnids, osmerids and also Chlorophthalmus.
- 2 Age of migratory whitebait juveniles of <u>Galaxias</u> species using daily growth rings to determine whether size differences at migration are due to differences in age or differences in growth rates.

MCEACHRAN, JOHN D. Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX 77843 (409) 845-5777

Current research topics: (1) Interrelationships of skates of the tribe Pavorajini (with P. Last), (2) Interrelationships of the spade fishes and bat fishes (Pisces: Ephippididae) (with G. D. Johnson), (3) A new species of Heterandria from Chiapas, Mexico (Pisces: Poeciliidae) (with C. Aadland), (4) Interrelationships of skates of tribe Rajiji, (5) Phylogenetic significance of electric organs of skates (with B. Jacob), (6) Ventral gill arch skeleton and musculature of batoid fishes (with T. Miyake). Long range studies include: (1) Systematics phylogenetics & biogeography of batoid fishes (Chondrichthyes, Batoidea) and (2) Book entitled Fishes of the Gulf of Mexico (with J. Fechhelm).

MEE, JONATHAN K.L. Oregon State University Hatfield Marine Science Center Aquarium, Marine Science Drive, Newport, Oregon 97365 (503)867-0100

Current work involves: (1) Master's thesis on the Apogonid fishes of Oman; (2) Research on a 63 cm. whale shark, Rhincodon typus from Omani waters; (3) Description of a new species of Heterodontus with Stephen Hare; (4) Completion of the description of a new species of Narcine with L. Compagno; (5) Completion of the description of a new Amphiprion with G. Allen.

MENEZES, NAERCIO A. Ichthyology, Museu de Zoologia Universidade de São Paulo, Caixa Postal 7172; OlO51, São Paulo, SP - Brasil

Research projects listed last year still going $\ensuremath{\text{on.}}$

NENG, QINGWEN. Professor of Ichthyology, Dept. of Aquaculture, Shanghai Fisheries University, 334 Jun Gong Rd., Shanghai 200090, P. R. China.

Current work includes: (1) studies on isozymes, skeleton characters of Chinese $\underline{\text{Coilia}}$ fishes; (2) development of suprabranchial organ of $\underline{\text{silver}}$ carp; (3) study continues on the systematics of the Cyclostomata and Chondrichthyes of China.

MERRETT, NIGEL R- Department of Zoology, The Natural History Museum, Cromwell Road, London, SW7 58D, U.K.

Current work includes: (1) comparison of the abyssal demersal ichthyofauna found at two sites below different productivity regimes in the eastern North Atlantic; (2) investigation of possible racial characteristics among deep demersal fishes in the same area using host-parasite relations as indicators (with R A Bray) and electrophoretic techniques (with P.A. Prodohl); (3) continuation of the revision of Bathymicrops with J. Nielsen.

 $\mbox{\scriptsize MILLER, Peter J.}$ Zoology Department, The University, $\mbox{\scriptsize Bristol},$ $\mbox{\scriptsize BS8 1UG,}$ $\mbox{\scriptsize UK.}$

Work this year has concentrated on producing a cladistic classification of the Gobioidei and a summary of this is now completed. Whatever its shortcomings, the present scheme has at least eliminated the paraphyletic Eleotrididae. The monograph on Eastern Atlantic marine and freshwater gobioids also continues, with some emphasis this year on the freshwater gobies of the Mediterranean basin. I am now collaborating with Dave Greenfield on Gnatholepis. Stuart McKay (SERC postgraduate) is still working on goby isozymes. My interest in small fish biology remains undiminished, and Dave Tipping (SERC postgraduate) is completing his researches on the control of reproduction in the Common Goby, Pomatoschistus microps.

MIQUELARENA, A. M. Instituto de Limnologia "Dr. Raul A. Ringuelet", C. C. 712, 1900 La Plata, Argentina

Current work: (1) Systematics and osteology of freshwater fishes from Argentina; (2) General ecology and zoogeography of freshwater fishes from Argentina.

MIRZA, MUHAMMAD RAMZAN. Assistant Professor of Zoology. Dept. of Zoology, Government College, Lahore, Pakistan.

Current work includes: (1) study of ichthyofauna of freshwater of the Makran Coast; (2) fishes of the river Neelam in Azad Kashmir; (3) Fishes of the Northern Areas (in collaboration with Saminllah Khan).

MOORE, JON A. Division of Vertebrate Zoology, Peabody Museum of Natural History, Yale Univ., New Haven, CT 06511

Current work: (1) I am finishing my thesis on "beryciform" interand intrarelationships using primarily osteologic characters; (2) a revision of the genus *Sorosichthys*; (3) an analysis of acanthomorph pelvic girdle anatomy (with Melanie Stiassny); (4) an analysis of the basal percomorph relationships.

MULLER, SONIA. Département d'herpétologie et d'ichtyologie, Muséum d'Histoire naturelle, case postale 434, CH-1211 Genève 6, Suisse. Phone 41-22/7359130

The revision of the genus Ancistrus continues as doctoral thesis. Morphological, osteological and enzymatic characters are studied in comparison with other Loricariidae. In collaboration with C. Weber, a work on Megalancistrus is in progress.

I would greatly appreciate the sending of living specimens from precise localities (postal charges will of course be refunded).

MUÑOZ-CHAPULI, RAMON. Associate professor, Department of Animal Biology, University of Málaga. 29071 Málaga (Spain).

Current work includes: (1) Comparative anatomy of coronary arteries in elasmobranchs. (2) Comparative anatomy of cephalic arteries in fishes. (3) Interrelationships in elasmobranchs based on immunological characteristics of isolated serum transferrin (with R. Lawson, D.H.Davies and V. de Andrés).

MUNROE, THOMAS A. Systematic zoologist, National Marine Fisheries Service Systematics Laboratory, National Museum of Natural History, Washington, D. C. 20560. (202) 357-4255

Current work: (1) Completing manuscripts revising Atlantic (completed), eastern Pacific (completed; some in collaboration with M. N. Mahadeva), and Indo-Pacific Symphurus (underway; in conjunction with M. S. Nizinski); (2) revision of western Atlantic Sardinella; (3) preparation of Clupeidae and Labridae sections for revision and up-dating of Bigelow and Schroeder's "Fishes of the Gulf of Maine"; (4) preparation of type catalog of clupeoid and pleuronectiform fishes at USNM; (5) revision of achirine soles (with N. Menezes). Osteological studies continuing for completion of a phylogenetic analysis of Symphurus.

MURDY, EDWARD O. Program manager, Division of International Programs, National Science Foundation, 1800 G. St., NW., Washington, D. C. 20550. Tel. (202) 357-9402 Fax. (202) 357-5839 BITNET: emurdy@nsf INTERNET: emurdy@note.nsf.gov

Steady progess is being made on an updated version of Hildebrand & Schroeder's "Fishes of Chesapeake Bay". High quality transparencies of species frequenting the Chesapeake Bay would be greatly appreciated.

I still have a limited number of copies of "A Taxonomic Revision and Cladistic Analysis of the Oxudercine Gobies (Gobiidae: Oxudercinae)", published in the Records of the Australian Museum, Supplement 11 (1989). I purchased these copies at cost for US\$15. If you send a check payable to E. O. Murdey for US\$15, I will be pleased to send you a copy. Or you may order a copy (A\$38) from: Circulations Officer (Community Relations), Australian Museum, P.O. Box A285, Sydney South, NSW 2000, Australia.

MYÉRS, ROBERT F. P.O. Box 21153, GMF, Guam 96921 USA ph.: (country code 671) 734-2590 (evenings Guam time)

Faunal studies of Micronesia continue as time permits. New projects include the description of a new <u>Parupeneus</u> (J. E. Randall sr. author). Projects carried over from last year include papers on new and recent records of Marianas fishes (with T. J. Donaldson and others) and gathering material of a new scarid to be described with J. E. Randall. <u>Micronesian Reef Fishes</u> will go into a second edition in early 1991. Changes will be limited to correcting typos and misidentifications as well as providing the names of species undescribed at the time of the orginal publication and adding a few range extentions (most of these were included in the 2/1/90 corrigenda/addenda). An expanded edition is expected in two or three years. Please send loan requests to me c/o the Marine Laboratory, UOG Station, Mangilao, Guam 96923 USA.

NAKABO, TETSUJI. Assistant Prof., Department of Fisheries, Faculty of Agriculture, Kyoto University, Kyoto 606: JAPAN

Current Systematic work included; (1) Key to the fishes of the Japanese Archipelago (ed. with T. Yoshino); (2) Callionymidae, western Atlantic Foetorepus with K.E.Hartel; (3) Draconettidae, Atlantic Centrodraco with K.E. Hartel; (4) Pseudoblennius (Cottidae, with M. Tomiyama); (5) Pleuronichthys (Pleuronectidae, with T. Kawashima & J. Adachi); (6) Pampus (Stromateidae, with M. Itani & U. Yamada); (7) Kyphosus (Kyphosidae, with K. Sakai).

Nakamura, Izumi Curator of Fishes, Aquatic Natural History, Museum, Fisheries Research Station, Kyoto University, Maizuru, Kyoto 625, Japan

Current work includes: (1) Systematic review of Gempylidae and Trichiuridae with Dr. N. Parin; (2) Evolution and establishment of econiche in the Scombriform fishes; (3) Adaptive evolution of epipelagic fishes.

NELSON, JOSEPH S. Dept. of Zoology, University of Alberta, Edmonton, Alberta T6G 2E9, Canada (403) 492-4741 (or 3308); FAX: (403) 492-7033

Research continues on the systematics of the Trichonotidae and Psychrolutidae, on the pelvic skeleton loss in <u>Culaea inconstans</u>, and on the classification and systematics of world fishes. The manuscript for a revision of "The Fishes of Alberta", with M. J. Paetz, is complete. The book co-edited with Ian J. Winfield of England "Cyprinid fishes; systematics, biology and exploitation" will be published by Chapman and Hall Ltd. this winter.

NETO, ANA ISABEL. Dept. Biologia, Univ. dos Acores, 9502 Ponta Delgada Cedex, Acores, Portugal. Tel. 096.35320 FAX 096.35370.

Working in collaboration with Jose M. Azevedo on the revision and updating of the collections of the Museu Carlos Machado, Azores, Portugal, and on the ecology of littoral fishes.

- NIJSSEN, Han & Isaäc J. H. ISBRÜCKER, Department of Ichthyology, Institute of Taxonomic Zooloy, P.O. Box 4766, 1009 AT Amsterdam, The Netherlands. Telephone (0)20-5256615, FAX +31-205257238.
- Current work includes: (1) Co-organization of the Seventh International Ichthyology Congress of the European Ichthyological Union (EIU) to be held in The Hague, August 26/30, 1991 (see separate announcement); (2) Alex Ploeg has finished his thesis (see References), which he will defend on 18th December 1990; (3) Ongoing revision of Corydoras on a faunal basis; (4) Several systematic research studies and projects in Loricariidae (as in last years), including description of some new taxa, revision of loricariin genera (e.g. Pseudohemiodon, Sturisoma, Loricariichthys).

NIZINSKI, MARTHA S. Zoologist, National Marine Fisheries Service Systematics Laboratory, National Museum of Natural History, Washington, D. C. 20560. Tel. (202) 357-2530

Current work: (1) Revision of Indo-Pacific Symphurus (with T. A. Munroe); (2) description of new species of eastern Pacific Symphurus (with T. A. Munroe); (3) completion of a type-catalogue of beloniform fishes at USNM (with B. B. Collette and N.V. Parin); (4) completion of systematic study of western North Atlantic sand lances (with B. B. Collette and B. B. Washington); (5) completion of Ammodytidae section for revision and up-dating of Bigelow and Schroeder's "Fishes of the Gulf of Maine".

NOLF, Dirk. Curator of fossil fishes. Institut royal des Sciences naturelles de Belgique, 29 Rue Vautier, 1040 Brussels, Belgium.

Current work includes:

Percoidei).

(1) Otalith-based reconstructions of fossil fish faunas presently concentrated on deepwater faunas from the Paleogene of Southern Europe (2) Application of otoliths to systematics of fossil and Recent fishes (presently concentrated on the suborder

NORRIS, STEVEN M. Dept. of Zoology and Museum, Arizona-State University, Tempe, AZ 85287-1501 BITNET AGSMNOASUACAD

Current work includes morphological, phylogenetic and biogeographic work on Ctenopoma (Anabantidae). Two new species have been described. Additional work is in preparation. Work on the alpha taxonomy and biogeography of the Malapteruridae (Siluriformes) has been undertaken.

OJEDA, F. PATRICIO. Departamento de Ecología, Facultad de Ciencias Biológicas, Pont. Universidad Católica de Chile, Casilla 114-D Santiago, Chile. FAX 56-2-2225515.

My work continues on studies dealing with taxonomy, biology, and ecology of littoral fishes of the Chilean coast. Current projects include functional morphology, bioenergetic, and digestive physiology of percoid herbivorous fishes, particularly of Kyphosidae, Girellidae, Aplodactylidae, and Blenniidae; and ecology of fish assemblages of intertidal rock-pools.

Okazaki, Toshio. Research scientist, Fish Genetics Section, Division of Genetics and Breeding, National Research Institute of Aquaculture, Tamaki-cho, Mie Prefecture 519-04, Japan.

Current research area: Biological systematics of freshwater fishes based on allozymes and mt-DNA variations.

Specific studies in progress: 1) Biochemical systematics of the genus <u>Silurus</u>; 2) Genetic relationships among Japanese dark chub, <u>Zacco temminckii</u> sp.; 3) Relationships among masu salmon complex.

I hope to exchange the fish specimens in the lake of Biwa for lenok (<u>Brachymystax</u> sp.).

ORR, JAMES W. School of Fisheries, HF-15, University of Washington, Seattle, Washington 98195 (206-543-8699/4270)

My work continues on the phylogenetic relationships of gasterosteiform fishes as a doctoral student under T. W. Pietsch. A revision of the Solenostomidae, with R. A. Fritzsche, is nearing completion. Work on syngnathoid generic interrelationships is continuing. The description of a new Oneirodes has been expanded to include a key to the species. Other ongoing work includes a note in press on Sebastes hopkinsi and another in preparation on the flatfishes of the northeast Pacific.

ORTON, RANDAL D. Environmental Science and Engineering Dept., UCLÁ 90024 Tel. (213) 580-8107 Fax. (213) 580-0873

My systematics research (including revisions of manuscripts listed in last year's newsletter) is on hold until I finalize a dissertation in environmental science and engineering. My revision of the Girellidae has been sent out for a presubmittal review; please let me know if you'd like to participate. The allelic comparison of New Zealand and Australian Girella tricuspidata was dropped because of inadequate activity on these five-year-old samples. I crossed disciplines last Spring, and gave a presentation to the American Meteorological Society on climatic influences on temperate water shorefish speciation and extinction (based on my work with Girella). Audience response can be characterized as "huh?" All in all, a slow year for systematics.

OZAWA, TAKAKAZU. Associate Professor, Faculty of Fisheries, Kagoshima University, 4-50-20 Shimo-arata, Kagoshima 890, Japan tel. (0992) 54-2181; FAX 0992-57-4550

Long-term studies include the analysis of Ichthyoplankton in the western North Pacific and in Kagcshima Bay, southern Japan.

PAEPKE, Hans-Joachim, Curator of Fishes, Museum of Natural History, Humboldt-University, Invalidenstraße 43, 0-1040 Berlin (Germany)

Two additional parts of our type catalogue are finished for printing: Part 3 Notothenoidei, Callionymoidei (co-authored by R. Fricke) and part 4 Anabantoidei, Channoidei. Furthermore are finished a MS about the phylogenetic relations of the species of the gemus Macropodus Lac. as well as the book "Paradiesfische" (which will be issued by Ziemsen Verlag in 1991).

Field work this summer included two weeks in North Korea (as visitor of the Kim-Il-Sung-University of Phyongyang).

PARENTI, LYNNE R., Division of Fishes, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560.

Phone (202) 357-3313, FAX (202) 357-1896

Current research includes: 1) description of new species of ricefishes and sicydline gobies as part of phylogenetic systematic analyses of both groups; 2) completion of a review paper on relationships of the atherinomorph fishes; and 3) preparation of the second edition of Cladistic Biogeography, with C. J. Humphries of The Natural History Museum, London, and other smaller papers on historical biogeography. In mid-1991, Mohd. Zakaria Ismail, of the University of Malaya, and I hope to begin a survey of fishes of the Rajang River, Sarawak, Malaysian Borneo.

PAULIN, CHRIS D. Department of Fishes, National Museum of New Zealand, P.O. Box 467, Wellington, New Zealand. Telephone Well. 846-019. Fax Well. 857-157.

Current work includes (1) book on the rock pool fishes of New Zealand with Clive Roberts; (2) biogeography of New Zealand Fishes; (3) descriptions of new species of *Coelorinchus* from New Zealand with Peter McMillan; (4) revision of *Arripis* from the Kermadec Islands.

Paulus, Thomas Senckenberg Research Institute, Ichthyology I, Senckenberganlage 25, D-6000 Frankfurt/Main, FR Germany, Phone: 069-7542255, Fax: 069-746238

Current work includes: (1) studies on morphology and ecology of syntopic Syngnathidae in the Red Sea; morphology of the tube snout in relation to prey; ecological niches in a coral reef habitat; (2) behaviour on fishes of the genus Pseudanthias (Pisces: Serranidae) in the Red Sea; (3) taxonomy and systematics of Red Sea fishes.

PAXTON, JOHN R. Senior Research Scientist, Australian Museum, 6-8 College St., Sydney, N.S.W 2000, Australia tel. (02) 339-8139; FAX (02)360-4350

Current work includes: (1) Larvae and juveniles of the whalefishes Barbourisia and Rondeletia (with G. D. Johnson); (2) Gonad morphology and reproductive biology of the whalefishes Barbourisidae, Rondeletiidae, Cetomimidae and Megalomycteridae; (3) Revision of the whalefish genus Gyrinomimus; (4) Osteology and relationships of the whalefish family Cetomimidae; (5) Revision of the anthiin genus Ellerkeldia (with G. R. Allen).

PEQUEÑO, GERMAN E. Director, Instituto de Zoología "Ernst F. Kilian", Universidad Austral de Chile, Casilla 567, Valdivia, Chile, tel.56 (063) 213911; FAX 00-56-63-212953

Current work includes: (a) distributional patterns in the Llanguihue Province coastal ichthyofauna (with J. Lamilla); (b) geographical relationships in the fishes from the Southern Chilean Archipelagos (sponsored by Spanish Ministry of Science and Education and Instituto de Ciencias del Mar, Barcelona); (c) biology of Callorhynchus callorhynchus from Valdivia; (d) systematic studies on Eleginops from Chile.

PEREIRA, EDSON H. L. Graduate student, Laboratory of Ichthyology, Museu de Ciencias da PUC-RS, P.O. Box 1429, 90620. Porto Alegre, Brasil. Tel. 512 391511, ext. 138.

Current work includes a review of the south Brasilian species of the loricariid genus <u>Hemipsilichthys</u>, with the description of a new species from the Uruguay river system (with R.E. Reis). (With financial support of the Conselho Nacional de Desenvolvimento Cientifico e Tecnologico-CNPq, grant no. 824187/89-0).

PIETSCH, THEODORE W., Professor, School of Fisheries, HF-15, University of Washington, Seattle, Washington 98195 (206) 543-8923, FAX (206) 685-3275

A paper on the osteology and relationships of ammodytid fishes (with C. P. Zabetian) and a revision of the Pegasidae (W. A. Palsson, senior author) have been published; work on the osteology and relationships of champsodontids continues (with D. Henriques). A manuscript for a book, Fishes of Puget Sound and Adjacent Waters, is progressing, as is a revision of the cottid genus Triglops. An analysis of lophilform relationships based on extraction of DNA from formalin-fixed material has been initiated. Papers on "Collection Building in Ichthyology and Herpetology in the 18th, 19th, and 20th Centuries," delivered at the 1990 meeting of the ASIH at Charleston, are being edited for Stanford University Press. Collecting efforts in the central North Pacific, and in Prince William Sound, Gulf of Alaska, continues, as does renovation, expansion, and computerization of the University of Washington fish collection. A proposal to establish a center for early life history stages of fishes at the University of Washington has been submitted to the NSF.

PINNA, MARIO de Department of Ichthyology, American Museum of Natural History, Central Park West at 79th st. New York-NY 10024 USA

I am starting to work seriously on my doctoral dissertation on the phylogeny of catfish families Portions of that work are intended for publication before the thesis itself: 1- monophyly and relationships of Amphiliidae; 2- relationships among Clariidae, Heteropneustidae & Uegitglanidae 3- familial relationships of Phreatobius (with C. Ferraris); 4- lower loricarioid relationships. Projects with trichomycterids continue as: 1- generic revision & phylogeny of Stegophilinae (with description of new gen. & sp. with H. Britski); 2- taxonomic status of Eremophilus, with new pelvicless Trichomycterus (with S. Weitzman); 3- new sarcoglanidinae from SE Brazil; 4- new spp of Scleronema.

PLATANIA, STEVEN P., Assistant Curator of Fishes, Museum of Southwestern Biology, Department of Biology, Univ. of New Mexico, Albuquerque, New Mexico 87131 (505) 277-6725 (505) 277-0304 [FAX]

Current areas of research are: 1) continuing 5-year study of fishes of the Rio Grande, NM, including analysis of macrohabit use; 2) survey of the fishes of the Rio Grande in the Big Bend National Park Region; 3) life history and systematics of Notropis jemezanus; 4) life history of Hybognathus amarus; 5)monitoring ichthyofaunal changes in the Pecos River, NM. Long-term plan is to produce an exhaustive work on the fishes of the Rio Grande (exclusive of political boundaries) which includes data from all previous collections and summarizes changes in abundance and distribution over time. I am continuing the expansion of the MSB fish collection and am preparing to computerize the collection. Dr. Brooks M. Burr (Southern Illinois University) is spending his 1990-1991 sabbatical at UNM assisting with many of the above projects.

PLÖSCH, TORSTEN. Roggenkamp 17, D-2875 Ganderkesse 2, Germany. (04221) 41584

Current work includes osteological and systematic studies on South American cichlid fishes.

POST, ALFRED. Curator of Fishes, Ichthyologie, Institut fur Seefischerei, Zool. Museum, Univ. Hamburg, Martin-Luther-King-Platz 3, D 2000 Hamburg 13.

Since September 1988 I interrupted my studies in ichthyology to be commissionary Director of the Institute for Seafisheries. I expect to go back to the ISH-collection early in 1991.

Proudlove, Graham S. Dept. of Environmental Biology, University of Manchester, Manchester, M13 9PL, United Kingdom

Continuation of projects of last year.

Quero, Jean-Claude, IFREMER-La Rochelle, Place du Séminaire, B.P. 7, 17137 L'Homeau, France

Continuing work on fishes of Réunion and Madagascar: Ophidiiformes (with J.C. Nielsen); Ostracoberycidae, Acropomatidae, Apogonidae (with C. Ozouf-Costaz); Triglidae, Scorpaenidae (with G. Duhamel); Bothidae (with D.A. Hensley); Anguilliformes (with L. Saldanha) International Ichthyology Congress, Den Haag, 26-30 Aug. 1991, to make a study of Pleuronectiformes, using about 15 morphological, molecular and numerical taxonomic methods.

RANDALL, JOHN E. Senior Ichthyologist, Bernice P. Bishop Museum, P.O. Box 19000-A, Honolulu, Hawaii 96817-0916 (808) 848-4130, 848-4115 FAX (808) 841-8968

FAX (808) 841-8968

Divers Guide to Maldives Fishes (400 spp.) in press 2½ years continues to be delayed due to poor book design. Fishes of the Great Barrier Reef and Coral Sea (G. Allen and R. Steene, coauthors; 1111 species, all illustrated in color) is now being printed. Editorial work on Indo-Pacific Fishes with Helen A. Randall continues. Number 19 will be Siganidae by D. Woodland; number 20, Epinephelinae (109 spp.) by J. Randall and P. Heemstra, and number 21, Valenciennea, by D. Hoese and H. Larson. Revisions of several labrid genera and Chromis are in progress. A review of Maldives gobies with Goren and Klausewitz is also in progress. A checklist of the fishes of Chesterfield Islands, Coral Sea with M. Kulbicki and J. Rivaton is in preparation; as is a checklist of Maldives fishes with C. Anderson.

RAUCHENBERGER, M. c/o Dept. of Zoology, The Natural History Museum, Cromwell Rd., London, U.K. SW7 5BD tel. (081) 938-9467

Current work includes: (1) revision of manuscript on the interrelationships of genera of the family Poeciliidae.

RÉ, PEDRO. Assistant Professor Faculty of Sciences University of Lisbon. Departamento de Zoologia e Antropologia. Faculdade de Ciências da Universidade de Lisboa. Campo Grande, Bloco C2, 1700 Lisboa. PORTUGAL.

Current work includes: (i) Study of the ichthyoplankton of the Portuguese coast and Portuguese estuaries; (ii) Ecology of the planktonic phase of <u>Sardina pilchardus</u> and <u>Engraulis encrasicolus</u>; (iii) Rhythms of activity of fish larvae (growth, feeding, swimbladder inflation/deflation; (iv) Daily growth of fish larvae based on otolith microstructure; (v) Fishery Biology; (vi) Recruitment variability (Clupeoidei).

REICHENBACHER, BETTINA Dipl.-Geol., Geol.-Paläont. Institut d. Univ. Frankfurt/M. Senckenberganlage 32-34 D-6000 Frankfurt/Main

(1) Continuing work on the fossil brackish fish-fauna of Lower Miocene in the western and central paratethys on basis of otoliths (Cyprinodontidae, Atherinidae, Channidae, Chandidae, Serranidae, Gobiidae).
(2) Description of a fossil fish-fauna of fresh-and brackish water fishes on basis of otoliths from the Upper Oligocene of Switzerland (Cyprinodontidae, Atherinidae, Chandidae, Serranidae, Gobiidae, Umbridae).

REINTHAL, PETER Department of Ichthyology, American Museum of Natural History, 79 at CPW, New York, N.Y. 10025; as of Jan. 1 1991 - Department of Biology, Eastern Michigan University, Ypsilanti, Michigan, 48197

Current work: (1) Systematics and ecology of cichlid fishes from Lake Malawi, Africa (2) Systematics and ecology of freshwater fishes from Madagascar (Field expedition Sept. 1990), (3) Geographic variation in shallow water sculpins from Lake Baikal, USSR (Field work and collection June-July 1990), (4) Survey of the frehwater fishes of Sierra Leone (Feb. 1990).

REIS, ROBERTO E. Curator of Fishes; Laboratório de Ictiologia; Museu de Ciências da PUCRS; P.O.Box 1429; 90620 Porto Alegre, Brasil. NEW Phone (512) 39-1511 ext. 3138 FAX (512) 39-1564

Current work includes: (1) the phylogenetic revision of the Neotropical catfish family Callichthyidae continues occuping most of my time; (2) the review of the La Plata system species of Loricariichthys is going on slowly; (3) some new species of the cichlid genus Gymnogeophagus are being described (with L.R. Malabarba); (4) a taxonomic revision and phylogenetic assessment of the pimelodid genera Bergiaria, Iheringichthys and Conorhynchos (with L.R. Malabarba, C.A. Lucena and Z.M. Lucena). The description of a new genus and species of hypoptopomine loricariid (with S. Schaefer) and the taxonomic study of Parapimelodus are both submitted for Copeia.

RETZER, MICHAEL Graduate assistant, Center for Biodiversity, Illinois Natural History Survey, 79 Natural Resources Building, 607 E. Peabody, Champaign, IL 61820 (217) 244-7965

Current work: (1) Revision of Farlowella, Loricariidae (my Ph.D. dissertation); (2) odontodes morphology of loricariid catfishes; (3) variation in tooth shape of darters (Percidae). Side interests include South American biogeography, Neobythites (Ophidiidae) systematics and ecology of South American and Gulf of Mexico fishes.

RICHARDS, WILLIAM J., Southeast Fisheries Center, 75 Virginia Beach Dr., Miami, FL 33149 (305)361-4249

Current work includes (1) studies on larval fish communities in the Gulf of Mexico and along the Florida Keys using MOCNESS gear; (2) continuation of a project to prepare an identification guide for fish eggs and larvae from the western central North Atlantic; (3) continuation of taxonomic studies of the families Triglidae and Peristediidae.

RIEHL, RÜDIGER. Institut für Zoologie (Morphologie & Zellbiologie), Universität Düsseldorf, Universitätsstr. 1, D-4000 Düsseldorf 1, Germany Tel. 0211/311-3582, Fax: 0211/342229.

Current work includes: (1) scanning electron micro scope studies on surfaces and micropyles of Antarctic fish eggs with special reference to their systematic significance. (2) Comparative studies on the ultrastructure of egg envelopes in a number of teleost families (blenniids, clariids, goodeids poeciliids, serrasalmids, silurids etc.). (3) comparative investigation of the oogenesis in some goodeid species.

ROBERTS, CLIVE D. Department of Fishes, National Museum of New Zealand. Telephone Well. 846-019. Fax Well. 857-157.

After completing a fellowship year at the Smithsonian, I returned down under in March to take up a full-time position at the National Museum of N.Z. Please note my change of address.

Current work includes (1) a review of the fishes of the Chatham Islands, New Zealand (ms submitted), (2) reproductive mode in <u>Seranus novemcinctus</u> with Bruce Collette, (3) comparative morphology of ctenoid scales and its phylogenetic significance, (4) checklist of the fishes of Niue Island, (5) book on the rock pool fishes of New Zealand with Chris Paulin. Other systematic work at various stages of completion include studies on the percomorph genera <u>Doedrleinia</u>, <u>Lepidoperca</u>, <u>Plectranthias</u>, <u>Polyprion</u> and <u>Stereolepis</u>.

ROSS, STEVE W. Center for Marine Science Research, UNC-W, 7205 Wrightsville Ave., Wilmington, NC 28403 (919) 256-3721 or 457-3397

Note my change of address above where I am directing the research program for the N.C. National Estuarine Research Program. PhD work on estuarine fish recruitment is nearing completion. Dr. Mary Moser and I obtained a large grant to study anadromous fish (especially shortnose sturgeon) migrations in the Cape Fear River. George Burgess and I plan to complete our annotated checklist of the marine fishes of North Carolina early next year.

RUCABADO, JAUME. Scientific Officer.

Instituto de Ciencias del Mar Paseo Nacional s/n 08039-BARCELONA (Spain) tel
(3) 310-64-50 fax (3) 319-98-42 telex 59-367 inpb-e

BIDICTIOS project (Bio-ecology of the Fish Resources of the Beagle Channel Tierra del Fuego, Argentina) has ended; many papers are published or are in press, including a large monograph.

BATIMAR project (Ichthyofauna of deep western Mediterranean, from 1000 to 2500 m depth) is also finished; publication of papers is waiting for the acceptation of three doctoral thesis of fellows involved in such research.

Ouring 1989 and 1990 a revision of zoogeographical conception concerning the fish species inhabiting the MACARONESIA area has been undertaken; paper is nearby to be submitted for publication.

The Reference Fish Collection of the Institute has been moved into a new room of the same building. At present is fully catalogued and computerised. The catalogue will be published in december 90.

SABATES, ANA Instituto de Ciencias del Mar, P. Nacional s/n. 08039 Barcelona, Spain

Current work: Systematics of Mediterranean fish larvae; ichthyoplankton dynamics: composition, distribution, ecology, relationship with hydrography and geography and other zooplankters.

SAKAMOTO, KAZUO. c/o Department of Zoology, University Museum, University of Tokyo, Hongo 7-3-1, Bunkyo-ku, Tokyo 113, Japan 03-812-2111 ex. 2840

Current work includes: (1) taxonomy of the Pleuronectidae; (2) fossil flatfishes in Japan (Pleuronectiformes) (with T. Uyeno); (3) relationships of the Scophthalmidae (with K. Amaoka); (4) systematic position of the Kurtidae (with Y. Tominaga)

SALLS, ROY A. Assistant director, Northridge Center for Public Archaeology, California State University, Northridge, California 91330. (818) 885-3575

Current work: (1) study of prehistoric fishing methods at Lake Cahuilla in the Coachella Valley, California; (2) Taphonomy of Gila elegans (Family Cyprinidae), Xyrauchen texanus (Family Catostomidae), Mugil cephalus (Family Mugilidae) and Elops affinis (Family Elopidae) in lake terrace archaeological middens; (3) analysis of archaeological fish remains from the Coachella Valley for a publication on prehistoric fishing at Lake Cahuilla (Salton Sea).

SASAKI, KUNIO Assistant Professor, Dept. of Biology, Faculty of Science, Kochi University, Akebono, Kochi 780, Japan

Current work on the Sciaenidae includes: Revision of P.N.G.-Australian sciaenids with descriptions of several new species; revision of <u>Johnius</u>; anatomy of <u>Boesemania</u>. Longterm phylogenetic study on perciforms with a beak-like mouth has just launched out.

Sato, Yoichi Curator of Zoology, Tokushima Prefectural Museum, Hachiman-cho, Tokushima, 770 JAPAN. TEL 0886-68-3636; FAX 0886-68-7197

Current work includes: (1) Ichthyofauna, both marine and freshwater, of Tokushima region, Shikoku Island, southern Japan; (2) Osteology and phylogeny of clupeoid fishes; (3) Geological distribution of Miocene fossil clupeid fish, Eosardinella hishinaiensis.

SCHAEFER, SCOTT A. Assistant Curator, Dept. of Ichthyology, Academy of Natural Sciences of Philadelphia, 19th and the Parkway, Philadelphia, PA 19103. (215) 299-1002 FAX 299-1028

Current research: (1) anatomy and relationships of scoloplacid catfishes completed and published, (2) revision, phylogeny, and biogeography of *Otocinclus* (with J.C. Garavello), (3) revisionary and phylogentic studies of Hypoptopomatinae(with H.A. Britski and J.C. Garavello), (4) comparative studies of catfish jaws and teeth, (5) morphological studies of *Brycon*.

SCHMIDT, ROBERT E. Simon's Rock College, Great Barrington, Massachusetts 01230 (413) 528-0771

Current projects: (1) Quantitative sampling of fishes in water-chestnut beds with a pop net; (2) Biology of Scardinius in New York; (3) Paracanthopoma (Trichamycteridae) relationships; (4) Taxonomy and distribution of fishes in Guyana, South America. I just returned from a short trip to the lowland riverine forest. New species descriptions include Awaous (Gobiidae) and Bryconops (Characidae).

SCHOENEN, PETER. International Collection "Cichlid Papers", Library, Parkstr. 15, D-5176 Inden 4, F.R. Germany.

Building a special library for literature about cichlidfishes. On stock about 10,000 papers (scientific as well as from aquarium magazines) containing all areas of cichlid research. To increase more material is requested. Current work: preparing bibliographies of important tilapias for aquaculture.

SCHULTZ, ORTWIN Curator of fossil fishes, Geolog.-Palaont. Abt., Naturhistorisches Museum Wien, Burgring 7, Postfach 417, A-1014 Wien, Osterreich (Austria)

Current work: General revision of Istiophoridae (recent and fossil). Osteology of the rostrum. Fossil Scaridae, Odacidae, and Labridae (General revision).

SCHULTZE, Hans-Peter, Curator of Vertebrate Paleontology, Museum of Natural History, The University of Kansas, Lawrence, Kansas 66045-2454, (913)864-3279.

Current ongoing studies: (1) lungfishes: revision of North American <u>Sagenodus</u> and <u>Tranodis</u> (Pennsylvanian and Mississippian); description of fossil <u>Lepidosiren</u> from Bolivia; (2) Fossilium Catalogus, volume Dipnoi: listing of all citations of fossil dipnoans, diagnosis, occurrence, etc. of fossil species; (3) rhipidistians: description of <u>Rhizodopsis</u> from Permian of Germany and <u>Megalichthys</u> from Pennsylvanian of Nova Scotia; (4) Guidebook for Devonian fish locality Miguasha, Quebec, Canada.

SEKI, MICHAEL P. National Marine Fisheries Service, NOAA, SW Fisheries Science Center Honolulu Laboratory, 2570 Dole Street, Honolulu, HI 96822-2396

Continuing work on: (1) faunal studies of the North Pacific Transition Zone and Subarctic Boundary; (2) ecological and systematic studies of North Pacific pomfrets (Bramidae); and (3) studies on the trophic relationships among central North Pacific seamount associated fishes.

Senou, Hiroshi Izu Oceanic Park, Diving Center, Futo, Ito, Shizuoka 413-02, Japan tel. (0557) 51-1129; Fax 0557-51-3412

Current work includes: (1) ichthyofauna of Izu Oceanic Park; (2) ichthyofauna of the Ryukyus; (3) taxonomy of early stage fishes after settlement.

SERET, BERNARD. Antenne ORSTOM, Museum National d'Histoire Naturelle, Laboratoire d'Ichthyologie generale et appliquee, 43, rue Cuvier, 75231 Paris cedex 05, France. Tel. 33 (1) 40.79.37.38, FAX 33(1) 40.79.34.84. EARN: SERET at FRMMHNI1.BITNET.

Current work includes: study of the chondrichthyan fishes from off West Africa, Madagascar, the Philippines and New Caledonia, with description of new species. Teleostean fishes collected during the MUSORSTOM deep-sea trawling cruises off New Caledonia are being sorted out and will be available to specialists who would be concerned (please contact me). A taxonomical and ecological survey of the freshwater fishes from New Caledonia is under way in collaboration with G. Dingerkus.

SHAO, KWANG-TSAO Research Fellow, Institute of Zoology, Academia Sinica, Nankang, Taipei, Taiwan, 11529, R.O.C., (02)7824595 ext 50, FAX 7858059.

Current works include: (1) The distribution, database, community structure of coastal fishes from Taiwan (III) - Pescadore Island and Hsiao-liu-chiu. Similar studies for the southern, northern and north-eastern Taiwan have been done in previous two years; (2) Impingement and biomonitoring of coral reef fishes around the waters of several nuclear power or fossil fuel power plants in Taiwan; (3) Continuously describe many new records of various fish families from Taiwan; (4) Describe new species of garden eel; cardinal fishes, (with J.P. Chen); anthiine; lizardfish (with J.E. Randall) etc.

SHEDLOCK, ANDREW M. School of Fisheries, University of Washington, FTR, HF-15, Seattle, WA 98195 (206) 543-8335

As a student under T.W. Pietsch, I am presently conducting research on the molecular systematics and zoogeography of Antennarius striatus (Teleostei: Lophiiformes) using mtDNA sequence data amplified via the polymerase chain reaction (PCR). Sequencing has commenced and DNA "fingerprints" of archival specimens from throughout the nearly circumtropical range of A. striatus are now being analyzed. Part of this past summer was again spent at sea as part of an intensive collecting effort being carried out by the School of Fisheries in Prince William Sound, Gulf of Alaska. In addition to assisting with the curation of this material, I am involved generally with the curation and computerization of the Fish Collection of the School of Fisheries.

SHIMADA, KAZUHIKO. Yaeyama Branch of Okinawa Pref. Government, Tonoshiro 3-2, Ishigaki, Okinawa 907, Japan.

Current work includes: (1) About the same as last year; (2) key to the fishes of Japanese Archipelago (Nakabo, T. and T. Yoshino, eds.).

SIDEBOTTOM, DAVID G. President International Characin Association, 18 Harry Street, Werneth, Oldham, Lancs. OL9 7TA. England. tel.061-626-9128

Current work includes: 1) A-Z of Leporinus Spix 1829, the identification and description of the species and sub-species;
If anyone would like to assist please send me copies of your published or unpublished works to the above address.

SIEBERT, DARRELL J. Dept. of Zoology, The Natural History Museum. Cromwell Rd., London, U.K. SW7 5BD tel. (081) 938-9467

Current work includes: (1) relationships of the cobitid genera <u>Somileptes</u> and <u>Neceucirrichthys</u>; (2) revision of the cobitid genus <u>Acantopsis</u> (in collaboration with T. Roberts); (3) fishing around for a cyprinid classification; (4) ?field work in Southeast Asia?

SILFVERGRIP, ANDERS M.C., Graduate student. Department of Vertebrate Zoology, Swedish Museum of Natural History, PO Box 50007, S-104 05 STOCKHOLM, SWEDEN. Tel. X46-8-6664118, Fax. X46-8-6664212.

Current work includes: (1) continuation of dissertation research on the pimelodid genus Rhamdia under supervision by S.O. Kullander; (2) field trip to Kashmir Valley, India, during November 1990.

SILVA, JOSE F. P. Student, Laboratory of Ichthyology, Museu de Ciencias da PUC-RS, P.O. Box 1429, 90620. Porto Alegre, Brasil. Tel. 512 391411, ext. 138.

Current work includes a review of the south Brasilian species of the pimelodid genus Rhamdella. (With financial support of the Conselho Nacional de Desenvolvimento Cientifico e Tecnologico-CNPq, grant no. 806104/88-0).

SKELTON, PAUL M. Curator of Freshwater Fishes, J.L.B.Smith Institute of Ichthyology, Private Bag 1015 Grahamstown 6140, South Africa. tel. 0461-27124, fax 0461-22403

Preparation of a field guide to southern African freshwater fishes is currently my major involvement. An account of the fish fauna of the Ruo River in Malawi is in preparation with Denis Tweddle. Looking ahead we have started compiling an atlas of distribution of southern African freshwater fishes with Jim Cambray at the Albany Museum. Amphiliid research is temporarily on hold while the above projects are completed.

SMITH, DAVID G. Division of Fishes, NHB-159, National Museum of Natural History, Washington, DC 20560

Current projects include: 1) description of a new moray eel from Walters Shoals, with B. Collette and E. Böhlke; 2) descriptions of cyematid larvae of <u>Leptocephalus holtitype</u>, with M. Miller; 3) relationships of <u>Linkenchelys</u>, with K. Tighe

SMITH-VANIZ, WILLIAM F. Associate Curator, Dept. of Ichthyology, Academy of Natural Sciences, 19th and the Parkway, Philadelphia, PA 19103 tel. (215) 299-1025; FAX 215-299-1028.

Current research virtually unchanged from that reported last year. $% \left(1\right) =\left(1\right) \left(1\right) +\left(1\right) \left(1\right) \left(1\right) +\left(1\right) \left(1\right$

SNOEKS, JOS Koninklijk Museum voor Midden-Afrika Vertebrate Section, Leuvensesteenweg, 13 B-3080 Tervuren, Belgium (02/7675401; fax 02/7670242)

- Current work includes:
 1) continuation of the study on Lake Kivu haplochromines; deadline : summer 1991.
- 2) contribution to Cloffa IV (Tristramella, Haplochromis, Astatoreochromis, Heterochromis, Chilochromis) 3) a description of a new Haplochromis from Rwanda is
- in press d) preparation of a trip to Congo-Brazzaville (with G. Teugels & L. De Vos)

SOEHN, KENNETH L. M.Sc. student, Department of Zoology, The University of Alberta, Edmonton, Alberta T6G 2E9, Canada (403) 492-

Current work: Preparation of M.Sc. thesis on heterostracan faunas of Wenlockian (Silurian) age from sections in the Delorme Group near Avalanche Lake, Mackenzie Mountains, Northwest Territories, Canada.

SPRINCER, VICTOR G. Curator, Division of Fishes, Museum of Natural History, Washington, D.C. 20560 Tel. (202) 357-3305 FAX 202-357-1876

Current research: Revision of blenniid genus Istiblennius; new records and species of blenniid genus Ecsenius; new genus of gobiid related to Gobiopsis.

STARNES, WAYNE C. Division of Fishes, NHB WG-12, Smithsonian Institution, Washington, D. C. 20560

Current work: (1) Project manager for taxonomic study of cyprinid genus Gila in Colorado River Basin; (2) finishing up Fishes of Tennessee with Dave Etnier (ms just copyedited for printing); (3) some work on the characiform family Parodontidae; (4) Bolivian fishes; (5) fossil priacanthids and eastern Pacific priacanthids (for FAO).

Stauffer, J. R., Jr. Curator of Fishes, School of Forest Resources, Penn State University, University Park, Pennsylvania 16802 (814)-863-0645

Current work includes: 1) alpha-taxonomy of the *Pseudotropheus zebra, Pseudotropheus elongatus*, and the *Lethrinops lituris* complexes in Lake Malawi, Africa; 2) distributional study of the fishes of West Virginia; 3) mussel/fish host interactions in the upper Allegheny River drainage, Pennsylvania. I will leave on a nine-month sabbatical 13 Dec., 1990 to Malawi, Africa. My sabbatical address is P.O. Box 11, Monkey Bay, Malawi, Africa.

STEHMANN, MATTHIAS Ichthyologie, Institut fuer Seefischerei (ISH), c/o Zool. Mus. Univ., Martin-Luther-King-Platz 3, D-2000 Hamburg 13, Germany. Tel. 040-4123.5645

Participation in 3rd IPFC Nov./Dec. 1989 in Wellington: 3 oral contributions and initiation of batoid descriptive methodology workshop, and study visits to CSIRO Hobart, AMS and NMNZ. Work on 17th VITYAZ chondrichthyans in progress with MS on new Rhinochimaera in press (with Compagno and Ebert), another on *Etmopterus* spp. in prep. (with Krefft). Participation in another USSR cruise 1991 to SE-Pacific not yet certain (under N. V. Parin.) Squaloid odontology by Herman et al. has appeared in our series (Ed. Stehmann), fourth issue on Scyliorhinidae in press. MS on rajoids on West African slope (with Golovan) ready for submission, another on SE-Indian Ocean Raja (Leucoraja) sp. n. well on the way (with Seret & Ishihara). Batoid contributions to CLOFETA and FSO have appeared, as well as taxonomic papers on Notoraja (with Ishihara) and Hydrolagus (with Hardy). Two more with Merrett et al. in press on deep demersal fish fauna.

STIASSNY, MELANIE L. J. Assistant curator of fishes, The American Museum of Natural History, 79th St. & C. P. W., New York, N.Y. 10024 (212) 769-5796

Current projects include: (1) A revision of the cichlids of the Cameroonian Lakes Beme and Ejagham. (continues). (2) Report on a collection of fishes from the Wologosi Highlands, Liberia, with a description of two new species of *Barbus* (Cyprinidae). (3) A review of the pelvic girdle in acanthomorph fishes, with Jon Moore (Yale

University). (4) Revision of the Pelvicachromis humilis group species (Cichlidae) from Sierra Leone, with Clara Lizana and Peter Reinthal (AMNH). (5) Description of a new species of Synodontis from the River Moa, Sierra Leone, with Michael Stewart and Peter Reinthal (AMNH). (6) Study of the recent collection of fishes from the Mangoro River, Madagascar. To date new species of the following genera have been identified: *Rheocles* (Bedotiidae), *Ptychochromoides* (Cichlidae), and a possible new species of *Ancharius* (Ariidae). (7) A paper entitled "Phylogenetic analysis and the role of systematics in the biodiversity crisis" has been submitted for publication in a symposium volume to be published by Columbia University Press.

STRINGER, GARY L. 110 Patton Drive, West Monroe, LA Ph. (318) 396-2337

1) "Neogene paleontology in the northern Dominican Republic -- fish otoliths" with Dr. Dirk Nolf of the Royal Institute of Natural Science of Belgium is in review for publication in the Bulletins of American

Paleontology.

2) A study of the Upper Cretaceous teleostean otoliths from the Ripley Formation of Union County, Mississippi has been completed, and the manuscript is being prepared

for submission to Mississippi Geology.

3) A long-term project involving the revision of the Upper Eocene otoliths from the Yazoo Clay of Caldwell

Parish, Louisiana is progressing.
4) A paper on the Late Pleistocene-Early Holocene teleostean otoliths from the Mississippi River mudlumps has been submitted to the Journal of Vertebrate Paleon-

Su, Jinxiang Professor of Ichthyology, Dept. of Aquaculture, Shanghai Fisheries University, Jun Gong Road, Shanghai 200090, P.R.China.

Current work includes: (1) Study of the osteological development in the blacksea bream(
Sparus macrocephalus)(with Enming Wang); (2) Study of the age and growth of the Chinese bagrid catfish (Pelteobagrus fulvidraco) in Taihu Lake; (3) Study continue on the systematics of the Tetraodontiformes of China.

SUN, GUOING Dept. of Biology, East China Normal University, Shanghai 20 062, People's Republic of China

Current work: (1) A study of histology of the digestive system of the icefish *Protosalanx hyalocranius* (Abbott); (2) The biology of *Lateolabrax japonicus* (Cuvier et Valenciennes) in Yangtze river estuary and nearby marine waters.

SWIFT, CAMM C. Associate Curator of Fishes Sect. of Fishes, Natural History Museum of Los Angeles County, 900 Exposition Blvd., Los Angeles, CA 90007-4000, (213) 744-3375, Fax 744-2999

This winter and spring four manuscripts to be submitted on 1)phylogenetic relationships of the tidewater goby, <u>Eucyclogobius newberryi</u>, and its relatives, 2) distinctive anterior vertebrae in clupeoid fishes, 3) phylogenetic relationships of grammistine serranoids, and 4)status and distribution of southern California freshwater fishes. Continuing to work on review of <u>Notropis texanus</u> species group, intraspecific variation in tidewater gobies and late Tertlary marine and estuarine fishes of southern California.

TAVERNE, Louis P. Prof. Dr., University of Burundi, Faculty of Sciences, Department of Biology, B.P. 2700, Bujumbura, Burundi (Africa).

Current work includes: (1) study of the Eocene Priacanthidae of Belgium; (2) study of some Cretaceous mesogean teleosts; (3) revision of the Cretaceous teleosts of Belgium; (4) functional evolution of some osteological structures in Teleostei.

TEUGELS, GUY G. Curator of fishes, Musee Royal de l'Afrique Centrale, Laboratoire d'Ichtyologie, B-3080 Tervuren, Belgique Tel. 02 767 54 01 Fax. 02 767 02 42

Current work: (1) Editorial work (with C. Leveque & D. Paugy ORSTOM/MNHN) of "Poissons d'eaux douces et saumatre de l'Afrique de 'Ouest; (2) a study on morphology, karyology and enzymatic variation in African clariid caffishes (with M. Legendre - ORSTOM; C. Ozouf-Costaz - MNHN; R. Guyomard - INRA); (3) Editorial work for C. Ozouf-Costaz - MNHN; K. Guyomard - INKAJ; (3) Editorial Wor CLOFFA 4 (Check-list of the Freshwater Fishes of Africa) (final volume of Cichlidae) (with J. Daget, J.P. Gosse & D. Thys Van Den Audenaerde); (4) systematics and ecology of fishes from the Kouilou river (Congo Brazzaville) (with L. De Vos & J. Snoeks - MRAC).

TOMINAGA, YOSHIAKI. Department of Zoology, University Museum, University of Tokyo, Hongo 7-3-1, Bunkyo-ku, Tokyo, 113, JAPAN 03-812-2111 ex. 2840

Current work includes: (1) relationships of zeiform families and genera of the world with the aid of radiograph image analysis; (2) distribution and morphology of the posteriorly extended gasbladder within the Percoidei (with K. Matsuura); (3) relationships of the Pseudotrichonotidae (with G. D. Johnson and M. Okiyama); (4) systematic position of the Kurtidae with detailed anatomical information (with K. Sakamato) Sakamoto).

TZENG, C.-S. Ph.D. student, Institute of Zoology, National Taiwan University, Taipei, 10764, Taiwan, R. O. China (886-2-7899220)

Current work: (1) mtDNA sequencing of Crossostoma lacustre. (2) A mtDNA sequence comparision among Homalopterid fishes of Taiwan.

ALFRED UFERMANN Ebereschenweg 41, D-4200 Oberhausen 11, Germany

My major interests are fishes of the families Cichlidae, Callichthyidae, Loricariidae, Aspredinidae, Scoloplacidae, Doradidae. Since 1989, I have started computerization and put in data-banks new taxa of all fish families. Xerox-copies of this list will be available for exchange with papers of other authors. I have also worked with my friends Robert Allgayer and Martin Geerts to complete our 2nd vol. "Systematical catalogue of cichlids"

Lists of new taxa of cichlids for the years 1987-1990 are available in xerox-copy form for exchange.

UJ, ANDRE. Post-graduate Student. Division of Fishes, Natural Museum of Natural History, Smithsonian Institution, Washington, D.C., 20560 (202)357-4027.

History, Smithsonian Institution, Mashington, U.C., 20980 (2021)71-402/2. The phylogenetic revision of the family Characidae auct. (Characiformes) is finished as my Ph.D. dissertation under the direction of Dr.V. Mahnert. From November 1990 I begin a post-graduate stage at the Smithsonian Institution with Dr. R.P. Vari as principal advisor. I intend to study more deeper some phylogenetical aspects of relationships of some Characidae auct. developped in my thesis, particularly those concerning ambiguous genera such Henigrammus / Hyphessobycon or Astyanax / Moenkhausia and try to give a better definition of the family Characidae.

Soon I intend to submit a paper on the Aphyocharax species from Paraguay.

Still of interest are: (1) results from electrophoretic and caryologic data in Characifornes; (2) anatomical and phylogenetical study at various level of any groups of Characidae auct, (and Characiforness generally) (3) some problems concerning ontogeny, e.g. <u>Cregrutus</u> and its affinities (2-3 teeth rows).

VARGAS, MARSAL M. Student, Laboratory of Ichthyology, Museu de Ciencias da PUC-RS, P.O. Box 1429, 90620. Porto Alegre, Brasil. Tel. 512 391511, ext. 138.

Current work includes a review of the south Brasilian species of the pimelodid genus <u>Pimelodella</u>. (With financial support of the Conselho Nacional de Desenvolvimento Cientifico e Tecnologico-CNPq, grant number 806104/88-0).

VARI, RICHARD P. Curator, Division of Fishes, National Museum of Natural History, Smithsonian Institution, Washington, D.C., 20560. tel. (202) 357-4027; FAX (202) 357-1896

Current research includes: completion of revisionary studies of the genera <u>Curimatella</u> and <u>Cyphocharax</u> of the family Curimatidae; revisionary and phylogenetic studies of the genus <u>Caenotropus</u> of the family Chilodontidae (with R.M.C. Castro and S. Raredon); and completion of a catalog of type-specimens of catfishes in the USNM collections (with C.J. Ferraris, Jr.). A collecting trip to the coastal rivers of eastern Brazil is planned for July 1991.

VIEIRA, ELIANA. Graduate student, Laboratorio de Ichtiología, Museu de Ciencias, Pontificia Universidade Catolica do RS, Caixa Postal 1429, 90620 Porto Alegre-RS, Brasil. FAX (0512) 39.1564.

Current work includes: stomach contents analysis of Pimelodus maculatus and Pimelodella laticeps (Pimelodidae) from the Guaiba River, Rio Grande do Sul, Brasil.

VIERKE, JÖRG. Heinrich-Heine Str. 15, D-2250 Husum, tel. 04841 71291

Current work on Snakeheads (Channa) and Belontiidae (especially Betta).

VOGT, KENNETH D, Biology Dept., Univ. Alaska, Anchorage, AK, 99508. 907-786-4770.

Currently most fish work is on hold in order to complete principle interest are in liparid fishes and fish parasites. A paper on the rehydration of museum specimens has been accepted by Curator.

WEBER, CLAUDE. Département d'Herpétologie et d'Ichthyologie, Muséum d'Histoire naturelle, Case Postale 434, 1211 Genève 6, Suisse.T. 22 / 7359130

Systematic studies on Loricariid fishes continue: (1) As long range studies, revisions of the genus *Hypostomus* (with R. Mazzoni Buchas for the species of the rio Parnaiba do Sul system), *Cochliodon* and *Rhinelepis*. (2) Revision of the genus *Megalancistrus* (in collaboration with S. Muller). (3) Electrophoretic studies of the proteins and osteology of some genus, (in collaboration with S. Muller). (4) Neotropical field collects of frozen and living specimens.

WEITZMAN, MARILYN J. Research Associate, Division of Fishes, Dept of Vertebrate Zoology, Smithsonian Institution, Washington, DC 20560, U.S.A. (202) 357-3379

Current: 1) Review of the Lebiasininae (Lebiasina and Piabucina) with the description of some new species and redescription of existing species as needed; 2) review of the Pyrrhulini (*Pyrrhulina*, *Copelna*, *Copella*; 3) phylogeny of Lebiasinidae. Other: systematic study of Tetragonopterinae (Characidae) especially Hyphessobrycon, Astyanax, Deuterodon of southern Brasil, certain Astyanax and Deuterodon in Amazon basin.

Weitzman, Stanley H. Curator, Division of Fishes, National Museum of Natural History, Smithsonian Institution, Washington, D.C., 20560. (202) 357-3379. Current research includes: Complete reviews of current research includes; complete leviews of the glandulocaudine tribes Diapomini and Glandulocaudini with Naércio Menezes; further revision of the phylogeny of the xenurobryconin glandulocaudines (with a description of a new genus and new species) with Sara V. Fink,
Antonio Machado & Ramiro Royero; a revision of
Tyttocharax; a description of a new Tyttocharax
with Hernán Ortega; a new species of
Megalamphodus and a revision of Spintherobolus, both with Lisa Palmer; a new species of Trichomycterus with Mario de Pinna.

Whitehead, Peter J. Centro de Investigaciones Biologicas, Apdo Post. 128, La Paz, B.C.S. 2300, Mexico. FAX 682-25322

With Rubén Rodríquez-Sánchez completing (by mid-1991) a book *The clupeoid fishes of NW Mexico* (Spanish/English), which summarizes the taxonomy, biology and fisheries for the 32 (+2 introduced) species of Clupeidae, Pristigasteridae and Engraulididae found in the Gulf of California and along the Pacífic coasts of the Baja California peninsula. Copiously illustrated.

WHITWORTH, WALTER R. Prof. Fisheries and Curator of Fishes, The University of Connecticut, Department of Natural Resources Management and Engineering, U-87, 1376 Storrs Rd, Rm 308, Storrs, CT 06269-4087. Tel. 203-386-0136.

Current work is centered on revising the "Freshwater Fishes of Connecticut", published in 1968. New section on the factors that have been affecting the distribution of fishes in freshwaters of Connecticut.

WILLIAMS, JEFFREY T. Co-Collection Manager, Div. of Fishes, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560 (202)357-3059

I have begun work with Jeff Howe on the Helcogramma ellioti species complex and we are making progress. I am continuing my revisionary studies of the Indo-pacific blenniid genera Alticus and Andamia. The revision of Istiblennius with V. Springer is proceeding and I am starting on the I. chrysospilos complex. Work has started on Tobago fishes we collected during a September 1990 expedition to the island. Among the collections are some interesting Starksia that may represent one or two new taxa. Analysis of character variation in Chrysiptera cyanea and in Canthigaster coronata has been temporarily put on hold. V. Springer and I have a paper in press on lowered sea levels and the distribution of Indo-Pacific marine shorefishes. A type catalog of the Blenniidae of the National Museum of Natural History (with V. Springer and T. Orrell) is in press in the Smithsonian Contributions to Zoology.

WINTERBOTTOM, RICHARD. Curator-in-Charge, Dept. of Ichthyology & Herpetology, Royal Ontario Museum, 100 Queen's Park, Toronto, Ontario, Canada M5S 2C6 tel (416) 586-5759; FAX 416-586-5863.

1). Research into the search for the gobioid sister group has wound down, and an attempt to publish it may, or may not, be made.

2). Revision of the gobiid Trimma from Australia (D. Hoese, senior author) - 23 species (13 undescribed) - currently writing up the seventh of the 12 species I'm responsible for.

3). Revision of the other species of Trimmatom, their phylogeny, and possible involvement of heterochrony in their evolution is underway.

4). Revision of Indo-Pacific Priolepis (with M. Burridge) is close to being written up, with most of the specimens examined and data taken. Several new species are involved.

5). Processing the collections from the Comores is almost complete, Moorea collections underway.

WIRTZ, PETER Zool. Institut, Albertstr. 21a, D - 78 Freiburg, Germany. Fax 0049-761-203-2815

All aspects of the biology of blennioid fishes. Still jobless, but from December 1990 on, for about 7 months, I will be at the "Departamento de Oceanografia e Pescas, Universidade dos Acores, Horta, Faila, Acores, Portugal" to compile an illustrated and annotated checklist of the fishes of the Acores. A dream job! Fax at Horta is 00351-92-22659.

Wu, Han-ling. Professor of Ichthyology, Laboratory of Fishes, Shanghai Fisheries University, 334 Jun Gong Rd., 200090 Shanghai, Peoples Republic of China

Current work includes: (1) On a new species of the genus Lophiodes (Pisces: Lophiidae) from the South China Sea (with Y. Ni and S. Li); (2) studies on the genera Eleotris and Odontobutis in China, with description of a new species (with X. Wu); (3) continuation and expansion of work on the ichthyo-fauna of Gobioidei from China; (4) study on deep-water fishes (macrourids) of the South China Sea.

YANG JUN-XING. Dept. of vertebrate, Kunming Institute of Zoology, Academia Sinica, Kunming, Yunnan, PEOPLES REPUBLIC OF CHINA

Current work includes: (1) study of the origin and evolution of the ichthyofauna of Fuxian Lake, Yunnan, China; (2) taxonomy of the nemacheiline loaches from Yunnan; (3) the phylogeny of the cobitid genus Yunnanilus.

ZAKARIA-ISMAIL, MOHD. Department of Zoology, University of Malaya, 59100 Kuala Lumpur, MALAYSIA. Tel. (03) 755-5466 ext. 528; FAX 603-757-3661.

Ongoing projects include: (1) osteological comparison between Osteochilus enneaporos and O. waandersii (Family: Cyprinidae) from Peninsular Malaysia; (2) morphometric analysis of Puntius eugrammus and P. lineatus; (3) ichthyofaunal studies of the Teris and Rengit rivers in the Krau Game Reserve, Malaysia. Long-term studies include preparation of a freshwater fishes of Peninsular Malaysia and conservation of Malaysian freshwater fishes.

ZARSKIE, AXEL. Curator of Fishes, Staatliches Museum fur Tierkunde, Dresden, Augustusstr. 2, GDR-Soto, Dresden.

Current work includes: (1) curatorial work in the collection; (2) faunistical work on European freshwater fishes and (3) systematic studies on some Characidae, Cyprinidae and Siluriformes.

ZHANG CHUENGUANG. Head of Fish Division and Deputy Director, Dept. of Vertebrate, Inst. of Zoology, Academia Sinica, 7 Zhongguancun Lu, Haitien, Beijing, China. tel. 2561876.

Current work includes: (1) classification and description of a new species from genus Sincyclocheilus (Cyprinidae);
(2) comparative study of the scales of the genus Onycostoma (Cyprinidae) by scanning electron microscope; (3) descriptions of 11 species and subspecies in Red Data Book of China. Longer range studies include: (1) study of ichthyofauna of Wuling Mountains, southwestern China; (2) revision of the genus Arius (Ariidae); (3) study of circumorbital bones of two subfamilies Danioninae and Leuciscinae (Cyprinidae).

ZHANG, YULING. Associate Research Professor of Ichthyology, Department of Vertebrate Taxonomy, Institute of Zoology, Academia Sinica, 19 Zhonggwanoun Lu, Haidian, Beijing, 100080 P. R. China. Tel. 2562712; FAX 2565689 Tgm. 3436.

Current work includes: (1) a morphological studies on land-locked masu salmon in the Tumen River; (2) phylogeny of the family Salangidae; (3) vertebrate of China; (4) continuation and expansion of work of the ichthyofauna of Acipenseriformes and Salmoniformes of China.

ZHENG, WEN-LIAN Research full professor. The Laboratory of Marine Experimental Biology, South China Sea Institute of Oceanology, Academia Sinica, Guangzhou, P. R. of China

Current work: (1) A taxonomic study of the Chinese carangoid fishes; (2) taxonomic and biological studies of fishes of Daya Bay, Guangdong Province.

ZHOU, WEI. Dept. of Vertebrate Taxonomy, Kunming Institute of Zoology, Academia Sinica, Kunming, Yunnan, China.

Current work includes: (1) study on phylogeny of genus Cyprinus; (2) differentiation of sucking disc of genus Discogobio; (3) ultrastructural differentiation and modification of scales in subfamily Cyprininae.

ZORZI, GEORGE D. Department of Ichthyology, California Academy of Sciences, Golden Gate Park, San Francisco, California 94118 (916) 643-1201 or (916) 944-1601

Current work includes: (1) update of the Rays and Skates chapter for the "California's Living Marine Resources" publication; (2) continued exploration of database software suitable for systematic applications.

GENERAL ANNOUNCEMENTS

"THE THREATENED WORLD OF FISH" International Congress of Ichthyology, The Hague The Netherlands, August 26-30, 1991

The 7th International Ichthyological Congress of the European Ichthyological Union (EIU) will be organized in the Congress Centre "Nederlands Congresgebouw" in The Hague, The Netherlands from August 26-30,1991.

The scientific programme will comprise plenary lectures, parallel symposia.

free and poster sessions.

The registration fee will be appr. Dfl. 450,--(Dutch Guilders); students app. Dfl 210,--. Preregistration is strongly encouraged and can be made at reduced fees (appr. Dfl 400,-- for regulars, and appr. Dfl 160,-- for students) until May 1, 1991.

The final announcement - including registration form, accommodation form and abstract form - will be forwarded in November 1990.

Congress Organization Services, "Van Namen & Westerlaken", P. O. Box 1558, 6501 BN NIJMEGEN, The Netherlands. Tel. +31-80234471, Fax. +31-80601159.

FAREWELL TO FISHES

With completion of the book on NW Mexican clupeoids (see under WHITEHEAD, P.J.P.), I will leave the Centro in La Paz and will lay ichthyology aside, or at least formal research, in order to give full attention to writing and to art, most likely in another Third World country. At the end of the present chapter I give a big vote of thanks to all friends/ colleagues who made this ichthyological journey so enjoyable and interesting and rewarding — at times even hilarious ! Cheers ! But now a new chapter awaits.

Peter Whitehead

Request by Matthias STEHMANN (ISH):

As mentioned in my 1990 report, our serial publication (mainly with J. Herman, B, and the Hovestadts, NL) on the odontology of living supraspecific chondrichthyan taxa is well on the way. Apart from a poster presentation of the subject during the 3rd IPFC in Wellington, 1989, meanwhile the community of chondrichthyan workers will be aware of the project and the stimuli offered by its results through reprints widely distributed of the first three issues. Part five on the remaining Carcharhiniformes is nearly finished for submission at end of 1990. Few gaps remained in groups already studied and/or published due to lack of study material, or do exist for forthcoming issues.

lack of study material, or do exist for forthcoming issues We do trust, that some of our colleagues may be able to assist us in filling such gaps, so that some intermediate supplementary issue can be prepared.

Ideally, missing taxa might be donated to, or exchanged with ISH and should at best be represented by a juvenile and adult female and male per taxon listed below, respectively. An adult, or immature couple would be better than postage approach to the property of the nothing however. Please contact M. STEHMANN at ISH. should you be able and willing to assist us with study material, and just tooth samples will already help us a lot, if specimens too big for shipping :

Hexanchus vitulus (warm temperate and tropical seas)
Mustelus whitneyi (SE-Pacific off Peru and Chile)
Cephalurus cephalus (Central Eastern Pacific, California)
Pentanchus profundicolus (Indo-West Pacific, Philippines)
Heterodontus portus jacksoni (Australia, New Zealand)
Heterodontus quoyi (Galapagos Isl., off Peru and Ecuador)
Heterodontus francisci (Central Eastern Pacific) Heterodontus francisci (Central Eastern Pacific)

Pseudoraja fischeri (Central Western Atlantic) Pavoraja <u>nitida</u> (Australia)

The former curator of the Ichthyological Collection of the State Museum of Zoology (Staatliches Museum fur Tierkunde Dresden, Augustusstr. 2, GDR-8010, Dresden), Mr. Dipl.-Biol. Walter Hebig, has left this department. The successor is Axel Zarske, starting 1 Oct. 1989. The fish collection of this museum was partly destroyed in a bombing raid in 1944, but some of the old collections by Alphons Stubel in the past century are in good condition. A type catalogue is in progress. Please address all correspondence and requests on the fish collection to Axel Zarske.

INTERNATIONAL CHARACIN ASSOCIATION, C/O GENERAL SECRETARY, 18 HARRY ST., WERNETH, OLDHAM, LANCS. OL9 7TA.

Many thanks to all who have sent information to us. Our journal 'CHARACOIDS' is now bi-monthly from quarterly when we started last year. We would like to ask that anyone who has published or is due to publish papers on Characoids, or any other tropical freshwater fishes with the exceptions of :- Anabatids; Catfish; Cichlids; Livebearers; Killifish, to bear us in mind and send us copies where they are available.

Although we cater primarily for characins we also deal with other tropical freshwater fishes that have no U.K. specialist society, (as yet?).

THE BOHLKE FUND provides funds for graduate students to work with the Ichthyology Collection at the Academy of Natural Sciences of Philadelphia. Money is currently available to underwrite travel to Philadelphia and to provide for modest living accommodations available at the Academy (the total not to exceed \$500.00). Send three copies of applications outlining proposed research to be undertaken at the Academy and a tentative travel budget to Dr. William F. Smith-Vaniz, Academy of Natural Sciences, 19th and The Parkway, Philadelphia, PA 19103. Deadline April 1, 1991.

The Sociedad Ictiologica Mexicana, A. C. (The Mexican Ichthyological Society) is announcing the Second National Meeting, which will be held in the City of Monterrey, Nuevo Leon, Mexico, during March 4-8. 1991. All kinds of oral (and posters) communications are welcome. For further information, please contact DR. SALVADOR CONTRERAS-BALDERAS (actual President of the Society), FACULTAD DE CIENCIAS BIOLOGICAS, UNIVERSIDAD AUTONOMA DE NUEVO LEON, MONTERREY, N. L. 64000 MEXICO.

WARNING FISHES IN DANGER

The 44 species of fishes of continental waters of Chile. South America, were declared in danger by the Continental Water Fish Commission in 1987. The Chilean Forest Service (CONAF) published the Red List of Chilean Terrestrial Vertebrates in 1988. The Chilean authorities request the cooperation of both foreign museums and collectors in protecting the fauna in danger.

Tomio Iwamoto replaced William N. Eschmeyer as chairman of the Department of Ichthyology at the California Academy of Sciences, San Francisco, on 1 July, 1990 for a period of 3 or more years. Please send loan requests and routine Department business to him or to collection manager David Catania. Dept. tel. (415) 750-7047, fax. (415) 750-7346.

PUBLICATION ANNOUNCEMENTS

The fishes of Yunnan, China, by Chu, S.-L and Chen, Y.-R., Part I (1989): 377 pp. 327 figs. 5 tabs, 220 sp. & subsp. + 81 genera included; Part II (1990): 313 pp. 270 figs. 12 tabs., 179 sp. & subsp. + 67 genera included

The Loaches of the Subfamily Nemacheilinae in China (Cypriniformes: Cobitidae) (1989) by Zhu S.-Q. 150 pp. 94 figs. 3 tabs., 91 sp. & subsp. + 14 genera included

South China Seas Fisheries Research No. 1 (1989), edited by South China Sea Fisheries Institute, Guangzhou, China. 170 pp.

Hydrobiology and Cultivation (incl.: freshwater, brackishwater and ocean) 1990, by Li M.-D. et al. Nankai Univ. Press. 285 pp.

ICHTHYOLOGICAL EXPLORATION OF FRESHWATERS An International journal for field-orientated Ichthyology. ISSN 0936-9902. Aim: Rapid publication (within 3-6 months after acceptance, no page charges) of papers documenting biodiversity of freshwater fishes. Focus: Tropical freshwater fishes. 4 issues of 96 pp. in 1991. Personal subscription DM 140./year/volume, institutional subscr. DM 280./year/vol. including mailing. Managing editor. Maurice Kottelat, Ichthyology Section, Zoologische Staatssammlung, Muenchhausenstr. 21, D-8000 Muenchen 60, Germany. <u>Publisher:</u> Verlag. Dr. F. Pfeil, P.O. Box 65 00 86, D-8000 Muenchen 65, Germany.

Indochinese nemacheilines. A revision of nemacheiline loaches (Pisces: Cypriniformes) of Thailand, Burma, Laos, Cambodia and southern Vietnam, by M. Kottelat. 1990 262 pp. 180 figs. 17x24 cm, paperback, ISBN 3-923871-47-3 DM 88.00. Available from: Verlag. Dr.

Freshwater fishes of Sri Lanka. By Rohan Pethiyagoda, 1990. 310 pp. 180 col. illust. 22x29 cm, clothbound, US\$75.00 including packing & delivery by registered airmail. Available from: The Wildlife Heritage Trust, 36/2 Castle Str., Colombo 8, Sri Lanka

Fishes Collected by the R/V Kaiyo Maru around New Zealand by K. Amaoka, K. Matsuura, T. Inada, M. Takeda, H. Hatanaka and K. Okada (eds). Japan Marine Fishery Resource Research Center, Tokyo, 410 pp., with 296 color photos. ¥ 6494.

This book treats 265 fishes, 14 cepahlopods, and 25 crustaceans, with descriptions and color photos.

Order from Planning Division, Japan Marine Fishery Resource Research Center, 3-27 Kioi-cho, Chiyodaku, Tokyo 102, Japan.

Second edition of Micronesian Reef Fishes A Practical Guide to the Identification of the Coral Reef Fishes of the Tropical Central and Western Pacific. Robert F. Myers. 1991. Coral Graphics, P.O. Box 21153 GMF, Guam 96921 USA. 9 x 7", 975 color figs., 298 p.+144 pls., 975 color photos. \$33.00 softbound, \$45.00 hardbound. Airmail to U.S, add \$3.00. Foreign orders: add \$2.00 for surface post or \$20 for airmail+\$5 for insurance if desired.

Changes from 1st edition will be limited to correcting typos and misidentifications as well as providing the names of species undescribed at the time of the orginal publication and adding a few range extentions (most of these were included in the 2/1/90 corrigenda/addenda). The hardbound will have a better cover with separate dust jacket. Owners of the 1st ed. not wishing to shell out for the 2nd, please send a stamped self-addressed envelope for a free copy of an updated corrigenda/addenda.

Fish and Fisheries of Saint Helena Island: available at limited copies; paperback in A4 format, 152 pp, 24 pp col. plates (76 colour + 5 black & white photos); 2 parts plus glossary, bibliography and

L12.50 incl. postage & packing (U. K.)
L14.50 (or US\$25.) incl. post. & pack. (surface mail elsewhere)
L17.00 (or US\$30.) incl. post. & pack. (airmail) Normal price is L15.00 exclusive of postage & packing.

Please send cheque or money order in L sterling or US\$ payable to Dr. A. J. Edwards - St. Helena a/c. Add.: Depart. of Biology, Ridley Building, The University of Newcastle upon Tyne NEI 7RU, U.K.

"Catalog of the Genera of Recent Fishes." W. N. Eschmeyer (some sections with co-authors). 1990. Special Publication, California Academy of Sciences. v + 697 pp., hard cover. Recent genera and subgenera (about 10,000) are arranged alphabetically -- each is tied to a reference, with full citation of author, date, page. The type species is given and the current status of most genera (with recent references) is provided. A second section lists the genera in a classification. The Literature Cited contains about 5600 references. An interpretation of the Code as it applies to genera is provided as Appendix A; appendix B lists opinions and other actions of the International Commission that deal with fishes. The book is available from: Scientific Publications, California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118. Cost is \$55.00 prepaid (California residents add \$3.99 tax; foreign add \$8.00 for surface shipping).

The freshwater fishes of Taiwan. 1990. by Chyng-shyan TZENG, Council of Agriculture, R. O. China. 150pp, 134 figs. In this book 67 species are included. Illustration in Chinese.

ICHTHYOLOGICAL SUPER DISCOUNT (Prices good through 31-3-1991.)

Notulae Naturae: 86 numbers available (US\$1.00 each.)

Monographs:

No. 2 The Fishes of the George Vanderbilt South Pacific Expedition 1937 by H. W. Fowler, 1938. Pp. 349. Paper-back. \$10; \$12.50 outside U.S. & Canada (reg. \$23; \$25).

No. 6 Results of the Fifth George Vanderbilt Expedition, 1941, by G. Vanderbilt, et al., 1944. Pp. 583. Paperback. \$10; \$12.50

outside U.S. & Canada (reg. \$26; \$28.50).

No. 7 A Study of the Fishes of the Southern Piedmont and Coastal Plain by H. W. Fowler, 1945. Pp. 408. Paperback. \$10; \$12.50

outside U.S. & Canada (reg. \$26, \$28.50).

No. 16 A Monograph on Plectognath Fishes of the Superfamily
Triancanthoidea by J. C. Tyler, 1968. Pp. 364. Hardback. \$15;
\$17.50 outside U.S. & Canada (reg. \$27; \$29.50).

No. 19 The Saber-toothed Blennies. Tribe Nemophini (Pisces: Blenniidae) by W. F. Smith-Vaniz, 1976. Pp. 196. Paper-back. \$11; \$13.50 outside U.S. & Canada (reg. \$17; \$19). .pm 1

Special Publications:

No. 14 Catalog of Type Specimens in the Ichthyological Collection of the Academy of Natural Sciences of Philadelphia by E. B. Bohlke, 1984. Pp. 246. Paperback. \$5; \$7.50 outside U.S. & Canada (reg. \$15; \$17).

No. 15 Morphometrics in Evolutionary Biology by F. L. Bookstein, et al., 1985. Pp. 227. Paperback. \$15; \$16 outside U.S. &

10% discount on orders of \$25-\$49.50; 20% disc. on orders of \$50 or more. PAYMENT IN FULL (in US\$) required prior to shipping. Checks drawn on a U.S. BANK or International money orders payable to "Scientific Publications--ANSP.", address: Scientific Publications,
The Academy of Natural Sciences of Philadelphia, 19th and the Parkway, Philadelphia, PA 19103 USA.

Two new illustration books: Book (1) and (2) of Exotic Marine Fishes (in Chinese) by K.T. Shao and L.S. Chen; Encyclopeia of Field Guide in Taiwan Vol 17&18 were published from Du-Chia Incorp. 1990. These two volumes cover about 300 species of coral reef fishes in Taiwan. About 450 underwater photos, with scientific names (Chinese, Latin, Japanese), common name, morphology, ecology, depth and distribution for each species. Each book has 200 pages. Available from Dr. K.T. Shao, Institute of Zoology, Academia Sinica, Nankang, Taipei, Taiwan, 11529, R.O.C. US\$14.50 (air-mail) and 12.50 (surface mail) for one volume. Price double for 2 volumes.

MIRZA, M. R. 1990 Freshwater fishes of Pakistan (in Urdu). Published by: Urdu Science Board, 299 Upper Mall Lahore, Pakistan. Price: Rs. 50 (Rupees fifty only).

TIM M. BERRA'S <u>Evolution</u> and the <u>Myth of Creationism</u>, Stanford University Press, Stanford, CA was published in September 1990. Paperback is \$7.95. It has been adopted by various introductory biology courses including The Ohio State University.

Fishes of the Southern Ocean. Edited by O. Gon and P.C. Heemstra. 462 pp, Published by the J.L.B. Smith Institute of Ichthyology, Private Bag 1015, Grahamstown 6140, South Africa. This book is a comprehensive account of the taxonomy, biology and distribution of Antarctic fishes. Introductory chapters treat the history of Antarctic ichthyology, oceanography, evolution and zoogeography of Southern Ocean fishes, ecological physiology, and the conservation of commercially exploited fishes.

The book is available for \$80.00 (including surface mail postage, add \$40 for air mail). Orders must be prepaid with a check in U.S. dollars drawn on a U.S. bank.

UNDERWATER GUIDE MALDIVES: FISHES.
P. Nahke and P. Wirtz. Due to appear November 1990. 48 DM. Can be ordered directly from the publisher, Naglschmid Verlag at Stuttgart, by FAX 0049-711-612323. A bilingual (German and English) identification guide mainly aimed at SCUBA divers. 147 underwater colour photos of 139 species. Similar volumes on Red Sea Fishes and Red Sea Invertebrates have already appeared.

Electro-Communication in Teleost Fishes--Behavior and Experiments. B. Kramer, University of Regensburg. (1990) Approx. 255 pp. 140 figs. 12 tabs. (Zoophysiology. Eds.: S. D. Bradshaw, W. Burggren, H. C. Heller, S. Ishii, H. Langer, G. Neuweiler, D. J. Randall. vol. 29). Hardcover DM.198. ISBN 3-540-51927-0. Detailed account of these fishes' biology and behavior and their sensory capacities; main emphasis on the descriptive and experimental analysis of electric communication behavior in a variety of species.

Type list of fishes at the Yale Univ. Peabody Mus. of Nat. Hist.: A list of type specimens will soon be published of all the fishes, including specimens formerly in the Bingham Ocean. collection. A total of 189 nominal species are listed with complete information. For more info. or copies of this list, please contact the Publications Office, Peabody Mus. of Nat. Hist., Yale Univ., P.O.Box 6666, New Haven, CT 06511 USA.

LATE ARRIVALS

GARZON-FERREIRA, JAIME Instituto de Investigaciones Marina de Punta de Betin, INVEMAR, A. A. 1016, Santa Marta, Colombia. Tel. (954) 235410; Fax. (954) 230530

Finally, the work of mapping marine ecosystems in the Santa Marta area has been completed! I am planning to spend some time next year censusing reef fish communities at Islas del Rosario. Publications describing another new species of *Lythrypnus* and reviewing this genus of gobies in the Colombian Caribbean are in progess.

MENNI, ROBERTO C. Lab. ictiologia. Museo de La Plata. Paseo del Bosque s/n, 1900 La Plata, Argentina. FAX 54-21-25 23 46

Current work: (1) Study of freshwater fish distribution in northern Argentina, including patterns and species - water chemistry relationships; (2) study of shark samples and preparation of a review of south Atlantic batoids.

Garzon-Ferreira, J. 1989. Contribución al conocimiento de la ictiofauna de Bahía Portete, departamento de la Guajira, Colombia. Trianea (Act. Cient. Tecn. INDERENA) 3: 149-172.

Garzon-Ferreira, J. 1990. An isopod, Rocinela signata (Crustacea: Isopoda: Aegidae), that attacks humans. Bull. Mar. Sci. 46(3): 813-815.

Garzon-Ferreira, J. and A. Acero. In press. Redescription of Coryphopterus tortugae (Jordan), a valid species of goby from the western Atlantic (Pisces: Gobiidae). Northeast Gulf Sci. 11(2).

Garzon-Ferreira, J. and A. Acero. In press. *Priolepis robinsi*, a new species of fish from the Caribbean Sea, with notes on *P. hipoliti* (Perciformes: Gobiidae). Copeia 1991(2).

Menni, R. C. 1988. La piel de los bagres y las oscillaciones del finalismo (Review of "De Aristóteles a Darwin y vuelta," by E. Gilson). Physis A. 46(110): 41-42

Gilson). Physis A, 46(110): 41-42.

Menni, R. C., H. L. Lopez and R. H. Aramburu. 1988. Ictiofauna de Sierra de la Ventana y Chasicó (Provincia de Buenos Aires, Argentina). Zoogeografía y parámetros ambientales. An. Mus. Hist. nat. Valparaiso 19: 75-84.

Garcia, M. L. and R. C. Menni. 1990 (in press). Studies on

rcia, M. L. and R. C. Menni. 1990 (in press). Studies on Argentine Pleuronectiformes V: Morphometrics and other biological aspects of *Xystreurys rasile* (Bothidae, Paralichthyinae). Gayana (Chile).

Miquelarena, A. M., R. C. Menni, H. L. Lopez and J. R. Casciotta. 1990. Ichthyological and limnological observations on the Salí river basin (Tucumán, Argentina). Icht. Expl. Freshwaters 1(3): 1-8. ROBERTS, TYSON R. Care of Supap Monkolprasit, Faculty of Fisheries, Kasetsart University, Bangken, Bangkok, Thailand

Fieldwork and research continue on freshwater fishes of southeast Asia and particularly Thailand. Revision of Pangasiidae (with Chavalit Vidthayanon) should be ready for publication in 1991. Systematic revisions of several other groups are nearing completion.

Work continues on description, osteology, and familial relationships of sand-loving African caffishes (Leptoglanis, Zaireichthys, etc.) including several undescribed taxa from the Congo basin, and on an unidentified minute Amazonian gobiid collected by Sven Kullander.

LITERATURE

- ABE, T. 1990. Notes on probable natural hybrids of common species and subspecies of puffers (Tetraodontidae, Teleostei) from Japanese and adjoining waters. (?)U O No. 39: 1-3.
- ABE, T. In press. Records of the fifth species of garden eel from Japan. (?)U O. ACERO P., A. In press. La ciencia marina colombiana. Bol. Cult. Bibliogr.
- ACERO P., A. In press. Peces llaneros. Bol. Cult. Bibliogr.
- ACERO P., A. In press. Lo que se pesca en el Pacífico. Bol. Cult. Bibliogr.
- ACERO P., A., AND P. ARENAS GRANADOS. In press. Gobioides broussoneti

 Lacepède (Pisces: Gobiidae) en el Caribe colombiano. An. Inst. Inv. Mar.

 Punta Betín.
- AL KAHEM, H. F., R. J. BEHNKE AND Z. AHMAD. 1990. Some osteological distinctions among four Arabian cyprinid species. Jpn. J. Ichthyol. v. 36 (4): 477-482.
- ALARCON-GONZALEZ, C., D. AURIOLES AND J. L. CASTRO-AGUIRRE. 1989. Presencia del nemátodo Contracaecum osculatum en el hospedero intermediario Paralichthys californicus y un hospedero definitivo Zalophus californianus. Mem. VII Simp. Internac. Biol. Mar., La Paz, BCS. 95-96.
- ALLEN, G. R. 1989. Freshwater fishes of Australia. [T. F. H. Publ. New Jersey.]
 ALLEN, G. R. 1990. Les poissons arc-en-ciel (Melanotaenidae) de la Peninsule de Vogelkop, Irian Jaya, avec description de trois nouvelles especes. Rev. Fr. Aquariol. v. 16 (no. 4): 101-112.
- ALLEN, G. R., AND W. E. BURGESS. 1990. A review of the glass-fishes (Chandidae) of Australia and New Guinea. Recs. West. Aust. Mus. Supp. v. 34: 139-206.
- ALLEN, G. R., AND D. COATES. 1990. An ichthyological survey of the Sepik River, Papua New Guinea. Recs. West. Aust. Mus. Supp. v. 34: 31-116.
- ALLEN, G. R., AND D. COATES. 1990. A new species of freshwater electridid fish from northern Papua New Guinea. Recs. West. Aust. Mus. Supp. v. 34: 131-138.
- ALLEN, G. R., AND R. H. KUITER. 1989 (30 Nov.). Hoplolatilus luteus, a new species of malacanthid fish from Indonesia. Rev. Fr. Aquariol. v. 16 (no. 2): 39-41.
- ALLEN, G. R., AND J. E. RANDALL. In press. Hypoplectrodes cardinalis, a new name for the serranid fish H. ruber (Allen) from southwestern Australia, with discussion of H. semicinctus from Juan Hernandez Islands. Rev. Fr. Aquariol.
- ALLEN, M. J. In press. The biological environment of the California halibut, Paralichthys californicus. Calif. Dep. Fish & Game, Fish Bull.
- ALLEN, M. J., AND K. T. HERBINSON. In press. Settlement of juvenile California halibut (*Paralichthys californicus*) along the coasts of San Diego, Orange, and Los Angeles counties in 1989. Calif. Coop. Oceanic Fish. Inves. Rep. 31.
- ALMAÇA, C. 1989. The conservation of freshwater fishes in Portugal. Comunicações e conclusões do seminário técnico sobre parques e conservação da natureza nos paises do sul da Europa. Faro, 24-28 Outubro de 1988. 159-162.
- ALMAÇA, C. 1990. Overall similarity and biogeography in Euro-Mediterranean Barbus (Cyprinidae, Pisces). Table Ronde Internationale "Barbus". 25-27 juillet 1989. 15-29.
- ALMAÇA, C. 1990. Neogene Circum-Mediterranean paleogeography and Euro-Mediterranean biogeography. Arq. Mus. Boc. (Nova Série) v. 1 (no. 41): 585-611.
- ALMAÇA, C. In press. A tentative key to the species of Euro-Mediterranean Barbus. Garcia de Orta, Sér. Zoológica.
- ALMAÇA, C. In press. Watercolours of marine fishes of Joaquim José da Silva's expedition to Angola (1783-1808). Museu de Ciència, Lisboa.

- ALMAÇA, C. In press. Evolutionary, biogeographical, and taxonomic remarks on Mesopotamian species of *Barbus*. In: Fish and fisheries in Mesopotamia. L. A. J. Al-Hassan ed. Koeltz Scientific Publ.
- AMAOKA, K., K. MATSUURA, T. INADA, M. TAKEDA, H. HATANAKA AND K. OKADA. 1990. Fishes collected by the R/V Kaiyo Maru around New Zealand. Jap. Mar. Fish. Res. Resch. Ctr. 1-410.
- AMAOKA, K., AND J. E. RANDALL. 1990. Epinephelus suborbitalis, a new species of grouper (Perciformes: Serranidae) from the Kyushu-Palau Ridge, western Pacific. J.L.B. Smith Inst. Ichthyol. Spec. Publ. No. 49: 1-9.
- ANDERSON, M. E. 1989 (20 Dec.). Review of the eelpout genus *Pachycara*Zugmayer, 1911 (Teleostei: Zoarcidae), with descriptions of six new species.

 Proc. Calif. Acad. Sci. v. 46 (no. 10): 221-242.
- ANDERSON, M. E. 1990. Studies on the Zoarcidae (Teleostei: Perciformes) of the southern hemisphere. III. The southwestern Pacific. J. L. B. Smith Inst. Ichthyol., Spec. Publ. No. 50: 1-17.
- ANDERSON, W. D., JR., AND P. C. HEEMSTRA. 1989 (19 Dec.). Ellerkeldia, a junior synonym of Hypoplectrodes, with redescriptions of the type species of the genera (Pisces: Serranidae: Anthiinae). Proc. Biol. Soc. Wash. v. 102 (no. 4): 1001-1017.
- ANDERSON, W. D., JR., N. V. PARIN AND J. E. RANDALL. In press. A new genus and species of anthiine serranid fish from the eastern South Pacific with comments on anthiine relationships. Proc. Biol. Soc. Wash.
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The index consists of a breakdown by subject followed by the systematic index. Mention in individual accounts is given first, then a "//" notation, followed by references in the literature cited section. Please excuse mistakes and omissions. Classification follows Eschmeyer (1990) "Catalog of the genera of Recent fishes."

Faunal Studies: ABE (Sagami Bay, Japan), ACERO P. (Colombian Caribbean), ALLEN [G. R.] (Papua New Guinea, n. New Guinea, tropical e. Pacific, Great Barrier Reef and Coral Sea), ALLEN [M. J.] (s. California, Bering Sea, ne. Pacific), ALMACA (Portugal), ANDERSON [M. E.] (deepsea w. So. America), AZEVEDO (Portugal), BALART (Mexico, Gulf of Calif.), BANARESCU (fw World, Danube Basin, Black Sea, Palistine), BEN-TUVIA (e. Mediterranean), BERRA (Australia), BIANCO (fw Italy, se. Europe), BURR (Kentucky and Tennessee USA), CAPPETTA (paleo Nile Valley and Red Sea, Denmark, etc.), CASTRO (se. Brazil), CASTRO- AGUIRRE (Baja Calif., Gulf of Calif.), CHAO (fw Brazil), CHAVEZ (fw Mexico), CHEN [Y.-R.] (Yunnan, China), CHU (Yunnan, China), COAD (Canada), COLLARES- PEREIRA (Portugal), COLLETTE (W. Wind Drift Is.), COSTA (c. Brazil), DEWITT (s. Shetland Is.), DINGERKUS (fw Europe), DONALDSON (Mariana & Izu Is.), DUHAMEL (St. Paul and Amsterdam Is., Fauklands), EDWARDS (St. Helena), ELVIRA (fw Iberia), FER-RARIS (fw Venezuela), FOLLETT (California), FRICKE (fw Turkey, fw Europe, type catalogs), GAEMERS (fossil, Europe), GARAVELLO (fw Brazil), GOLANI (e. Mediterranean & Red Sea), GOREN (fw Israel, e. Mediterranean), GREEN-FIELD (Belize), GUILBERT (fw Europe), HATOOKA (Japan), HERZIG (Austria), HUREAU (e. tropical Atlantic, Weddell Sea), HUTCHINS (sw. Australia), IVANTSOFF (fw Australia), JARDIM (Brazil), JAYARAM (fw India), JEON (Korea), KIM (fw Korea), KOTTELAT (fw Sulawesi, Sri Lanka, Indonesia, Viet Nam, Burma, etc.), KRAMER [S.] (s. Calif. USA), KRUPP (Red Sea, Middle East, S. China Sea, e. cent. Pacific), KULLANDER (Zaire), LEE (Korea), LEIS (Coral Sea, French Polynesia), LI (fw China), LLORIS (Argentina, Mediterrean, Macronesia, se. PAcific), LOBEL (Congo, Johnston Atoll), LOF-TUS (Florida USA), MACHIDA (Japan), MATSUURA (New Zealand), MCEACHRAN (Gulf of Mexico), MERRETT (e. N. Atlantic), MIRZA (Pakistan, Kashmir), MIQUELARENA (fw Argentina), MURDY (Chesapeake Bay USA), MYERS (Micronesia), NAKABO (Japanese Archipelago), NELSON (Alberta Canada), NETE (Portugal), NOLF (paleo Europe), OZAWA (N. Pacific, Japan), PAEPKE (N. Korea), PARENTI (Sarawak, Borneo), PAULIN (New Zealand), PAULUS (Red Sea), PEQUENO (Chile), PIETSCH (Alaska), PLATANIA (New Mexico USA), QUERO (Reunion, Madagascar), RANDALL (Maldives, Great Barrier Reef and Coral Sea, Chesterfield Is.), RE (Portugal), REINTHAL (Sierra Leone, Madagascar), RICHARDS (Gulf of Mexico, w. cent. Atlantic) ROBERTS, [C.] (New Zealand, Niue I.), ROBERTS [T.] (fw se. Asia), Ross (N. Carolina USA), RUCABADO (Argentina, w. Meditteranean, Macronesia), SABATES (Mediterranean), SATO (s. Japan), SCHMIDT (Guyana SA), SEKI (n. Pacific), SENOU (Japan, Ryu Kyu Is.), SERET (New Caledonia, W. Africa, Madagascar, Philippines), SHAO (Taiwan), SHEDLOCK (Gulf of Alaska), SHIMADA (Japanese Archipelago), SIEBERT (se. Asia), SILFVERGRIP (India), SKELTON (S. Africa fw), SNOEKS (Congo), STARNES (Tennessee USA, Bolivia), STAUFFER (W. Virginia, USA, Lake Malawi), STEHMANN (deepsea), STIASSNY (Cameroon, Liberia, Madagascar), SWIFT (s. California), TEUGELS (W. Africa, fw Africa, Congo), VARI (e. Brazil), WANG (Yunnan China), WHITWORTH (Connecticut USA), WILLIAMS (Tobago), WINTERBOTTOM (Comores), WIRTZ (Azores), ZAKARIA-ISMAIL (Malaysia), ZARSKE (fw Europe), ZHANG [G.] (sw. China), ZHENG (Guangdong Prov. China)

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PETROMYZONTIFORMES:

2 Petromyzontidae: BERTMAR, LAMILLA

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- 3 Hexanchidae:
- 4 Chlamydoselachidae:

HETERODONTIFORMES:

5 Heterodontidae: MEE

ORECTOLOBIFORMES:

- 6 Rhincodontidae: MEE
- 7 Parascylliidae:
- 8 Brachyaeluridae:
- 9 Orectolobidae:
- 10 Hemiscylliidae:
- 11 Stegostomatidae:
- 12 Ginglymostomatidae:

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- 14 Lamnidae: // ANDRES ET AL.
- 15 Megachasmidae: BERRA // BERRA & HUTCHINS
- 16 Cetorhinidae:
- 17 Alopiidae: EITNER

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- 19 Proscylliidae:
- 20 Pseudotriakidae:
- 21 Leptochariidae:
- 22 Triakidae: // CAPPETTA
- 23 Hemigaleidae:
- 24 Carcharhinidae: EITNER, HOWE // SERET
- 25 Sphymidae:

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- 26 Squalidae: DEL CERRO, STEHMANN // FRICKE
- 27 Echinorhinidae: // CAPPETTA

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SOUATINIFORMES:

29 Squatinidae: GAIDA

PRISTIFORMES:

30 Pristidae: STEHMANN // SERET, STEHMANN

TORPEDINIFORMES: STEHMANN

- 31 Torpedinidae: // BARANES & RANDALL
- 32 Narkidae: MEE

RAJIFORMES: HATOOKA, LAST, MCEACHRAN, STEHMANN // MIYAKE FT AI

- 33 Rhinobatidae: // STEHMANN
- 34 Platyrhinidae: // STEHMANN
- 35 Rajidae: DEL CERRO, LAMILLA, LAST, LEIBLE, STEHMANN, ZORZI //
 ISHIHARA & STEHMANN, LAMILLA & MELLENDEZ, LEIBLE ET
 AL., RASCHI & MCEACHRAN, SERET, STEHMANN, STEHMANN &
 BUERKEL, ZORZI

36 Anacanthobatidae:

MYLIOBATIFORMES:

- 37 Dasyatidae: // MCEACHRAN & SERET, ROBERTS & MONKOLPRASIT, TANIUCHI & ISHIHARA
- 38 Gymnuridae: // MCEACHRAN & SERET
- 39 Myliobatidae: // MCEACHRAN & SERET
- 40 Urolophidae:
- 41 Potamotrygonidae: // TANIUCHI & ISHIHARA
- 42 Mobulidae: BOR // BOR, MCEACHRAN & SERET
- 43 Hexatrygonidae:

CHIMAERIFORMES: LEIBLE

- 44 Callorhynchidae: PEQUENO
- 45 Chimaeridae: // HARDY & STEHMANN, STEHMANN
- 46 Rhinochimaeridae: // COMPAGNO ET AL., STEHMANN

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- 48 Polyodontidae: // LI

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49 Polypteridae:

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- 53 Pantodontidae:
- 54 Hiodontidae:
- 55 Notopteridae:

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- 57 Gymnarchidae:

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- 58 Elopidae: SALLS
- 59 Megalopidae:

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60 Albulidae:

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- 62 Notacanthidae:
- 63 Lipogenyidae:

ANGUILLIFORMES: CASTLE, QUERO // ZHOU

- 64 Anguillidae: BAST & STREHLOW
- 65 Heterenchelyidae:
- 66 Moringuidae:
- 67 Chlopsidae:
- 68 Myrocongridae: CASTLE,
- 69 Muraenidae: BOHLKE, HATOOKA, SMITH // COLLETTE ET AL.

- 70 Synaphobranchidae (incl. Ilyophinae and Simenchelyinae): SMITH // STEFANESCU ET AL.
- 71 Ophichthidae: CASTLE, MACHIDA & SHIOGAKI
- 72 Colocongridae:
- 73 Congridae (incl. Bathymyrinae and Heterocongrinae): CASTLE, KLAUSEWITZ, SHAO // ABE, CASTLE
- 74 Muraenesocidae:
- 75 Derichthyidae:
- 76 Nemichthyidae:
- 77 Serrivomeridae:
- 78 Nettastomatidae: KLAUSEWITZ // GUTIERREZ & CHAVEZ

SACCOPHARYNGIFORMES:

- 79 Cyematidae: SMITH
- 80 Saccopharyngidae:
- 81 Eurypharyngidae:
- 82 Monognathidae:

CLUPEIFORMES:

- 83 Denticipitidae:
- 84 Clupeidae: DITTY, FUIMAN, MUNROE, OKAZAKI, RE, SATO, SWIFT, WHITEHEAD // BLAXTER & FUIMAN, FUIMAN & GAMBLE, GOURENE & TEUGELS, MENESES & RE, PALOMERA & SABATES, RE, WHITEHEAD & BLAXTER
- 85 Engraulidae: BALART, BORNBUSCH, MENG, RE, SWIFT, WHITEHEAD // JARAMILLO & PEQUENO, PALOMERA & SABATES, RE
- 86 Chirocentridae: SWIFT

GONORYNCHIFORMES:

- 87 Chanidae:
- 88 Gonorynchidae:
- 89 Kneriidae:
- 90 Phractolaemidae:

CYPRINIFORMES:

- 91 Cyprinidae: BANARESCU, BERRA, BURR, BUTH, CHEN [X.-Y.], CHEN [Y.-R.], COAD, COELHO, COLLARES-PEREIRA, CUI, DAS, ELVIRA, HAGLUND, HERZIG, HOSOYA, JAYARAM, JOHNSTON, KAWAMURA, KRUPP, MENG, OKAZAKI, PLATANIA, SALLS, SCHMIDT, SIEBERT, STARNES, STIASSNY, SWIFT, ZAKARIA-IS-MAIL, ZARSKE, ZHANG [C.], ZHOU // AL KAHEM ET AL., AL-MACA, BANARESCU, BANARESCU & COAD, BESTGEN & PLATANIA, BOLTZ ET AL., CARNEY & PAGE, CHU (with YANG), COLLARES-PEREIRA, COLLARES-PEREIRA & MADEIRA, CUI & CHU, DAS & NELSON, ELVIRA ET AL., HOWES, JEON, JOHNSTON & RAMSEY, KIM & KANG, KIM & KIM, KOTTELAT & PETHIYAGODA, LI, LI & FANG, MAYDEN ET AL., MENG & FAN, MINCKLEY ET AL., MIRZA, OELLERMANN & SKELTON, PLATANIA & BESTGEN, PAGE & JOHNSTON, ROBERTS, SUZUKI & JEON, SKELTON, VIDTHAYANON & KOTTELAT, WANZENBOCK ET AL., YANG ET AL., ZHOU, ZHOU & XIE
- 92 Psilorhynchidae:
- 93 Cobitidae (incl. Botiinae): COLLARES-PEREIRA, DELMASTRO, KIM, SIEBERT // BURRIDGE ET AL., MIRZA, VASIL'EVA ET AL., ZAKARIA-ISMAIL
- 94 Balitoridae (incl. Nemacheilinae): TZENG, YANG // CHU (with YANG), KOTTELAT, TZENG ET AL., YANG & CHU, ZAKARIA-ISMAIL
- 95 Gyrinocheilidae: // ZHOU
- 96 Catostomidae: BUTH, HAGLUND, SALLS // PAGE & JOHNSTON, PLATANIA, PLATANIA & BESTGEN

CHARACIFORMES: BUCKUP, UJ

- 97 Citharinidae (incl. Distichodontinae):
- 98 Alestiidae (incl. all African "Characidae"):
- 99 Hepsetidae:
- 100 Hemiodontidae (incl. Parodontinae): LANGEANI, STARNES
- 101 Curimatidae (incl. Prochilodontinae, Chilodontinae, Anostominae): CASTRO, GARAVELLO, SIDEBOTTOM, VARI // GARAVELLO, GARAVELLO ET AL., VARI & BARRIGA
- 102 Erythrinidae
- 103 Lebiasinidae: WEITZMAN [M.] // WEITZMAN & FERNANDEZ
- 104 Gasteropelecidae:
- 105 Ctenoluciidae:
- 106 Cynodontidae:
- 107 Characidae (New World characins): BUCKUP, CASTRO, LUCENA [C.], LUCENA [Z.], MALABARBA, PROUDLOVE, RIEHL, SCHAEFFER, SCHMIDT, UJ, WEITZMAN [M.], WEITZMAN [S.], ZARSKE // BUCK-UP & MALABARA, CASTRO & VARI, MENEZES & WEITZMAN, REIS, VARI & SIEBERT, WIRZ-HLAVACEK & RIEHL

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- 109 Ictaluridae: BORNBUSCH
- 110 Bagridae: SU // CUI, MIRZA & JAN
- 111 Cranoglanididae:
- 112 Siluridae: BORNBUSCH, OKAZAKI, RIEHL // BORNBUSCH, CUI, DINGERKUS ET AL., HOWES
- 113 Schilbeidae:
- 114 Pangasiidae: ROBERTS
- 115 Amblycipitidae: CHEN (X.-P.)
- 116 Amphiliidae: PINNA, ROBERTS, SKELTON
- 117 Akysidae:
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- 119 Sisoridae:
- 120 Clariidae: LOFTUS, PINNA, RIEHL, TEUGELS // CUI, OZOUF-COSTAZ ET AL.
- 121 Heteropneustidae: PINNA
- 122 Chacidae: ZAKARIA-ISMAIL
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- 124 Malapteruridae: NORRIS
- 125 Ariidae: STIASSNY, ZHANG [C.] // CHAVEZ & SAUCEDO
- 126 Plotosidae: ALLEN
- 127 Mochokidae: STIASSNY // SKELTON & WHITE
- 128 Doradidae: UFERMANN
- 129 Auchenipteridae:
- 130 Pimelodidae: BUCKUP, GARAVELLO, LUCENA [C.], LUCENA [Z.], MALABARBA, PINNA, REIS, SILFVERGRIP, SILVA, VARGAS, VIEIRA // KOTTELAT
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- 139 Scoloplacidae: SCHAEFFER, UFERMANN // SCHAEFFER, SCHAEFFER ET AL.
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- 142 Esocidae
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- 147 Alepocephalidae: BEGLE
- 148 Platytroctidae: CASTRO-AGUIRRE
- 149 Leptochilichthyidae:
- 150 Lepidogalaxiidae: BERRA // BERRA ET AL.
- 151 Osmeridae: BEGLE, MCDOWALL // BEGLE
- 152 Plecoglossidae: // AZUMA ET AL., TAKAHASHI ET AL.
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- 154 Retropinnidae: MCDOWALL
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- 156 Salmonidae: BEHNKE, BERTMAR, BUSBY, FOLLETT, OKAZAKI, ZHANG [Y.] // BEHNKE

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- 163 Melanostomiidae:
- 164 Malacosteidae:
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- 169 Notosudidae:
- 170 Synodontidae (incl. Harpadontinae, Bathysaurinae): CASTRO-AGUIRRE, SHAO // DONALDSON
- 171 Giganturidae:
- 172 Paralepididae: CASTRO-AGUIRRE
- 173 Anotopteridae:
- 174 Evermannellidae:
- 175 Omosudidae:
- 176 Alepisauridae:
- 177 Pseudotrichonotidae: JOHNSON, TOMINAGA

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- 179 Myctophidae:

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- 181 Aphredoderidae:
- 182 Amblyopsidae:

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- 183 Muraenolepididae: // HOWES
- 184 Bregmacerotidae:
- 185 Euclichthyidae:
- 186 Macrouridae: ANDERSON [M. E.], HOWES, IWAMOTO, PAULIN, WU // STEFANESCU & LLORIS
- 187 Moridae: HOWES // PAULIN, PAULIN & MATALLANAS
- 188 Melanonidae: HOWES // PAULIN
- 189 Gadidae: CASTRO-AGUIRRE, GAEMERS // GAEMERS
- 190 Lotidae:
- 191 Phycidae:
- 192 Merlucciidae: GAEMERS // HOWES, METALLANOS & LLORIS

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- 193 Ophidiidae (incl. Brotulinae, Neobythitinae): ANDERSON [M. E.], COHEN, MACHIDA, RETZER // CHEN & SHAO, MACHIDA & AMAOKA
- 194 Carapidae: MACHIDA // MACHIDA
- 195 Bythitidae (incl. Brosmophycinae): MACHIDA, PROUDLOVE // CHEN & SHAO, COHEN ET AL., STEFANESCU ET AL.
- 196 Aphyonidae:

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- 199 Antennariidae: RANDALL, SHEDLOCK // PIETSCH, PIETSCH & GROBECKER, SAUCEDO ET AL.
- 200 Tetrabrachiidae:
- 201 Lophichthyidae:
- 202 Brachionichthyidae:
- 203 Chaunacidae: CARUSO
- 204 Ogcocephalidae: ACERO P.
- 205 Caulophrynidae:
- 206 Neoceratiidae:
- 207 Melanocetidae:
- 208 Himantolophidae:
- 209 Diceratiidae: // WU ET AL.
- 210 Oneirodidae: ORR // ORR, PIETSCH
- 211 Thaumatichthyidae:
- 212 Centrophrynidae: PIETSCH
- 213 Ceratiidae:
- 214 Gigantactinidae:
- 215 Linophrynidae:

GOBIESOCIFORMES:

216 Gobiesocidae: FRICKE, HUTCHINS // HUTCHINS

ATHERINIFORMES: PARENTI

217 Atherinidae: DYER

Atherinopsinae: DYER, REICHENBACHER

Menidiinae: DYER
Notocheirinae

Atherioninae

Atherininae: // CROWLEY & IVANTSOFF, CROWLEY ET AL.

Bedotiinae: STIASSNY // STIASSNY

Dentatherininae

Pseudomugilinae (incl. Telmatherinidae): IVANTSOFF // KOTTELAT

Melanotaeniinae: ALLEN

218 Phallostethidae:

CYPRINODONTIFORMES: PARENTI

219 Aplocheilidae: COSTA // COSTA

Aplocheilinae: // COSTA

Rivulinae: COSTA, LEE // COSTA, COSTA & BRASIL, COSTA ET AL., LEE ET AL

220 Cyprinodontidae: REICHENBACHER

Cyprinodontinae

Valenciinae: // BIANCO & MILLER

Aplocheilichthyinae

Profundulinae

Fundulinae

Cubanichth vinae

Fluviphylacinae

Empetrichthyinae

221 Goodeidae: RIEHL // HIERONIMUS

222 Poeciliidae: COSTA, HIERONIMUS, MCEACHRAN, PROUDLOVE, RAUCHENBERGER, RIEHL // GREENFIELD, HIERONIMUS, RAUCHENBERGER, RAUCHENGERGER ET AL., RIEHL

223 Anablepidae:

BELONIFORMES: // ZHOU

224 Adrianichthyidae: // KOTTELAT

225 Scomberesocidae:

226 Belonidae: COLLETTE, NIZINSKI // COLLETTE & PARIN

227 Hemiramphidae: COLLETTE // COLLETTE & PARIN

228 Exocoetidae: ABE

LAMPRIFORMES: JOHNSON

229 Lampridae: // HUTCHINS

230 Veliferidae:

231 Lophotidae: CASTRO-AGUIRRE

232 Radiicephalidae:

233 Trachipteridae:

234 Regalecidae: // CASTRO-AQUIRRE ET AL.

235 Stylephoridae:

236 Ateleopodidae:

237 Mirapinnidae:

238 Megalomycteridae: PAXTON

BERYCIFORMES: LI, MOORE

239 Monocentridae:

240 Trachichthyidae: MOORE

241 Anomalopidae: // ROSENBLATT & JOHNSON

242 Diretmidae:

243 Anoplogastridae:

244 Berycidae:

245 Holocentridae: GOLANI // CHEN ET AL.

246 Stephanoberycidae:

247 Hispidoberycidae:

248 Melamphaidae:

249 Gibberichthyidae:

250 Polymixiidae:

CETOMIMIFORMES:

251 Rondeletiidae: JOHNSON, PAXTON

252 Barbourisiidae: JOHNSON, PAXTON // PAXTON

253 Cetomimidae: PAXTON

ZEIFORMES: DEWITT, TOMINAGA

254 Parazenidae:

255 Macrurocyttidae:

256 Zeidae:

257 Oreosomatidae:

258 Grammicolepididae:

259 Caproidae:

GASTEROSTEIFORMES: ORR

260 Hypoptychidae:

261 Gasterosteidae (incl Aulorhynchinae): BUTH, COAD, HAGLUND, NEL-SON // HAGLUND ET AL., KIM ET AL.

262 Indostomidae:

263 Pegasidae:

SYNGNATHIFORMES:

264 Aulostomidae: ORR

265 Fistulariidae:

266 Centriscidae:

267 Solenostomidae:

268 Syngnathidae: PAULUS // CARDENAS & PEQUENO, PAULUS

SYNBRANCHIFORMES: // ZHOU

269 Synbranchidae:

270 Mastacembelidae:

271 Chaudhuriidae:

SCORPAENIFORMES:

272 Scorpaenidae: KENDALL, ORR, QUERO // ERICKSON ET AL, POSS & COLLETTE, KENDALL, PAULIN, POSS & DUHAMEL

273 Caracanthidae:

274 Aploactinidae: JOHNSON

275 Pataecidae:

276 Gnathanacanthidae:

277 Congiopodidae: // HEEMSTRA & DUHAMEL

278 Triglidae (incl. Peristediinae): CASTRO-AGUIRRE, DEL CERRO, QUERO, RICHARDS // MILLER & RICHARDS, SCHMITTER-SOTO & CASTRO-AGUIRRE

279 Dactylopteridae:

280 Platycephalidae:

281 Bembridae:

282 Hoplichthyidae:

283 Anoplopomatidae:

284 Hexagrammidae: CASTRO-AGUIRRE

285 Normanichthyidae:

286 Ereuniidae:

287 Cottidae: PIETSCH, REINTHAL // NELSON

288 Cottocomephoridae:

289 Comephoridae:

290 Psychrolutidae: NELSON // FRICKE, NELSON

291 Agonidae: BUSBY

292 Cyclopteridae: DUHAMEL, KIDO

PERCIFORMES: MOORE // ZHOU

293 Centropomidae (incl Latinae):

294 Ambassidae (Chandidae): // ALLEN & BURGESS

295 Percichthyidae: HATOOKA // POST & QUERO, ROBERTS [C.]

- 296 Acropomatidae: QUERO, ROBERTS [C.]
- 297 Moronidae:
- 298 Polyprionidae: ROBERTS [C.]
- 299 Dinopercidae:
- 300 Serranidae (incl. Anthinae, Epinephelinae, Liopropomatinae, Grammistinae): BALDWIN, COLLETTE, DONALDSON, JOHNSON, LOBEL, PAXTON, RANDALL, REICHENBACHER, ROBERTS [C.], SHAO, SU, SWIFT // ALLEN & RANDALL, AMAOKA & RANDALL, ANDERSON & HEEMSTRA, ANDERSON & RANDALL, ANDERSON ET AL., BALDWIN, BALDWIN & JOHNSON, BALDWIN ET AL., PAULUS, RANDALL & KUITER, RANDALL ET AL., SCHUHMACHER ET AL.
- 301 Symphysanodontidae:
- 302 Centrogeniidae:
- 303 Pseudochromidae (incl. Congrogadinae, etc.): GILL // GILL
- 304 Grammatidae:
- 305 Callanthiidae: ANDERSON [W. D.]
- 306 Plesiopidae: MOOI & RANDALL
- 307 Acanthoclinidae: // SMITH-VANIZ & JOHNSON
- 308 Glaucosomatidae:
- 309 Terapontidae:
- 310 Banjosidae:
- 311 Kuhliidae:
- 312 Centrarchidae: BERRA, MABEE
- 313 Elassomatidae:
- 314 Percidae: CHAPLEAU, RETZER // BANARESCU & STANESCU.
 JOHNSTON, ORR & RAMSEY, PLATANIA, RAESLY ET AL.
- 315 Priacanthidae: STARNES
- 316 Kurtidae: BERRA, SAKAMOTO, TOMINAGA
- 317 Apogonidae: JOHNSON, MEE, QUERO, SHAO // GREENFIELD & JOHNSON, RANDALL & HAYASHI, RANDALL ET AL.
- 318 Epigonidae:
- 319 Dinolestidae:
- 320 Sillaginidae:
- 321 Malacanthidae: // ALLEN & KUITER, BAUCHOT & DESOUTTER
- 322 Lactariidae: // BAUCHOT & DESOUTTER
- 323 Scombropidae:
- 324 Pomatomidae: DITTY // BAUCHOT & DESOUTTER
- 325 Rachycentridae: DITTY // BAUCHOT & DESOUTTER
- 326 Echeneidae: HATOOKA // BAUCHOT & DESOUTTER
- 327 Carangidae: ACERO P., BALART, ZHENG
- 328 Nematistiidae:
- 329 Coryphaenidae: BENTIVOGLIO
- 330 Menidae: // BAUCHOT & DESOUTTER
- 331 Leiognathidae: // BAUCHOT & DESOUTTER
- 332 Bramidae: SEKI
- 333 Caristiidae:
- 334 Arripidae: PAULIN // BAUCHOT & DESOUTTER
- 335 Emmelichthyidae:
- 336 Lutjanidae: ACERO P., LEIS, LOFTUS // LLORIS & RUCABADO
- 337 Caesionidae: CARPENTER // CARPENTER
- 338 Lobotidae: DITTY // BAUCHOT & DESOUTTER
- 339 Gerreidae: GILL, HATOOKA // BAUCHOT & DESOUTTER
- 340 Haemulidae:
- 341 Inermiidae:
- 342 Spanidae: CARPENTER, SU // KINOSHITA & TANAKA, PAULIN, SU & WANG
- 343 Centracanthidae:
- 344 Lethrinidae: CARPENTER // CARPENTER & ALLEN
- 345 Nemipterid :

- 346 Sciaenidae: CASTRO-AGUIRRE, CHAO, DITTY, FUIMAN, SASAKI //
 SASAKI
- 347 Mullidae: GOLANI, HATOOKA, MYERS // GOLANI & GALIL, HUTCHINS
- 348 Pempheridae: HATOOKA
- 349 Leptobramidae:
- 350 Bathyclupeidae:
- 351 Toxotidae:
- 352 Coracinidae:
- 353 Kyphosidae (incl. Girellinae, Scorpidinae): NAKABO, OJEDA, ORTON //
 VIAL & OJEDA
- 354 Parascorpididae:
- 355 Drepanidae: // LLORIS & RUCABADO
- 356 Ephippidae: DITTY, JOHNSON, MCEACHRAN
- 357 Monodactylidae:
- 358 Scatophagidae:
- 359 Chaetodontidae:
- 360 Pomacanthidae: HOWES // KRUPP & DEBELIUS
- 361 Enoplosidae: // BAUCHOT & DESOUTTER
- 362 Pentacerotidae:
- 363 Nandidae: KULLANDER // BAUCHOT & DESOUTTER
- 364 Oplegnathidae: // BAUCHOT & DESOUTTER
- 365 Cichlidae: AHLANDER, CASCIOTTA, ENGELS, GAEMERS, KULLANDER, MALABARBA, PLOSCH, REINTHAL, REIS, SCHOENEN,
 SIDEBOTTOM, SNOEKS, STAUFFER, STIASSNY, TEUGELS, UFERMANN // DE VOS ET AL., GAEMERS, JANSSENS ET AL., KULLANDER, KULLANDER ET AL., KULLANDER & FERREIRA,
 KULLANDER & SILFVERGRIP, KULLANDER & STAECK, LUCENA
 & AZEVEDO, MCKAYE ET AL., PLOEG, REINTHAL, SNOEKS ET
 AL., STIASSNY
- 366 Embiotocidae: // BAUCHOT & DESOUTTER
- 367 Pomacentridae: EDWARDS, MEE, WILLIAMS // FOLLETT & RAN-DALL, LLORIS & RUCABADO, RANDALL & FOLLETT
- 368 Cirrhitidae: DONALDSON // BAUCHOT & DESOUTTER, DONALDSON
- 369 Chironemidae: // BAUCHOT & DESOUTTER
- 370 Aplodactylidae: OJEDA // BAUCHOT & DESOUTTER
- 371 Cheilodactylidae: // BAUCHOT & DESOUTTER
- 372 Latridae: // BAUCHOT & DESOUTTER
- 373 Cepolidae: // BAUCHOT & DESOUTTER
- 374 Opistognathidae: ACERO P.
- 375 Notograptidae:

Mugiloidei:

376 Mugilidae: HARRISON, HODA, SALLS // CHEN ET AL., HARRISON & HOWES, HODA & QURESHI

Polynemoidei:

377 Polynemidae:

Labroidei:

- 378 Labridae: CARPENTER, MUNROE, SCHULTZ // RANDALL & KUITER
- 379 Odacidae: SCHULTZ
- 380 Scaridae: HUREAU, MYERS // BELLWOOD & SCHULTZ, SHAO & CHEN

Zoarcoidei:

- 381 Bathymasteridae: MATARESE // MATARESE
- 382 Zoarcidae: ANDERSON [M. E.], HATOOKA // ANDERSON [M. E.], LLORIS, LLORIS & RUCABADO, MATALLANAS ET AL., NIELSEN ET AL.

- 383 Stichaeidae: HATOOKA, KIM, MATARESE // FOLLETT & ANDERSON
- 384 Cryptacanthodidae:
- 385 Pholidae: HATOOKA
- 386 Anarhichadidae:
- 387 Ptilichthyidae:
- 388 Zaproridae:
- 389 Scytalinidae:

Notothenioidei: PAEPKE // FRICKE & PAEPKE

- 390 Bovichtidae:
 - 391 Nototheniidae: PEQUENO // DEWITT ET AL., GAN & ZHANG [C.], KOUBBI ET AL., LOMBARTE ET AL., RIEHL & EKAU
 - 392 Harpagiferidae: EAKIN, HUREAU // EAKIN & DEWITT, HUREAU
 - 393 Bathydraconidae:
 - 394 Channichthyidae:

Trachinoidei:

- 395 Xenocephalidae:
- 396 Chiasmodontidae:
- 397 Champsodontidae: PIETSCH
- 398 Trichodontidae:
- 399 Ammodytidae: NIZINSKI, PIETSCH // NIZINSKI ET AL., PIETSCH & ZABETIAN, SABATES ET AL.
- 400 Trachinidae:
- 401 Uranoscopidae:
- 402 Trichonotidae: NELSON
- 403 Creediidae:
- 404 Leptoscopidae:
- 405 Percophidae (incl. Bembropinae, Hemerocoetinae): DAS, JOHNSON
- 406 Pinguipedidae: DONALDSON

Pholidichthyoidei:

407 Pholidichthyidae:

Blennioidei: CAVALLUZZI, WIRTZ // GREENFIELD & JOHNSON

- 408 Tripterygiidae: CAVALLUZZI, FRICKE, HOWE, WILLIAMS // WILLIAMS & MCCORMICK
- 409 Labrisomidae: CAVALLUZZI, WILLIAMS
- 410 Clinidae:
- 411 Chaenopsidae: ACERO P., CAVALLUZZI
- 412 Dactyloscopidae: CAVALLUZZI
- 413 Blenniidae: ALMEIDA, BATH, KIM, OJEDA, RIEHL, SPRINGER, WIL-LIAMS // BATH, BATH & RANDALL, GOREN & GALIL, HIRAMAT-SU & MACHIDA, WILLIAMS, WIRTZ

Icosteoidei:

414 Icosteidae:

- Callionymoidei: PAEPKE // FRICKE & PAEPKE
 - 415 Callionymidae: CASTRO-AGUIRRE, FRICKE, JEON, NAKABO // FRICKE, NAKABO & MCKAY
- 416 Draconettidae: FRICKE, NAKABO

Schindlerioidei:

417 Schindleriidae:

Gobioidei: BAUCHOT, GOREN, MILLER, WINTERBOTTOM, WU

- 418 Rhyacichthyidae: // BAUCHOT EL AL.
- 419 Eleotridae: AKIHITO, ALLEN, WU // ALLEN & COATES, MILLER, WONGRAT & MILLER

- 420 Gobiidae: AKIHITO, DONALDSON, GREENFIELD, HARRISON, JEON, LARSEN, MILLER, MURDY, PARENTI, RANDALL, REICHEN-BACHER, ROBERTS, SCHMIDT, SPRINGER, SWIFT, WINTERBOTTOM, WU // ACERO P. & ARENAS GRANADOS, BIANO & MILLER, BRZOBOHATY & GAUDANT, ECONOMIDIS & MILLER, GILL & MILLER, GOREN, HARRISON, HODA & GOREN, KOTTELAT & PETHIYAGODA, LARSEN, MILLER, SILVA MELO & ACERO P., WINTERBOTTOM, WINTERBOTTOM & BURRIDGE, WU & ZHOU
- 421 Kraemeriidae:
- 422 Microdesmidae (incl. Ptereleotrinae): // MILLER
- 423 Xenisthmidae: GILL

Acanthuroidei:

- 424 Siganidae: RANDALL
- 425 Luvaridae:
- 426 Zanclidae:
- 427 Acanthuridae:

Sphyraenoidei:

428 Sphyraenidae:

Scombroidei: NAKAMURA // NAKAMURA

- 429 Scombrolabracidae:
- 430 Gempylidae: NAKAMURA
- 431 Trichiuridae: NAKAMURA
- 432 Xiphiidae:
- 433 Istiophoridae: SCHULTZ
- 434 Scombridae: COLLETTE // COLLETTE, ROBERTS [C.]

Stromateoidei:

- 435 Amarsipidae:
- 436 Centrolophidae:
- 437 Nomeidae:
- 438 Ariommatidae:
- 439 Tetragonuridae:
- 440 Stromateidae: DITTY, NAKABO

Anabantoidei: MABEE, PAEPKE

- 441 Anabantidae: MABEE, NORRIS // KOTTELAT, NORRIS & DOUGLAS, NORRIS & TEUGLES
- 442 Belontiidae: // PAEPKE, SCHALLER & KOTTELAT
- 443 Helostomatidae:
- 444 Osphronemidae:

Luciocephaloidei:

445 Luciocephalidae:

Channoidei:

446 Channidae: AHLANDER, PAEPKE, REICHENBACHER, VIERKE // MENG, VIERKE

PLEURONECTIFORMES: CHAPLEAU, LI, MUNROE, ORR // LI & WANG

- 447 Psettodidae:
- 448 Citharidae:
- 449 Scophthalmidae: SAKAMOTO
- 450 Paralichthyidae: ALLEN [M. J.], CASTRO-AGUIRRE, KRAMER [S.] // ALARCON- GONZALEZ ET AL., ALLEN, ALLEN & HERBINSON, KRAMER [S.]
- 451 Bothidae: GAIDA, QUERO // BEN-TUVIA, FUKUI & OZAWA, QUERO & GOLANI, RE ET AL.

- 452 Achiropsettidae:
- 453 Pleuronectidae: CHAPLEAU, GAIDA, NAKABO, SAKAMOTO //
 SAKAMOTO & UYENO
- 454 Achiridae: MUNROE
- 455 Soleidae: BURGIN, CHAPLEAU, HODA // CHAPLEAU, QUERO & DESOUTTER, QUERO ET AL., RANDALL & MCCARTHY
- 456 Cynoglossidae: MUNROE

TETRAODONTIFORMES: MATSUURA, SU // ZHOU

- 457 Triacanthodidae: MATSUURA
- 458 Triacanthidae:
- 459 Balistidae: RANDALL & MILLINGTON
- 460 Monacanthidae: // MATSUURA & SUNOBE
- 461 Ostraciidae: MATSUURA
- 462 Triodontidae:

- 463 Tetraodontidae: KIM, MATSUURA, WILLIAMS // ABE, MATSUURA, SAUCEDO ET AL.
- 464 Diodontidae: //SAUCEDO ET AL.
- 465 Molidae:

SARCOPTERYGII:

COELACANTHIFORMES:

466 Latimeriidae:

CERATODONTIFORMES:

467 Ceratodontidae: SCHULTZE

LEPIDOSIRENIFORMES:

468 Lepidosirenidae: ARRATIA, CASCIOTTA, SCHULTZE

LATE ADDITIONS

- AMAOKA, K., AND H. IMAMURA. In press. Two new and one rare species of bothid flounders from Saya de Malha Bank, Indian Ocean (Teleostei: Pleuronectiformes). Copeia.
- AMAOKA, K., K. NAKAYA AND M. YABE. 1989. Fishes of Usujiri and adjacent waters in southern Hokkaido, Japan. Bull. Fac. Fish. Hokkaido Univ. v. 40 (no. 4): 254-277.
- AMAOKA, K., AND N. V. PARIN. 1990. A new flounder, Chascanopsetta megagnatha, from the Sala-y-Gomez Submarine Ridge, eastern Pacific ocean (Teleostei: Pleuronectiformes: Bothidae). Copeia No. 3: 717-722.
- GARCIA, M. L., AND R. C. MENNI. In press. Studies on Argentine Pleuronectiformes V: Morphometrics and other biological aspects of *Xystreurys rasile* (Bothidae, Paralichthyinae). Gayana (Chile).
- GARZON-FERREIRA, J. 1989. Contribución al conocimiento de la ictiofauna de Bahía Portete, departamento de la Guajira, Colombia. Trianea (Act. Cient. Tecn. INDERENA) v. 3: 149-172.
- GARZON-FERREIRA, J. 1990. An isopod, Rocinela signata (Crustacea: Isopoda: Aegidae), that attacks humans. Bull. Mar. Sci. v. 46 (no. 3): 813-815.
- GARZON-FERREIRA, J., AND A. ACERO. In press. Redescription of Coryphopterus tortugue (Jordan), a valid species of goby from the western Atlantic (Pisces: Gobiidae). Northeast Gulf Sci.
- GARZON-FERREIRA, J., AND A. ACERO. In press. Priolepis robinsi, a new species of fish from the Caribbean Sea, with notes on P. hipoliti (Perciformes: Gobiidae). Copeia.
- KRUCKOW, T., AND D. THIES. 1990. Die Neoselachier der Paliokaribik (Pisces: Elasmobranchier). Cour. ForschungsInst. Senckenb. v. 119: 1-102.

- MENNI, R. C. 1988. La piel de los bagres y las oscilaciones del finalismo (Review of "De Aristóteles a Darwin y vuelta", by E. Gilson). Physis A v. 46 (no. 110): 41-42.
- MENNI, R. C., H. L. LOPEZ AND R. H. ARAMBURU. 1988. Ictiofauna de Sierra de la Ventana y Chasicó (Provincia de Buenos Aires, Argentina). Zoogeografía y parámetros ambientales. An. Mus. Hist. Nat. Valparaiso v. 19: 75.84.
- MIQUELARENA, A. M., R. C. MENNI, H. L. LOPEZ AND J. R. CASCIOTTA. 1990. Ichthyological and limnological observations on the Salf river basin (Tucumán, Argentina). Ichthyol. Explor. Freshwaters v. 1 (no. 3): 1-8.
- SCHINDLER, I. 1989. Pseudocrenilabrus nicholsi vs Pseudocrenilabrus ventralis. DCG-Info. 2o(7). 124-125.
- SCHINDLER, I. 1989. Zur Namensgebung von Neolamprologus brichardi mit Anmerkungen zum Status des Taxons Julidochromis elongatus Steindachner, 1909. DCG-Info. 20(10) 181-183.
- SHIRAI, S., AND K. NAKAYA. 1990. A new squalid species of the genus Centroscyllium from the Emperor Seamount Chain. Jpn. J. Ichthyol. v. 36 (no. 4): 301-308
- STAECK, W. 1990. Ergänzungen zur Beschreibung von Apistogramma hoignei Meinken, 1965. Aquar. Terrar. Z. v. 43 (no. 7): 412-416.
- THIES, D. In press. The osteology of the bony fish Tetragonolepis semicincta BRONN 1830 (Actinopterygii, Semionotiformes) from the Early Jurassic (Lower Toarcian) of Germany. Geologica et Palaeontologica.
- YABE, M. In press. Bolinia euryptera, a new genus and species of sculpin (Scorpaeniformes; Cottidae) from the Bering Sea. Copeia.

AMAOKA, KUNIO Professor, Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University, Hakodate, Hokkaido 041, Japan (0138)

Current work: (1) Relationships of Rhombosoleinae (with D. Hensley). (2) A world catalog of the left-eyed flounders for FAO (with D. Hensley). (3) Revision of the genera Syacium and Cyclopsetta. (4) Systematics of bothid flounders from New Caledonia (with J. Rivaton). (5) Relationships among the genera of Scophthalmidae (with K. Sakamoto). (6) Development and taxonomy of larval and juvenile fishes in the northern North Pacific.

ENDO, HIROMITSU Graduate student, Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University, Hakodate, Hokkaido 041, Janon

Current work: (1) Phylogenetic relationships of the Gadiformes (for Ph.D. under the direction of Dr. K. Amaoka); (2) anatomical study of the phycid hakes Phycis and Urophycis; (3) redescription of the morid Laemonema modestus (with Dr. O. Okamura); (4) new records of the abyssal grenadiers Coryphaenoides armatus and C. yaquinae from the western North Pacific (with Dr. Okamura).

GON, OFER J L B Smith Institute of Ichthyology, Somerset Street, Private Bag 1015, Grahamstown 6140, South Africa. Tel. (0461) 27124 Fax. (0461) 22403 Telex 244219

I have done almost no research over the last year -- all my time was devoted to editing <u>Fishes of the Southern Ocean</u>. My entry for last year still applies. Because of recent increases in printing costs, we have raised the price of FSO to \$100. Please note the change from the price quoted in the announcement. The book is being printed and launching is scheduled for the second week of December.

GOTO, TOMOAKI Graduate student, Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University, Hakodate, Hokkaido 041, Japan

Current work: Phylogenetic study of the orectolobid sharks on the basis of osteology and myology under the direction of Prof. Kunio Amaoka.

HOSHINO, KOUICHI Graduate student, Laboratory of Marine Zoology Faculty of Fisheries, Hokkaido University, Hakodate, Hokkaido 041, Japan.

Current work: Comparative osteology and phylogenetic systematics of the family Paralichthyidae.

IMAMURA, HISASHI Graduate student, Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University, Hakodate, Hokkaido 041, Japan

Current work: (1) Phylogenetic relationships of the Platycephaloidei under the direction of Dr. K. Amaoka: (2) descriptions of two new and one rare species of the bothid flounders (with Dr. Amaoka.)

MIHARA, EIJI Graduate student, Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University, Hakodate, Hokkaido 041, Japan

Current work: Taxonomy of the pleuronectiform fishes collected from New Caledonia under the direction of Dr. K. Amaoka.

NAKAYA, KAZUHIRO Associate Professor, Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University, Minato-machi, Hakodate, Hokkaido 041, Japan. Tel. 0138-41-0131 (ext. 247) Fax. 0138-43-5015

My main concern is on the systematics of the elasmobranch fishes. Current works in short range: (1) revision of long-snouted Apristurus species; (2) application to Int. Comm. Zool. Nom. of conservation of the name Apristurus atlanticus (with B. Séret). Middle and long range works: (1) further revision of world Apristurus; (2) taxonomy of genus Proscyllium; (3) deepwater elasmobranch fauna around Japan. New work just begun is taxonomy of non-elasmobranch fishes of Lake Tanganyika.

SCHINDLER, INGO Warthestraße 53a, 1000 Berlin 44, Germany

Current work: (1) Studies on the Otoliths of <u>Apistrogramma</u> and other neotropical Cichlidae; (2) studies on a small collection of characoids from Venezuela, with description of a new <u>Lebiasina</u> and some redescription.

SHIMOKAWA, TOMOKI Graduate student, Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University, Hakodate, Hokkaido 041, Japan

Current work: The phylogeny of the cirrhitoid fishes on the basis of external and internal character under the direction of Prof. K. Amaoka.

SHINOHARA, GENTO Graduate student, Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University, Hakodate, Hokkaido 041, Janan

Current work: (1) Comparative anatomy (osteology, myology) and phylogeny of the hexagrammid, zaniolepidid and anoplopomatid fishes; (2) studies of nerve patterns in the scorpaeniform fishes under the direction of Prof. Amaoka.

SHIRAI, SHIGERU Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University, 3-1, Minato, Hakodate 041, Japan

Now finished my dissertation work on the phylogeny of squaloid sharks. Other works have just completed on: (1) The phylogenetic study of Squatina, pristiophorids, and rajiforms; and 2) new species of Scyliorhinus from South Japan (with S. Hagiwara and K. Nakaya). Current work: (1) The higher elasmobranch phylogeny; (2) review of Centroscyllium sharks (with George Burgess); and (3) review of Squatina sharks.

STAECK, WOLFGANG Auf dem Grat 41a, 1000 Berlin 33, Germany

Current work: Description of a new Apistogramma spec. from the upper Amazonas drainage in Peru.

THIES, DETLEV Inst. für Geologie & Paläontologie, Univ. Hannover, Callinstr. 30, 3000 Hannover 1, Germany

Current work: (1) Study of a deep water shark fauna from the Late Cretaceous of western Germany; (2) study of <u>Araripelepidotes</u> temnurus from the Early Cretaceous of Brazil.

YABE, MAMORU Assistant Professor, Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University, Hakodate, 041 Japan

Current work: (1) Preparation for a paper on a new species of Porocottus from nothern Japan; (2) revision of the cottid genus Radulinopsis with an undescribed species; (3) comparative osteology and myology of some sculpins of Lake Baikal; (4) osteology and myology of Normanichthy (with T. Uyeno); (5) taxonomy of larval and juvenile fishes in the northern waters around Japan (with K. Amaoka and K. Nakaya).

YOSHIMURA, KEIZO Graduate student, Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University, Hakodate, Hokkaido 041, Janan

Current work: Phylogenetic study of the stromateoid fishes on the basis of osteology and myology under the direction of Prof. Kunio Amaoka.

BARMAN, R. P. Assistant zoologist, Division of Fishes, Zoological Survey of India, 27 Jawaharlal Nehru Road, Calcutta 700 016, India.

Current work: (1) Continuing with the systematic studies on the marine and estuarine fish fauna of Gujarat (latitude 23.00 N and longitude 72.00 E); (2) continuing the final typing of the systematic studies on the freshwater fish fauna of Tripura (latitude 23.45 N and longitude 91.30 E).

Barman, R. P. (1989) <u>Barilius nelsoni</u>, a new cyprinid fish (Pisces: Cyprinidae) from Tripura, north-eastern India. J. Bombay Nat. Hist. Soc. v. 86 (no. 2): 213-215

Barman, R. P. (1989) On a collection of fish from Mizoram, India. J. Bombay Nat. Hist. Soc. v. 86 (no. 3):463-466

ECONOMIDIS, PANOS STAVROS Professor, Aristotle University of Thessaloniki, Dept. of Zoology, Box 134, GR-54006 Thessaloniki, Greece. Tlx 412181 AUTH GR, Fax 206138

Current work: (1) Study of the fish fauna of Aoos River, with the descriptio of a new species of Orthias (Noemacheilinae); (2) new records of marine fishes of Greece; (3) taxonomy of Ladigesocypris ghigii (Cyprinidae) from Rhodos Island; (4) study of the genus Cobitis (Cobitidae) from Greece, with descriptions of three new species (with T. T. Nalbant); (5) revision of the genus Scardinius (Cyprinidae) from Greece (with A. Wheeler & C. Iliadou); (6) taxonomy of the Pungitius hellenicus (Gasterosteidae) with J. Nelson); (7) morphometry of Salmo trutta (Salmonidae) of Greece (with Y. Karakoussis & C. Triantaphyllidis).

Kotulas, G., N. Pasteur, P. Berrebi, P. S. Economidis & J. P. Quignard (1988) Distribution biogéographique de statut systématique des taxons du groupe Solea vulgaris / aegyptiaca / senagalensis. Rapp. Comm. Int. Mer Médit. v. 31(2):277

Economidis, P. S. (1989) Distribution pattern of the genus *Barbus* (Pisces, Cyprinidae) in the freshwater of Greece. Trav. Mus. Hist. Nat. "Grigore Antipa", Bucarest v. 30:223-229

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Economidis, P. S. (In press) Freshwater fishes. In: Greek red data book.

Karakousis, Y., C. Triantaphyllidis & P. S. Economidis (Submitted) Morphometric and meristic variability among seven Greek brown trout (Salmo trutta) populations.

WITKOWSKI, ANDRZEJ Curator of fishes, Division of Ichthyology and Herpetology, Museum of Natural History, Wroclaw, Poland

Current work: (1) Study of the ichthyofauna of the rivers of Lower Silesia (SW Poland); (2) lateral-line system of the freshwater sculpins (Cottus) from Far East and Japan; (3) systematic revision of Polish populations of Sabanejevia (Cobitis) aurata; (4) bibliography of the genus Hucho (Salmonidae).

Witkowski, A. (1989) Fishes introduced to Polish waters and their effect on environment. Przegl. Zool. 33:583-598.

Witkowski, A. (1990) The Huchen, \underline{Hucho} \underline{hucho} /L./ is endangered in Europe. Chron. Przyr. Ojcz. 46:47-53.

Witkowski, A., M. Kolacz (1990) Geographic and ecological variability of <u>Gymnocephalus cernuus</u> (Linnaeus, 1758) (Osteichthyes: Percidae) from Poland. Fragm. Faun. 33:149-178.

Witkowski, A., J. Blachuta and J. Kusznierz (In press) Ichthyofauna of the Widawa River. Sci. Ann. Pol. Anglers Assoc.

Witkowski, A., J. Blachuta and J. Kusznierz (In press) Golden loach, <u>Sabanejevia aurata</u> (de Filippi, 1865) in the Widawa River - the second locality in the Odra River basin. Przegl. Zool.

Witkowski, A., M. Rogowska (In press) Breeding tubercles of some European cyprinid fishes (Osteichthyes: Cypriniformes, Cyprinidae). Zool. Abh. (Dresden).

ANDRIASHEV, A. P. Prof. Zoological Institute, Academy of Sciences, Leningrad 199034, USSR

I am continuing my study of the Falkland-Patagonian species of the genus <u>Careproctus</u> (Liparididae); six new species are described and two insufficiently known species are redescribed (in two papers in press or just published). Besides, I begin to work on the revised and enlarged edition of my book "Fishes of the Northern Seas of the U.S.S.R." (1954, Engl. ed. 1964) in the co-authorship with Dr. N. V. Chernova. All 7 papers by A. P. Andriashev mentioned in "Newsletter of Syst. Ichthyol." (No. 9, 1989) are published now.

Andriashev, A. P. (In press) Redescription of the syntypes of "Liparis antarctica Putnam n. subsp. (?) falklandica Lönnberg" with description of two new species of the genus Careproctus from the bathyal depths of Argentina and New Zealand. Proc. Zool. Inst. Ac. Sci. Leningrad (In Russian, with English summary).

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Prirodina, V. P. (1989) New karyological data on three species of the white-blooded fishes (Notothenioidei: Channichthyidae). Proc. Zool. Inst. Acad. Sci., Leningrad. v. 201:66-72.

Wild Fish

Water Budget for Fish or Power?

An Interview with Michele DeHart

Managing water for fish in the Columbia and Snake River Basins is the focus of the guest opinion on page 3 and this article, written by Wilderness Society intern Joan Eltman.

Requesting water flows for salmon migration in the Columbia River Basin is the Sisyphean task of the Fish Passage Center. In an arrangement that reflects competing interests in the region, the Passage Center represents state and federal fisheries agencies and tribes, but it is funded by Bonneville Power Administration (BPA) and can only draw on a predetermined volume of water allocated to the Northwest Power and Conservation Planning Council's water budget for fish.

Michele DeHart directs the Passage Center. She spoke recently with WILD FISH and offered a number of insights about the divisive issue of ensuring water for fish. "At the least," she states, "fish need more water to survive. We simply can't provide adequate conditions with the amount of volume allocated. The Power Council's own analysis shows that."

The problem is that releasing water for salmon migration in spring is not considered a "good business" decision according to those who control the process—the hydropower operators. And it means that lower flows will occur later, while fish are still migrating. Notwithstanding the conflict between approaches, the Council's water budget is not "extra" water allocated solely for fish. It is a volume calculated by the Army Corps of Engineers (Corps) in its hydropower projections. When power planning includes water releases for fish, the guiding principle is to maximize revenues rather than to equalize fish and hydropower needs as

envisioned by Congress when it passed the Northwest Power and Conservation Act in 1980

As DeHart describes it, requesting flows is a straightforward process. Each year, the Corps gives the Passage Center the projected average flow for May and June. By comparing daily data from the smolt monitoring program with data from past years, the Center determines its flow request proposal for migrating fish. The proposal is discussed in two or three conference calls among the Passage Center, fisheries agencies, and tribes until agreement is reached. Then the Center submits the flow request to the Corps, which, in turn, discusses the request with BPA, Idaho Power Company, the Bureau of Reclamation, and other users. These entities may or may not agree to the proposal. DeHart emphasizes, "We don't have our hands on any dials or levers" at the dams, but Passage Center flow requests are usually honored by the Corps.

Since all the responsible agencies communicate about flows, such an orderly process to help fish migrate could succeed. "Except," as DeHart flatly declares, "we've taken away the migration corridor for fish. We have overdeveloped the system." She adds, "Now we're in the same place as we were back in the 60's. The difference is we tried the other alternatives—hatcheries and transportation—and didn't change the hydropower system. We have tried to improve transportation and hatcheries every year, and we try to improve bypass. But we can never improve them enough so that we don't have to fix the migration corridor. There's nothing left to do but make those changes we didn't want to make back in 1968."

Continued on page five

"We have to learn to share more than we have shared before. We owe the salmon a signal; we can't just abandon him."

LOUIE H. DICK, JR., Umatilla Tribe Oregon Humanities, 1990



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Coming up

Volunteer Neilson Abeel submitted the following thoughts on water management and conservation.

In the Northwest, water has generally been plentiful and cheap. This past spring, Portland residents heard rumblings about the low level of winter moisture and the possible shortage of water in the Bull Run watershed, the principal water supply for the city. Six to seven years of drought, increased use by a growing population, the lack of a plan for water conservation—by mid-June, the City Commission and Water Bureau instigated use restrictions and fines for violators. Announcements, warnings, and news items appeared in the daily papers. Portland began a period of martial law over water use, both commercial and residential. Interest was revived in searching out new sources, raising rates for use, and encouraging some

conservation. All is being undertaken to ensure that humans can count on a steady supply.

Other northwestern populations—wild fish—have suffered from a shortage of water for much longer. Once abundant in free-flowing rivers, wild fish are now reduced to a handful of survivors. Their water is controlled and used by humans—in many cases, used up totally. Increasingly, the result is extinction. We accept rules and regulations over our drinking water, even if somewhat begrudgingly. We need to devise new rules for the salmon's water in the hopes that the shortage can be reversed. Just like humans, the fish need water to survive.

Wild Fish

is published by The Wilderness Society every two months. The newsletter features information about wild fish at risk and their habitats in the Pacific Northwest (Idaho, Washington, and Oregon) and California. Opinions expressed in articles by others are not necessarily those of The Wilderness Society. Feel free to reprint information from WILD FISH in your organization's newsletter. Send your letters and articles to the address below. The staff reserves the right to edit all submitted material for space considerations.

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TO THE EDITORS

Dear WILD FISH:

At present, much publicity is given to attempts to remedy fisheries damage caused by Columbia River management techniques. Public policy should be to reduce dependence on artificial river management and hydroelectric generation facilities if long-term fisheries improvements are to be expected. Bonneville Power Administration's efforts to increase use of electric water and space heating, such as the agency's "Energy-Efficient Manufactured Housing Program," create new demand, which is likely to be satisfied at the expense of all citizens and all fish species.

Amory Lovins' observation that using electricity for space heating is like "cutting butter with a chainsaw" is extremely accurate. The real, total cost of electricity is much greater than consumers are led to

believe. Whether the generation source is fossil fuel, nuclear generators, or hydro, environmental costs have proven to be enormous.

Those of us who are truly concerned about anadromous fish need to create a system to monitor current and proposed electricity sales and distribution policies and programs of the BPA and the Northwest Power Planning Council. We need, for example, to encourage use of renewable energy and natural gas to help the Columbia River realize its potential as a bountiful source of native salmon. Without proper direction on "the front end," long-range improvements in Columbia River management are nearly impossible.

William R. Day President, Anchor Associates Portland, Oregon

For the Salmon: Reforms in Water Management Karen Garrison

Much attention has focused on drawing down reservoirs behind hydropower dams to speed Idaho salmon smolts to the ocean. That focus is warranted, but a strategy for saving the fish also requires increased flows in the Snake River and rivers throughout the Northwest. Even after drawdowns are achieved, increased flows will be needed to refill reservoirs and aid salmon that migrate in summer and fall.

The main potential source of those flows is water now controlled by farmers. Irrigation in the upper Snake consumes six million acre-feet or more each year—99.8 percent of all the water consumed in Idaho. While irrigated agriculture is economically important to Idaho, the value it creates can be sustained with less water. Incentives for efficient use and voluntary transfers to aid salmon could free more water for fish without harming the farm economy.

But existing law and policy discourage efficiency improvements and lock water into existing irrigation uses. Water is allocated primarily under state law. The central tenet of that law—the prior appropriation doctrine—gives the most secure rights to the earliest appropriator. The system works against salmon because Idaho did not begin granting instream rights for fisheries until after the Snake and other rivers were overallocated.

In Idaho's federal irrigation projects, irrigators pay taxpayer-subsidized rates of less than \$1 per acre-foot (about one percent of what many urban residents pay). At that price, low-value crops and inefficient practices are common. In 1985, for example, farmers planted surplus crops on almost 30 percent of the Idaho lands irrigated with subsidized water.

Stronger instream flow protections, implementation of the public trust doctrine, incentives to minimize diversions, and other reforms are needed to secure more water for salmon. Useful models exist. Washington has begun a trust water rights program that

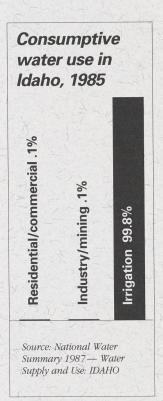
allows the transfer of saved water, provided that a portion of the savings from government-funded conservation remains in the stream. Oregon has a similar law and is developing a new program that would facilitate transfers at market prices, for instream as well as other purposes. California implemented a drought water bank for the first time in 1991, procuring 800,000 acre-feet for needy water users by offering a price that made it worth farmers' while to fallow fields.

In the Columbia/Snake Basin, similar programs could allow hydropower operators to secure fish flows needed in dry years by buying water at market prices from willing irrigators. Hydropower generated with these flows would underwrite much, if not all, of the cost, and irrigators could continue to farm all their land in non-drought years while gaining increased revenues in dry years. With revised rules, Idaho's existing water bank could be used for this purpose. But the bank now leases water at rates too low to attract water away from low-value crops, and agricultural preferences discourage water leasing for fisheries.

The Northwest Power and Conservation Planning Council addressed water management reform in recent amendments to its Fish and Wildlife Program. The Council called on the states to impose a moratorium on new water diversions, secure one million acre-feet of water for Idaho salmon through water efficiency and marketing, and form a Snake River Basin Advisory Committee to recommend institutional changes capable of accomplishing those goals.

The advisory committee can ensure that irrigators become part of the salmon solution. But salmon advocates will have to apply continued pressure at the state level to ensure that the committee does it job and that its recommendations are carried out.

Karen Garrison is a senior projects scientist for Natural Resources Defense Council in San Francisco. "While irrigated agriculture is economically important to Idaho, the value it creates can be sustained with less water."





THE WILDERNESS SOCIETY

NORTHWEST REGION

October 13, 1992

Robert Behnke Colorado State University Department of Fishery and Wildlife Biology Fort Collins, CO 80523

Dear Mr. Behnke,

Thank you for your interest in WILD FISH. I have added your name to the mailing list, and you should receive the November/December issue in early November.

Sincerely,

Valerie Kitchen Regional Associate

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Publications, etc.

- Influences of forest and rangeland management on salmonid fishes and their habitats. A comprehensive look at the impacts of land management activities on salmonid spawning and rearing habitat. Includes chapters on life histories, habitat requirements, natural habitat processes, logging, grazing, road building, mining, and more. Ed: W.R. Meehan. American Fisheries Society Special Publication 19, Betheseda, MD. 1991.
- The Alsea Watershed study: Effects of logging on the aquatic resources of three headwater streams of the Alsea River, Oregon. Part I Biological studies. J.R. Moring and R.L. Lantz. 1975. OSFW Fishery Research Report No. 9. Fisheries and Wildlife Department, Oregon State University, Corvallis, OR 97331. 66pp.
- Genetic effects of cultured fish on natural fish populations. Addresses the genetic consequences of aquaculture on natural fish populations. Recommends strategies for the genetic protection of native populations, as well as strong restrictions on gene flow from cultured to wild populations. K. Hindar, N. Ryman, and F. Utter. 1991. Canadian Journal of Fisheries and Aquatic Sciences 48:945-957.

Salmon 2000

The recently released Washington State Department of Fisheries' "Salmon 2000 Report" is a breath of fresh air, inspiring a renewed hope that we may not after all completely decimate our wild populations of salmon and steelhead. The report, called for by the state Senate in 1988, is intended to drive public policy decisions regarding salmon resources into the 21st century.

The report's most important passages:
acknowledge the exorbitant cost and general failure of artificial propagation programs;

- credit current land use practices, including urbanization, logging, and agriculture, with dooming salmon to a steady loss of habitat and numbers:
- note that instream flows exist for only a third of Washington's streams, thus making it impossible to determine whether any new diversion request should or should not be granted;
- recommend the adoption of tax incentives for habitat restoration programs;
- call for careful evaluation of new artificial fish propagation programs and encourage alternatives—greater support for habitat restoration, fish harvest management, logging reforms, and regional land use programs—to promote wild fish production.

We at American Rivers could not agree more. The report also calls for an inventory of all wild Washington and Columbia River stocks and a quantification of habitat quality. This information would form the baseline from which to evaluate recovery efforts, direct future land use activities, and estimate salmon production potential.

Katherine P. Ransel

Washington Department of Fisheries and the Northwest Power Planning Council both have acknowledged the need for such data. Yet the Council is currently considering proposals for several new supplementation projects throughout the region before baseline data are collected. New hatchery programs or major renovations of existing facilities are also being proposed by Washington State. Moreover, as "Salmon 2000" notes, there already exist at least two largescale experimental supplementation projects in the region—one for Tucannon spring chinook as mitigation for downstream passage losses and the other for several native chinook salmon populations as mitigation for hydroelectric development in the mid-Columbia.

We believe decisionmakers should wait until the results are in on these experiments before committing more public resources to new supplementation projects. We believe the steps called for in "Salmon 2000" should be followed to restore wild fish populations so that these fish do not have to depend in the future on expensive technological fixes that may well self destruct over time.

American Rivers is also especially attuned to the ways in which dams, on the mainstem Columbia/Snake system and throughout the Puget Sound and Oregon coastal basins, have blocked spawning and rearing habitat, decreased or eliminated flows necessary for migration, and directly slaughtered fish in their turbines. Let's fix the dams, provide adequate flows for fish, and stop ruining habitat. In other words, let's spend our money on things we know will work to save salmon in the region.

Katherine Ransel is co-director of American Rivers Northwest in Seattle, Washington.

COVER STORY

Continued from page one

DeHart argues strongly that managing water for minimum fish flows results in bare survival conditions. She says, "There is no alternative but to have guaranteed adequate flows for fish, and I don't mean minimum flows. When there are better runoff years, the fish need to have a share of that, too."

Disappointingly, the Endangered Species Act listings of Snake River sockeye and Snake River chinooks have not resulted in any change in conditions. "The 'no jeopardy' opinion from the National Marine Fisheries Service did not add any additional mitigation from the original Northwest Power Council program," says DeHart. In her view, conditions for spring migrants are still status quo.

Can the fish runs be saved? If we had built fewer large hydropower projects, DeHart believes we could have helped fish, adding that we "went too far." Emphasizing her respect for power managers, DeHart is convinced that if it were the job of BPA and the Corps to maximize revenues while conserving and protecting anadromous fish stocks, they could do that because "BPA and the Corps are so good at what they do." DeHart asserts that it never has been the job of BPA and the Corps to accomplish both, and "trying to make it their job 40 years after the fact is hard, because it means giving up some efficiency relative to revenue."

DeHart states that anadromous fish protection could also come from changing the Pacific Northwest Coordinated Agreement under which Oregon and Washington, but not Idaho, hydrosystems operate. The Agreement could incorporate requirements for fish, spreading costs across all utilities. Other measures such as habitat protection and conservation programs can help. In addition, DeHart theorizes that "solar energy is not out of reach," but the perception will remain that solar power is not a viable resource as long as it looks too costly. She notes, "Hydropower is artificially cheap, but the minute it gets expensive, other energy sources will be attractive. We won't freeze to death in the dark if we protect fish. We have alternatives. Fish don't."

Pointing out that hatchery fish and wild fish suffer the same fate when they attempt to migrate, DeHart maintains that there are no easy fixes. The question remains whether anything will be done in time to save salmon. DeHart says what is needed is a person in a position to change the hydropower system so that it operates for anadromous fish protection. She summarizes the political dilemma succinctly: "The grief for someone with the courage to make the hard decisions is immediate, while the benefits are long term. It's a rare individual who is willing to do that."

"The grief for someone with the courage to make the hard decisions is immediate, while the benefits are long term. It's a rare individual who is willing to do that."



Michele DeHart in her Portland office.

JOAN ELTMAN, THE WILDERNESS SOCIETY

AROUND THE REGION

Suit and Notice of Intent to Sue Filed Against Federal Agencies. In late July, Sierra Club Legal Defense Fund (SCLDF) filed suit in federal district court in Seattle against the National Marine Fisheries Service (NMFS), Bonneville Power Administration, the Army Corps of Engineers, and the Bureau of Reclamation. The suit argues that NMFS and the dam operators are ignoring their "legal mandate to provide safe in-river migratory conditions for the Snake River salmon," according to SCLDF attorney Vic Sher. He added, "Their business-as-usual approach to the Columbia River hydrosystem spells disaster for the few remaining Snake River sockeye and chinook."

On August 5, SCLDF filed a 60-day notice of intent to sue the Forest Service for not complying with the Endangered Species Act (ESA). The notice charges that the Service is failing to protect habitat of threatened Snake River chinook salmon on the Umatilla and Wallowa-Whitman national forests in eastern Oregon and Washington. SCLDF's Adam Berger said that the ESA requires the Forest Service to consult with the National Marine Fisheries Service to ensure that forest plans will not jeopardize threatened chinook but that "the Forest Service is attempting to evade this duty by engaging in 'informal' consultations and relegating consultation to the lowest level of forest planning."

NOTE

For your reference, the November/ December issue of WILD FISH will contain a summary of legal actions being undertaken on behalf of salmon in the region.

Publications, etc.

- A Time for Action (videotape, 15 minutes) and Journey of the Kings (videotape, 28 minutes). Videos and related information suitable for schools, church, or civic groups. Available on loan at no charge. Northwest Power and Conservation Planning Council, 851 SW Sixth Avenue, Suite 1100, Portland, OR 97204 or call 1-800-222-3355 or 503-222-5161 (in Oregon) and ask for Ann.
- Incidence and causes of physical failure of artificial habitat structures in streams of western Oregon and Washington. Evaluates rates and causes of physical impairment or failure for 161 fish habitat structures in 15 streams in southwestern Oregon and southwestern Washington. C.A. Frissell and R.K. Nawa. 1992. North American Journal of Fisheries Management 12:182-197.

NOTE

Artists and Photographers

We seek drawings and photographs of fish, fish habitat, and problems in fish management to help illustrate issues discussed in WILD FISH. Artwork and photos selected for use will be credited; originals will be returned.

Tribes and Conservationists Meet. On July 24, the Columbia River Inter-Tribal Fish Commission hosted a meeting at its Portland office for tribal members, Inter-Tribal staff, and environmentalists. Tribal elders and Inter-Tribal chairman Ted Strong began the meeting with their thoughts; then the participants shared a noon meal of traditional foods, including salmon. The afternoon was spent discussing areas of cooperation in the task of conserving salmon populations.

efforts to help anadromous fish are increasing along the West Coast; technical information and assistance is vital. Sea Grant Advisor Jim Waldvogel has compiled and published a "Volunteer Enhancement Source Handbook" that lists agency personnel who can supply needed information. A topical coding gives each individual's area of expertise. To get a copy, contact Jim Waldvogel, Area Marine Advisor, University of California, Sea Grant Extension Program, 981 H Street, Crescent City, CA 95531 707-464-4711.

STATE ACTION

California

Captive Breeding for Endangered California Chinook. California fishermen and government biologists have announced plans to captive breed the Sacramento River winter chinook salmon. In 1989, this population was listed as threatened by the National Marine Fisheries Service and as endangered by the California Department of Fish and Game. Total counts for the population numbered approximately 118,000 in 1969, but dropped to 2,094 in 1991. The fishermen maintain that while the breeding program will help speed recovery, it is by no means a stand-alone solution. To address some of the long-term problems facing the fishery, the fishermen are working to pass legislation (see July/August issue of WILD FISH), that seeks to reform the federal government's Central Valley Project in California. The project consists of 20 dams and 500 miles of

diversion canals, which the fishermen hold responsible for de-watering rivers and destroying fish spawning and rearing habitat.

Participating in the captive breeding program are the Pacific Coast Federation of Fishermen's Associations, U.S. Fish and Wildlife Service, National Marine Fisheries Service, California Department of Fish and Game, University of California, California Academy of Sciences, Tyee Club, and Golden Gate Fishermen's Association.

Idaho

Tracking Endangered Idaho Sockeye.

Salmon Survival Watch reports that as of August 14, nine Snake River sockeye salmon adults passed Lower Granite Dam en route to Redfish Lake in Idaho's Sawtooth Mountains and that one actually made it to the lake. Last year, eight sockeye crossed Lower Granite, but only four, one female and three males, made it to the collection weir at the lake. All fish returning to the weir are placed in a captive breeding program run by the Idaho Department of Fish and Game.



National Geographic photographer Joel Sartore (above foreground) records on camera the first of four sockeye vigils, sponsored by Salmon Survival Watch, on the bank of Redfish Lake Creek in central Idaho.

DIANE RONAYNE, IDAHO DEPARTMENT OF FISH AND GAME.

The Watch also notes that as of August 14, 3,006 summer chinook had reached Lower Granite. Last year's count for the same date was 3,805, and the 10-year average is 4,855 fish.

For more information, contact Pat Ford (208-345-9067), Cathy Baer (208-774-3426), or Trish Klahr (208-345-6933).

Washington

Hanford Reach: Your Comments Are Needed. The National Park Service is holding a series of meetings on the future of theHanford Reach of the Columbia River. The Park Service has released its draft review study and Environmental Impact Statement and is now seeking public comment. The 51-mile Reach is the last free-flowing portion of the Columbia in the United States. It contains spawning grounds for chinook salmon; habitat for bald eagles, peregrine falcons, and waterfowl; and archaeological sites.

The public meetings are scheduled in Basin City, Richland, Mattawa, and Seattle, Washington, on September 8, 9, 10, and 14 respectively. The Seattle meeting will begin at 7:00 p.m. in the Federal Building, South Auditorium, 915 2nd Avenue (use 2nd Avenue entrance). The Park Service will also accept written comments through October 9. Submit them to Kristen Sycamore, Recreation Division, National Park Service, 83 S. King, Seattle, WA 98104 206-553-5366.

The Washington Wild and Scenic Rivers Campaign states that the preferred alternative in the draft, which would designate a permanent national wildlife refuge and give wild and scenic protection to the Reach, is the option that best protects fish and wildlife. To review the draft study and find out more about what you can do, contact Linda Hanlon, Washington Wild and Scenic Rivers Campaign, 1731 Westlake Avenue North, Suite 202, Seattle, WA 98109 206-283-4824.

New Sierra Club Office for Fish. The Sierra Club has opened a Columbia Basin Field

Office in Pullman, Washington, to concen-

trate on building a citizens' campaign for salmon restoration throughout the region. Jim Baker, previously of Friends of the Earth and the Northwest Conservation Act Coalition, runs the office. His top priority is threatened and endangered salmon runs in the Snake River. For more information, contact Jim at Sierra Club, Columbia Basin Field Office, Route 2, Box 303-A, Pullman, WA 99163 509-332-5173.

Oregon

industry.

Forestry Board Postpones Riparian Protection Decisions—You Can Still Help. It appears that pressure from the timber industry has succeeded in delaying public review of the Oregon Board of Forestry 's stream classification and riparian protection rules for state and private lands. The Board, meeting on August 3 in Salem, decided to send its proposed draft rules back to its staff for further revision at the request of the Oregon Forest Industry Council, Small

According to the most recent schedule, the Board will hold a series of regional committee meetings in September and then take up the revised draft rules during its October 15 meeting in Mollala.

Woodlot Owners, and the hardwood

The Board is preparing the rules in response to a mandate of the Oregon Legislature in 1991 to revise the state's Forest Practices Act. The rules, when finalized, are supposed to provide ecologically sound standards for retention of woody debris, shade, water quality, and evaluation of cumulative effects.

David Moskowitz, director of Northwest Steelheaders, supplied the preceding information and can tell you more about how to participate in making sure that the rules live up to the legislative mandate. Contact David at Association of Northwest Steelheaders, P.O. Box 22065, Milwaukie, OR 97222 503-653-4176.

More on page eight

Coming Up

September 26-27: Washington Steelhead Symposium at Pacific Lutheran University, Puyallup, Washington. Sponsored by the Washington Wildlife Commission and supported by many steelhead fishing organizations. Registration limited to 300. Mail \$10 check, payable to The Washington Steelhead Symposium to: Pacific Lutheran University, Columbia Center, 3716-116th Ave. Ct. E., Puyallup, WA 98372. Call 206-863-1612. 206-246-5225, or 206-832-3826.

September 27-30: The Idaho Chapter of the American Fisheries Society is hosting the Third Biennial Chinook and Coho Workshop in Boise, Idaho. The title and theme of the workshop is: Salmon Management in the 21st Century; Recovering Stocks in Decline. For more information, contact James Chandler, 208-383-2974.

September 5-October 4: Coastweeks 1992. Monthlong exploration of Washington's waters, shorelands, and watersheds. Contact Karla or Chuck Fowler, Coastweeks Coordinators, 1325 West Bay Drive NW, Olympia, WA 98502 206-943-3642.

Coming Up

October 3-4: Third annual Coast and Ocean Conference hosted by Oregon **Natural Resources** Council (ONRC) in Newport, Oregon. Discussion topics include threats to coastal salmon and other endangered species, coastal barriers, and marine sanctuaries. \$25/\$15 registration options. Contact Michael Carrigan, ONRC, 522 SW 5th Avenue, #1050, Portland, OR 97204 503-223-9001.

November 13-15: Environment, Labor and Social Justice conference, The Evergreen State College, Olympia, Washington. For logistical and registration information, contact Helen Lee, 206-866-6000, X6525 or Anna Bachmann, 206-866-6000, X6707.

Update on Illinois River Winter Steel-

head. In May, 11 conservation and fishing groups petitioned the National Marine Fisheries Service (NMFS) to list the Illinois River winter steelhead under the Endangered Species Act (ESA; see May/June WILD FISH). In July, NMFS responded, saying that the petition "presents substantial scientific information indicating that listing may be warranted." The Service will initiate a status review of the fish under section 4 of the ESA and continues to seek further information concerning the fish and its habitat. Comments may be sent by October 29, to: Merritt Tuttle, Chief, Environmental and Technical Services Division, NMFS, 911 N.E. 11th Ave., Room 620, Portland, OR 97232. For more information, contact Garth Griffin, NMFS, 503-230-5430 or Andy Kerr, Oregon Natural Resources Council, 503-223-9001.

Update on Bureau of Reclamation

Lawsuit. The May/June issue of WILD FISH reported that the Oregon Natural Resources Council (ONRC) had filed a lawsuit against the U.S. Bureau of Reclamation regarding the agency's actions in the Klamath Basin. The U.S. Fish and Wildlife Service (USFWS) has since written a biological opinion to the Bureau stating, "Long-term operation of the Bureau of Reclamation's Klamath Project for water deliveries in southern Oregon and northern California is likely to jeopardize the continued existence of two endangered species of fish"—the Lost River and shortnose suckers. USFWS concluded that the effects of the Klamath Project could be reduced by measures that the Bureau could take, including "the maintenance of minimum water surface elevations in the Klamath Basin lakes." ONRC's lawsuit is still pending. For more information, contact Pete Sorenson, environmental attorney, 503-683-1378.

THE WILDERNESS SOCIETY

The Wilderness Society's Pacific Northwest and California regional offices are all involved in protecting wild fish.

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Wild Fish

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Robert Behnke Colarado State University

Department of Fishery & Wildlife Bidogy

Fart Collins, co 80523 Jocus Managing Water for Fish

Wild Fish

Fish Habitat At Risk: Siskiyou National Forest Barbara Ullian

Barbara Ullian, with the Siskiyou Regional Education Project in southern Oregon, writes about a concern of many in the Pacific Northwest—the unwillingness of federal land managers to provide adequate protection and restoration of critical fish habitat.

"The decline of the wild Pacific salmon... is tragic because it means the whole ecosystem is in decline.... The salmon is a kind of current between forest and sea...."

Tom Jay, *Orion*, Autumn 1992 In October of 1992 the Siskiyou Regional Education Project led seven other local and national environmental groups in submitting a detailed letter to the Siskiyou National Forest documenting the dramatic decline of the Siskiyou's once prolific wild salmon and steelhead runs. The letter requested revision of the 1989 Siskiyou forest plan because of new information and asked for an interim moratorium on logging and road building in watersheds that contain sensitive and declining native anadromous fish.

The Forest Service has not responded to the letter, which notes that 18 stocks of wild salmon, steelhead, and cutthroat trout on the forest are at high to moderate risk of extinction, according to the Endangered Species Committee of the American Fisheries Society. The Oregon Department of Fish and Wildlife also has documented declining fish populations on the Siskiyou, listing as sensitive the Lower Rogue fall chinook (less than 300 adults), the Illinois River fall chinook (population unknown), the Rogue Basin coho (currently the bulk of the Rogue's wild cohorun in the Illinois basin), and chum salmon.

The Forest Service plans to build roads and log in all of the Siskiyou's major roadless, unprotected drainages in the next three years — including the 88,000-acre

North Kalmiopsis and the 100,000-acre South Kalmiopsis roadless areas. The agency has scheduled 18 roadless area and wild and scenic river corridor Environmental Impact Statements for completion before 1996.

Eight of these roadless area timber sales are in the Illinois River Basin. The Illinois is a major tributary of the Rogue River, and it is strictly a wild fishery with no current or historic hatchery programs. After a consistent 20-year decline in catch rates, the Illinois' unique winter steelhead trout was petitioned to be listed as a federal threatened or endangered species in May 1992 (see WILD FISH, Sept/Oct 1992). The petition was accepted for status review by the National Marine Fisheries Service in August 1992

In a study for The Wilderness Society, Dr. Chris Frissell emphasized the importance of roadless areas in maintaining wild fish populations and aquatic diversity:

The ecologically significant effects of logging and forest road development are primarily long-term and cumulative in nature, and are especially severe when activities occur on steep, erosion-prone lands such as those that dominate most roadless areas on the national forests. Watersheds draining federal roadless areas appear to provide refugia for native aquatic species which are regionally depressed and declining. Logging and road construction in these areas carries a high risk of eliminating the last remaining examples of biologically diverse, native aquatic ecosystems.

"Salmon runs are depleted because the entire [Columbia] River system has been stretched to the breaking point.... As with many issues, we can pay a little now, or a lot later."

President-elect Bill Clinton



JAN/FEB 1993

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COVER STORY

Continued from front page

Despite the risk to declining wild fisheries, the Forest Service continues to propose timber sales in roadless areas containing highly unstable ground and sensitive fish stocks. A rationale for the sales is found in the forest plan. But the plan also states, "[The] Siskiyou National Forest ranks highest in the production of wild (non-hatchery) salmonids in Region 6" (Oregon and Washington) and predicts, "[During] the first decade potential fish harvests are expected to increase from current levels...."

Furthermore, the plan obfuscates both the economic value of maintaining healthy watersheds and fisheries and the economic impacts of their decline. The Forest Service contends that by investing dollars in stream structures, rather than protecting watersheds and habitat, it can increase fish production and mitigate the effects of logging and road building.

There is no assurance these actions will work. In the meantime, fish numbers plummet. In 1974, the Forest Service estimated the annual value of the sport and commercial fishery on the Illinois at more than \$2 million. In 1992, the Illinois fishery no longer supported harvest; it was strictly catch and release, and all tributaries were closed to angling.

In 1990, an Oregon Department of Fish and Wildlife biologist met with the Forest Service concerning the lower Rogue's once prolific fall chinook and stated, "[W]e are in danger of losing these stocks within the next few years...[from] a combination of habitat reduction/degradation and overharvest..."

The Forest Service continues to plan timber sales in the lower Rogue tributaries of Shasta Costa and Quosatana Creeks with little mention of the declining wild fish.

Often, off-forest impacts such as drought, water withdrawals, and ocean conditions are blamed for the decline of the Siskiyou's wild salmon and steelhead. But 80 percent of the Illinois River Basin is managed by the federal government — 71 percent by the Forest Service; nine percent by the Bureau of Land Management. At Oregon's southernmost boundary, 88 percent of the beautiful Little Winchuck River's watershed is part of the Siskiyou National Forest. The American Fisheries Society's report lists the Winchuck's fall chinook salmon at moderate risk of extinction and its coho salmon at high risk of extinction; the river's chum salmon are extinct. Habitat damage was cited in the report as a primary threat to the

The Siskiyou is a national forest with five designated Wild and Scenic Rivers; more are being considered. All of these rivers have high water quality and fisheries as outstandingly remarkable values for which they were designated. The Chetco is a world class fishery with immense fishing pressure. The Elk is one of the most productive streams on the West Coast. The North Fork Smith is critical to California's Smith River fishery.

In 1861, the salmon runs of the Rogue River were said to be as large or larger than those that existed in many streams in Alaska. The Illinois' mint bright 15-pound winter steelhead are said to be worth at least two fish from anywhere else. These are irreplaceable national treasures, which must be protected and restored and not treated as constraints on the dominant use, timber. The silver currents that run between the forests and the sea must not be broken.

Wild Fish

is published by The Wilderness Society every two months. The newsletter features information about wild fish at risk and their habitats in the Pacific Northwest (Idaho, Washington, and Oregon) and California. Opinions expressed in articles by others are not necessarily those of The

articles by others are not necessarily those of The Wilderness Society. Feel free to reprint information from WILD FISH in your organization's newsletter. Send your letters and articles to the address below. The staff reserves the right to edit all submitted material for space considerations.

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FROM THE EDITORS

Over the past year, we have received considerable comment on the usefulness of WILD FISH. We take this opportunity to thank you for your support and contributions. Both are invaluable. To assist people acting to protect wild fish, we will continue to cover a wide variety of issues related to

this complex task. In upcoming issues, we plan to compile special sections on topics such as hatcheries, harvest, and activities that degrade spawning and rearing habitat. We will look to our readers for suggestions and submissions and welcome your new ideas for 1993.

Update on System Operation Review.

Our recent cover report (WILD FISH, July/August 1992) described the System Operation Review (SOR) process of the Bonneville Power Administration, Army Corps of Engineers, and Bureau of Reclamation to devise a strategy for operating the Columbia River in the future. In August, the agencies released 10 candidate strategies and, subsequent to public comment, narrowed the field to six. A seventh may be added when the National Marine Fisheries Service releases its plan for endangered Snake River salmon populations.

Opinions about the six candidate strategies are mixed, according to the *Northwest Conservation Act Report* (Nov. 27, 1992), which quotes Dan Rohlf of the Northwest Environmental Defense Center: "SOR is not living up to its potential as a tool for effecting changes in river operations that will give salmon the water and flows they need to coexist with the hydroelectric system." On the other hand, the *Report* notes that electric utilities participating in SOR claim the process is moving toward an Environmental Impact Statement geared toward saving "every new endangered species that comes along."

For more information or to be kept up to date as SOR continues, contact us at WILD FISH.

Idaho Group Seeks Help From New Administration. Idaho Rivers United urges salmon advocates to write President-elect Bill Clinton and Vice President-elect Al Gore and request: 1) that balanced management of the Columbia hydrosystem for restoration of wild Snake River salmon runs be an environmental priority; 2) that salmon protection provisions of the Northwest Electric Power Planning and Conservation Act of 1980 are implemented and enforced; 3) that politics be kept out of salmon recovery planning. Letters should be addressed to Clinton and Gore c/o Mr. Bruce Reed, Clinton-Gore Transition Team, P.O. Box 615, Little Rock. AR 72203 (fax) 501-372-2292. For more information, contact Idaho Rivers United, P.O. Box 633, Boise, ID 83701 208-343-7481.

Corps Claims Fixing Dams Will Be

Costly. During the December 9 Portland meeting of the Northwest Power and Conservation Planning Council, the U.S. Army Corps of Engineers reported that altering dams on the Columbia and Snake rivers to assist ailing salmon runs could cost billions of dollars and take more than a decade to complete. Oregon Council member Ted Hallock observed, "It's like the Egyptians building pyramids with human labor instead of modern construction techniques." The Corps continues to study more than a dozen options for changing operations at dams and reservoirs to help salmon and will present a full report to the Council late next year.

Power and Conservation Council Sets 1993 Meeting Dates. If you follow the Northwest Power and Conservation Planning Council's doings, the recently adopted schedule for 1993 monthly meetings may come in handy: January 13-14, Boise, ID; February 10-11, Spokane, WA; March 10-11, Helena, MT; April 14-15, Sun River, OR; May 12-13, Idaho; June 9-10, western Washington; July 14-15, Jackson, MT; August 11-12, Oregon; September 15-16, Idaho; October 13-14, Washington; November 10-11, Montana; and December 15-16, Portland, OR. As the dates near, contact the central office of the Council (1-800-222-3355; in Oregon, 503-222-5161) for more information.

The Wilderness Society's Pacific Northwest and California regional offices are all involved in protecting wild fish.

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"It's like the Egyptians building pyramids with human labor instead of modern construction techniques."

Ted Hallock

Publications, etc.

■Forests in distress: A critique of the Bureau of Land Manage-ment's draft resource management plans for western Oregon. This analysis of draft plans for the BLM's 2.5 million acres in western Oregon determines that the agency fails to protect and maintain ancient forest ecosystems and the many species that they support - including anadromous and resident fish. In a special section on fish habitat, the critique notes that BLM lands contain more miles of streams inhabited by salmon and steelhead than on the 4.3 million acres of national forests in Oregon's western Cascades. Even the agency's overly optimistic studies indicate fish habitat on BLM lands is severely degraded. Yet, the BLM plans to continue two destructive practices - logging and road building - on fragile and unsuitable lands in watersheds. The Wilderness Society, December 1992. Contact WILD FISH for a free copy.

Publications, etc.

- Economic contribution of salmon to Oregon's coastal communities. Hans Radtke, Resource Economist, assisted by The Research Group (Corvallis, Oregon), for the Governor's Coastal Salmonid Initiative Conference. Describes the history and economies of ocean commercial fishing. Reports on the economic impacts of ocean and inland recreational salmon fishing and identifies existing uses of salmon resources and considerations in changing existing uses. Contact the Oregon Coastal Zone Management Association, P.O. Box 1033, Newport, OR 97365, 503-265-8918.
- Portland/Vancouver: Toxic Waters. Full color map. Locates and describes more than 150 sources of pollution in the Willamette and Columbia rivers and local tributaries. Folded maps: \$3.00; posters: \$5.00. Send a check to Northwest Environmental Advocates, 133 S.W. Second Avenue, Suite 302, Portland, OR 97204-3526 or call 503-295-0490. Coming soon is a broader map of the Columbia Basin that shows impacts on the river from toxins, dams, the Hanford nuclear reservation, grazing, mining, irrigation, and forest practices.

California

Habitat Lawsuit Against Bureau of Reclamation Withdrawn, But For How

Long? Nine commercial fishing and conservation groups have withdrawn their lawsuit against the U.S. Bureau of Reclamation concerning the Bureau's lack of protection of salmon spawning habitat in the Sacramento River. But the plaintiffs and Sierra Club Legal Defense Fund (SCLDF), which filed the suit on behalf of the groups, state that if need be, they'll go to court once more. SCLDF's Michael Sherwood said, "We will now wait for the Bureau to announce its 1993 water allocation decision. If their plan again violates the Endangered Species and Clean Water acts, we will be prepared to sue again immediately."

Shortly after the lawsuit was filed, the Bureau announced plans to release cold water from Whiskeytown Lake Dam near Redding, California into Clear Creek, a major Sacramento River tributary. The Bureau claims that the decision to release the water was under consideration for some time and did not result from the pending lawsuit. But it was not until after the suit was filed in September 1992 that the agency began its release.

The drought-stricken Sacramento flowed cooler and swifter. Still, prior to the suit, "[Millions of Sacramento salmon eggs were cooked," said Tryg Sletteland of the Sacramento River Council. He noted that according to the California State Department of Fish and Game, elevated water temperatures during 1992 destroyed the eggs of an estimated 18 percent of the endangered Sacramento winter run chinook, 21 percent of the commercially valuable fall run, and 52 percent of the imperiled spring run.

To exacerbate matters, the Sacramento River in 1992 hosted a record low spawning migration, with the fall chinook count projected at 20,000, down from 140,000 in 1988. The run has averaged 80,000 fish over the past 10 years and accounts for as much as 90 percent of the commercial ocean catch off the California coast. Blame for the small migration has been placed on transfers of

northern California water south of the Sacramento-San Joaquin Valley, the drought, and El Nino ocean conditions.

For more information, contact Zeke Grader, Pacific Coast Federation of Fishermen's Associations, P.O. Box 989, Sausalito, CA 94966 (415-332-5080) or Joan Reiss, The Wilderness Society, 116 New Montgomery, #526, San Francisco, CA 94105 (415-541-9144).

And on the Klamath...Minimal releases of water from the Iron Gate Dam on the Klamath River have resulted in insufficient river flows and high water temperatures detrimental to fish. California lawmakers asked the Klamath Basin Compact Commission and the Bureau of Reclamation to make cold water releases available for returning spawners in the Klamath and Sacramento rivers. The Commission called meetings in September and October, bringing together municipal, hydropower, farming, and fishing interests.

The Bureau of Reclamation has since announced it would increase releases below Iron Gate Dam from 400 to 600 cubic feet per second (cfs) to help migrating salmon. (The 600 cfs flow is still less than half of the 1300 cfs minimum release required by the Federal Energy Regulatory Commission for Iron Gate Dam at this time of year.) One of the reasons previously given by the Bureau for not increasing flows into the Klamath was concern for the endangered Lost River and shortnose suckers in Upper Klamath Lake (see WILD FISH, Sept/Oct 1992, "Update on Bureau of Reclamation Lawsuit").

Now, according to the Bureau, cooler weather has allowed the increased flow releases. In addition, many growers dependent on lake water for irrigation have decreased their use. These factors, says the Bureau, have combined to increase the elevation of the lake, which provides habitat for the imperiled suckers.

Idaho

Temperatures Rise on Boise National

Forest. The Idaho Conservation League's Boise Forest Watch group this fall found higher than normal water temperatures in the North Fork of the Boise River, which flows through the Breadwinner roadless area on the Boise National Forest. The Forest Service is proposing a timber sale in the North Fork drainage, and the Forest Watch members are concerned that logging could have further negative impacts on the river's temperatures, since clearcutting on tributaries opens up the forest canopy that shades streams. The group will continue to conduct water quality monitoring and seeks volunteers to help with public relations, photography, outings, and research. Contact Nancy Tyler (208-342-3423) or Trish Klahr, Idaho Conservation League, P.O. Box 844, Boise, ID 83701 (208-345-6933).

Rivers Need Your Help — Adopt One.

Idaho Rivers United's River Advocate Team is up and running. Ten river lovers have volunteered to gather information about their adopted rivers and monitor activities on and near the rivers. There remains a long list of rivers in need of adoption. Contact Liz Paul, Idaho Rivers United, P.O. Box 633, Boise, ID 83701 208-343-7481.

Oregon

Mining in Fish Habitat. The Medford District of the Bureau of Land Management (BLM) is considering approval of a plan to mine nickel at Eight Dollar Mountain in southern Oregon. The mining area would be located on a mountainside above the Illinois River, where steelhead runs have been proposed for federal threatened or endangered listing (WILD FISH, Sept/Oct 1992). The BLM's Environmental Assessment of the mining project admits that "surface disturbance and road excavation can lead to higher levels of erosion and silt runoff" and that "increased silt loads in the river can affect the survival of the fish species by filling the spaces in the rocks and decreasing the amount of oxygen available to the developing eggs, causing increased mortality." Even though the BLM's own documentation shows a high potential for harm to fish, the 1872 Mining Law allows for mineral exploration and development above all other uses of public lands. Conservationists are urging, among other things, that the BLM prepare an Environmental Impact Statement on the project to consider the cumulative impacts of mining activities on water quality, the Wild and Scenic Illinois River, and sensitive fisher-

In a related story from the Illinois Valley, patents are pending on 4,360 acres of federal lands along Rough and Ready Creek, a tributary of the Illinois River, for a major nickel mine and processing plant. The current drought and high water temperatures have limited the creek's capacity as fish habitat, but a 1984 Forest Service roadless area evaluation stated that the lower portion of Rough and Ready Creek is an important steelhead stream.

For more, contact Barbara Ullian or Barry Snitkin, Siskiyou Regional Education Project, P.O. Box 220, Cave Junction, OR 97523 (503-592-4459) or Mark Hubbard, Oregon Natural Resources Council, 1161 Lincoln Street, Eugene, OR 97401 (503-344-0675).

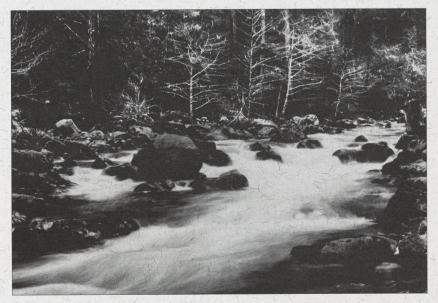
Coming Up

January 12:

Snake River Salmon Recovery Team (National Marine Fisheries Service). Public session, 8:30-3:30, Boise State University, Section C/Jordan Ball Room. Topic is potential measures to recover Snake River salmon.

January 26-28:

Stream Habitat Classification Conference. LaSells Stewart Center, Oregon State University, Corvallis, OR. Regional scientists will present information on and results of recent research on stream habitat classification. Contact Forestry Conference Assistant, Oregon State University, College of Forestry, Peavy Hall 202, Corvallis, OR 97331-5707 503-737-2329.



Potential candidate Wild and Scenic River — East Fork Illinois River, Siskiyou National Forest. Barbara Ullian

Coming Up

March 18-21:

Eleventh Annual California Salmon, Steelhead and Trout Restoration Conference, College of the Redwoods, Eureka, CA. Registration deadline is February 15. Contact the California Salmon, Steelhead and Trout Restoration Federation, P.O. Box 4260, Arcata, CA 95521 707-444-8903.

April-September:

RiverWatch. The Columbia/Willamette RiverWatch consists of educational boat tours of the Columbia Slough, the lower Willamette, and the lower Columbia. For tour information, contact Eugene Rosolie, Northwest Environmental Advocates, 133 S.W. Second Ave., Suite 302, Portland, OR 97204-3526 503-295-0490.

Washington

Coho in the Hood Canal. Streams in northwestern Washington's Hood Canal are welcoming home alarmingly low numbers of wild coho salmon. The run size for Big Beef Creek, an indicator stream for the health of Hood Canal wild stocks, has been considered dangerously low for several years. Officials project that if the trend continues, the numbers may soon warrant a threatened or endangered listing of the coho under the federal Endangered Species Act (ESA). Protection under the ESA could bring all Washington salmon fishing to a halt from June through October, when coho migrate, since it is impossible to fish for other species of salmon without catching some Hood Canal coho. A ban would include all water within three miles of Washington's coast and all water east of Neah Bay, including all of Puget Sound. Fisheries officials say recent drought conditions have killed many coho smolts. They add that an increasing number of those leaving for the Pacific Ocean via the Strait of Juan de Fuca never return, due to unpredictable ocean survival conditions. The total catch, meanwhile, has been relatively constant. As one official stated, "It's like deficit spending."

Yakima Fish Production Draws Near.

The Bonneville Power Administration hopes to launch soon an experiment on 6,100 square miles of the Yakima River Basin in eastern Washington, with a goal of expanding salmon and steelhead populations. While traditional hatchery programs rely on returning hatchery fish to provide eggs for the next generation, the Yakima project will use eggs gathered only from wild fish. Also, rather than raising fish exclusively in hatcheries, wild fish offspring spawned in hatcheries will be distributed in artificial ponds along creeks and streams. Biologists hope the fish will "imprint" to their adopted creeks and streams and return to them as adults to spawn naturally.

Many are concerned about the effects of rapidly expanded migrant fish numbers on resident species and on each other. Skeptics, among them Bill Bakke of Oregon Trout, feel that potential problems should be addressed prior to project approval. The Bonneville Power Administration has prepared a draft Environmental Impact Statement and anticipates completion of the final EIS by next August. Construction could begin in November 1993. Contact Bill Bakke, Oregon Trout, 5331 S.W. Macadam, Suite 228, Portland, OR 97201 503-222-9091.

Wild Fish

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Mr. Robert Behnke Colorado State University Dept. of Fishery & Wildlife Biology Fort Collins, CO 80523-



Ecology and Management of Northwest Salmonids: Bull Trout II Conference

c/o Trout Unlimited Canada Box 6270, Station D Calgary, Alberta, Canada T2P 2C8 Phone: (403) 221-8364 Fax: (403) 221-8368 monita@tucanada.org www.tucanada.org/bulltrout2

Alberta Environment -Fish and Wildlife Management Division

June 25, 1999 To:

Alberta Fish and Game Association

Interested Participants in the *Ecology and Management of* Northwest Salmonids: Bull Trout II Conference

Alberta Wilderness Association

The Conference Steering Committee From:

American Fisheries Society - North Pacific International Chapter

Thank you for your interest in the Ecology and Management of Northwest Salmonids: Bull Trout II Conference. We have received a great deal of initial response to the Conference, with over 40 papers scheduled for presentation. We are therefore expecting a great turnout and very informative sessions.

British Columbia Ministry of Fisheries

Inside this package is registration information for the Conference. As you are probably aware, this conference will be held form November 17 – 20, 1999 in Canmore, Alberta, Canada.

Canadian Parks and Wildemess Society

Included is the package is a Registration Form, as well as information on accommodations at the Radisson Hotel and Conference Centre. Please note that the deadline for early registration is October 15, 1999.

Montana Department of Fish, Wildlife and Parks

Should you have any further questions, please feel free to phone (403) 221-8364, or e-mail monita@tucanada.org, or visit the conference web site:

Oregon Department of Fish and Wildlife

www.tucanada.org/bulltrout2

Parks Canada

The web site contains information all of the Conference details. Be sure to visit the site often to find out the latest on the Keynote Speakers, the conference program and other important information.

TransAlta Utilities Corporation

> We encourage you to pass on copies of this information to your colleagues who might be interested in attending the Conference.

Trout Unlimited Canada

Thank you, and we look forward to seeing you at the Conference!

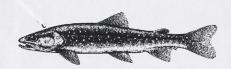
United States Fish and Wildlife Service

Department of Biological The Steering Committee,

University of Alberta, Sciences

> Ecology and Management of Northwest Salmonids: **Bull Trout II Conference**

University of Calgary, Department of Biological Sciences



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www.tucanada.org/bulltrout2

Registration Form

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Please circle whe	ther paying in Canadian or US	funds		
	include the following: lunches on done copy of the Conference Pro		and 20; one ticket to the	ne November 19
Early (up to Octobe	er 15, 1999): \$225 (\$C) or \$	165 (\$US) x	delegates =	\$
Late (after October	r 15, 1999): \$265 (\$C) or \$7	195 (\$US) x	delegates =	\$
Additional Banquet	t Tickets: \$30 (\$C) or \$25 (US) x	c tickets =		\$
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	cy: Cancellations received prior to refunds will be issued after O		s, 1999, will be subjec	t to a \$50.00 (\$C)

Accomodation/Transportation

Registration fees <u>do not</u> include accommodation at the Radisson Hotel and Conference Centre or ground transportation to Canmore from Calgary. Please refer to the following page for more information on hotel reservations. For information on travelling from Calgary to Canmore, visit the Conference web site at www.tucanada.org/bulltrout2.

Please send this form to:

Ecology and Management of Northwest Salmonids:Bull Trout II
c/o Trout Unlimited Canada
Box 6270, Station D
Calgary, Alberta T2R 2C3
Phone (403) 221-8364; Fax: (403) 221-8368
monita@tucanada.org or register online at www.tucanada.org/bulltrout2



Ecology and Management of Northwest Salmonids: Bull Trout II Conference

c/o Trout Unlimited Canada
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Calgary, Alberta, Canada T2P 2C8
Phone: (403) 221-8364 Fax: (403) 221-8368
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www.tucanada.org/bulltrout2

Alberta Environment – Fish and Wildlife Management Division

Alberta Fish and Game Association

Alberta Wilderness Association

American Fisheries Society - North Pacific International Chapter

British Columbia Ministry of Fisheries

Canadian Parks and Wildemess Society

Montana Department of Fish, Wildlife and Parks

Oregon Department of Fish and Wildlife

Parks Canada

TransAlta Utilities Corporation

Trout Unlimited Canada

United States Fish and Wildlife Service

University of Alberta, Department of Biological Sciences

University of Calgary, Department of Biological Sciences August 10, 1999

To: Dr. Bob Behnke Colorado State University

From: Michael Monita

Hello Dr. Behnke. As we discussed earlier, I've put together a package of information about the conference for you, and I've also enclosed a copy of the Proceedings from its predecessor, The Friends of the Bull Trout Conference.

Cutthroat session

As you are probably aware, one of the goals of our Conference is to set the stage for future meetings on salmonids found in northwestern North America. To facilitate this, we have scheduled a special session on cutthroat trout, which we would like to have you kick off with a Keynote Presentation. We have been in contact with many researchers currently doing work on cutthroat trout in both the U.S. and Canada, and we anticipate several strong papers for the cutthroat trout session. Subjects will cover the full range of cutthroat trout issues, including the management, biology, status and human dimension aspects of cutthroat trout across its international range.

Recommendations for Presentation

As a starting point for discussion, I would like to suggest that subspecies of cutthroat trout found in northwestern North America (Idaho, Montana, Washington, Oregon, British Columbia and Alberta) be the focus of your presentation. In addition, I would like to propose that your presentation follow the recommendations for keynote presentations that will be given at the Conference. These guidelines are given as a reference to begin discussion only. The recommendations are as follows:

- 1. An overview of the status, known ecology and management of the cutthroat trout found in northwestern North America.
- 2. Important information gaps with respect to the above.
- 3. Suggestions to address current and anticipated management risks.

Again, this outline is provided as a recommendation only. Please feel free to adjust the outline to suit your presentation.

Abstract/Paper for Proceedings

We would also like to ask that you provide an abstract of your presentation for inclusion in the Conference Program, as well as for posting on the Conference Web Site, at your earliest convenience. Additionally, though it is not a requirement, we would appreciate it if you could prepare a full copy of your presentation for inclusion in the Conference Proceedings. Instructions for Authors have been included in this package.

Thank you, and please feel free to contact me should you have any further questions.

Michael Monita

The Conference Steering Committee

Printed on recycled paper

Ecology and Management of Northwest Salmonids: Bull Trout II

Invitation and Call for Papers

You are cordially invited to a follow-up conference to the Friends of the Bull Trout Conference which was held in Calgary in May 1994. Ecology and Management of Northwest Salmonids: Bull Trout II will be held in Canmore, Alberta from November 17-20, 1999. Canmore is about 80 km west of Calgary, AB and is located in the Canadian Rocky Mountains just outside of Banff National Park.

Since the Friends of the Bull Trout Conference was held more than four years ago, interest in a follow-up conference has continued to grow. Although the Bull Trout Task Force (Alberta) which hosted the original conference has disbanded, a Steering Committee consisting of stakeholder groups and government agencies in British Columbia, Alberta and the United States has recently joined to organize and host the follow-up conference.

This conference will focus on the biology, management, and status of bull trout throughout their international range. However, status reports will be confined to jurisdiction-wide reports. Presentations on the human dimension aspects of bull trout management will also be encouraged (e.g., compliance by anglers to bull trout regulations, ability of anglers to properly identify bull trout, and awareness and education initiatives).

The Steering Committee also wants to set the stage for subsequent follow-up conferences. Consequently, as well as including several sessions specific to bull trout, the follow-up conference will include two additional sessions. One session will be on the management, biology, status and human dimension aspects of cutthroat trout (all subspecies) throughout their international range. It is hoped that this session will provide a good foundation for a subsequent conference on cutthroat trout in three to five years. The second special session will include presentations on other native salmonid species in northwestern North America. It is expected that the presentations in this session will largely be invited papers dealing with different species across all, or a major portion, of their international range (e.g., special management requirements, risk considerations, or summary of existing information). However, we are also encouraging authors who are interested in giving a presentation in this special session to submit abstracts to us for consideration.

The Steering Committee believes publishing proceedings is necessary to help further increase the exchange of technical information presented at the conference. However, to avoid some of the delays encountered with the proceedings from the Friends of the Bull Trout Conference, a different procedure will be followed. Rather than sending all papers out for peer-review, and having authors make the

appropriate revisions, authors will be given two choices. Under the first option, papers will be edited for style only and will be published in full in the proceedings without peer-review. Authors following this option will take full responsibility for content. The second option will be for authors who want to publish their papers in the primary literature and undergo a peer-review process. The Steering Committee will seek to have those papers published as a block of papers in a special section of an existing journal. Extended abstracts of these peer-reviewed papers will also be included in the conference proceedings. It is expected that this process will allow the Steering Committee to publish the proceedings within six to nine months of the conference; thereby, making the information presented at the conference available in a written format within a relatively short period of time.

The Steering Committee is excited about this conference's potential to repeat many of the successes that the original Friends of the Bull Trout Conference had. Representation on the Steering Committee indicates that there is already a substantial amount of interest throughout the bull trout's international range to see a successful follow-up conference. The groups involved in Steering Committee discussions to date include: Alberta Fish and Game Association, Alberta Environmental Protection, TransAlta Utilities, Alberta Wilderness Association, British Columbia Ministry of Fisheries, Oregon Department of Fish and Wildlife, Canadian Parks and Wilderness Society, North Pacific International Chapter (American Fisheries Society), Montana Fish, Wildlife and Parks, Parks Canada, Trout Unlimited Canada, U.S. Fish and Wildlife Service, University of Calgary, and the University of Alberta.

For more information about this conference, please contact Michael Monita at Trout Unlimited Canada (kbrewin@cadvision.com or 403-221-8364). Please indicate what kind of information you would like to receive from the following list:

- being placed on the conference mailing list
- presenting a paper or a poster at the conference
- becoming a sponsor of the conference
- obtaining a copy of the conference proceedings

We welcome you to pass on this circular to others who you think may also be interested in being included on our mailing list.

Ecology and Management of Northwest Salmonids: Bull Trout II November 17 - 20, 1999, Canmore, Alberta, Canada

Instructions for Authors

Reprinted With Permission from the Canadian Journal of Fisheries and Aquatic Sciences www.nrc.ca/cisti/journals/efisauth.html and www.uoguelph.ca/~cjfas/WExtended-Abstracts.html

The Ecology and Management of Northwest Salmonids: Bull Trout II Conference has decided to adopt the standards of the Canadian Journal of Fisheries and Aquatic Sciences as the format for all papers submitted for presentation. All authors, both those interested in having their work peer-reviewed and submitted to the primary literature as well as those choosing to not have their work peer-reviewed and published solely in the Conference Proceedings, <u>must</u> comply with the standards outlined below.

All Authors Are to Submit the Following at the Conference:

- 1. Authors submitting papers for consideration by the Primary Literature:
- three printed copies of both the manuscript and the extended abstract
- a copy of both the manuscript and the extended abstract on diskette, with all file names and software used to prepare the manuscript clearly indicated
- 2. Authors submitting papers for the Conference Proceedings only:
- three printed copies of the manuscript
- a copy of the manuscript on diskette, with all file names and software used to prepare the manuscript clearly indicated
- 3. Authors presenting papers at the Poster Session only:
- three printed copies of the manuscript or the extended abstract
- a copy of the manuscript <u>or</u> extended abstract on diskette, with all file names and software used to prepare the manuscript clearly indicated

Guidelines for Extended Abstracts

- 1. The Extended Abstract (EA) should not exceed 800 words in length (exclusive of title, authors' names and affiliations, brief figure captions, summary tables and literature cited).
- 2. The EA may only contain only summary statements, summary information (e.g. on taxonomy, distributions, analyses etc.), and essential summary statistics (e.g. means, ranges, summary regressions, ANOVA's).
- 3. Presentation of methods is strictly limited to the minimum needed to understand the design of the study, and is not sufficient to permit its replication.
- 4. The EA may only contain no more than two data modules (e.g. two tables OR two figures OR one figure and one table). Each table or figure itself should constitute no more than a summary of data (it is not acceptable that the identical table or figure should be submitted for publication to CJFAS).
- 5. Conclusions are limited to the main findings of the study.
- 6. Citation of literature is limited to five references.

Preparation of Manuscripts

General Guidelines

- Type the manuscript on white paper (8.5 x 11 in.) on only one side of the page. Leave all margins at least 1 in. wide.
- Type only the title, authors' names and affiliations, and related footnotes on the first page. Number all pages beginning with the title page, including those for tables and captions for illustrations.
- Double-space all parts of the manuscript, including tables, captions for tables and figures, footnotes, and the reference list. Use italic font if available; when not available, underline material that is to be set in italics.
- Do not use all capitals anywhere in the manuscript.
- Use the name-and-year system for literature citations.

Page 2: Instructions for Authors

Parts of The Manuscript

Title

Limit the title to what is documented in the manuscript. It is the key to the article and should clearly and concisely reveal what appears in the paper itself. The title serves two functions: (1) it allows the reader to judge whether or not the article is of potential interest and (2) it should provide enough information to permit the reader to judge the scope and potential importance of the article. Words in the title should convey a maximal amount of information and identify the nature of the research, organism used, and where appropriate, the technical approach (e.g., X ray, chromatography, mathematical analysis). Titles should not begin with a numeral or introductory prepositions such as "On" or "Towards" or expressions such as "A contribution to..." or "Investigations on..." Good titles greatly assist scientists and librarians in using scientific literature and aid indexers in preparing titles for keyword indexes. Series titles should be avoided.

Abstract

An abstract is required for all manuscripts and should state concisely, in up to 175 words, what was done, found, and concluded. Like the title, the abstract enables readers to determine the paper's content and decide whether or not they need to read the entire article. Begin the abstract with the main conclusion from the study, and support it with the relevant findings. Limit details of methods to those needed in understanding what was done, and work them into statements of findings. Avoid using phrases such as "...is discussed" or "...was found"; be specific. As the abstract is often divorced from the main body of the paper by abstracting and indexing services and is the only part of a paper some readers ever see, it is important that it accurately reflect the paper's contents and be completely self-contained (i.e., any essential references) in a retrievable form (e.g., R.B. Deriso. 1980. Can. J. Fish. Aquat. Sci. 37: 268-282).

Introduction

Limit the introduction largely to the scope, purpose, and rationale of the study. Restrict the literature review and other background information to that needed in defining the problem or setting the work in perspective. Try beginning with the purpose or scope of the work, defining the problem next, and adding guideposts to orient the reader. An introduction generally need not exceed 375-500 words.

Materials and methods

Materials and methods provides the framework for getting answers to the questions posed in the purpose of the work.

Limit the information on materials and methods to what is needed in judging whether the findings are valid. To facilitate assessment, give all the information in one section when possible. Refer to the literature concerning descriptions of equipment or techniques already published, detailing only adaptations. Often, it helps to begin statements on procedures with a phrase indicating the purpose, such as "To determine...we..." If the section is long, consider using subheadings corresponding to headings for the findings.

Results

Limit the results to answers to the questions posed in the purpose of the work, and condense them as comprehensively as possible. Give the findings as nearly as possible in the terms in which the observations or measurements were made and so avoid confusion between facts and inferences. State noteworthy findings to be noted in each table and figure, and avoid restating in the text what is clear from the captions. Material supplementary to the text can be archived in the report literature or a recognized data depository and referenced in the text.

Discussion

Limit the discussion to giving the main contributions of the study and interpreting particular findings, comparing them with those of other workers. Emphasis should be maintained on synthesis and interpretation and exposition of broadly applicable generalizations and principles. If these are exceptions or unsettled points, note them and show how the findings agree or contrast with previously published work. Limit speculation to what can be supported with reasonable evidence. End the discussion with a short summary of the significance of the work and conclusions drawn. If the discussion is brief and straightforward, it can be combined with the results section.

Acknowledgements

We strongly urge authors to limit acknowledgments to those who contributed substantially to scientific and technical aspects of the paper, gave financial support, or improved the quality of the presentation.

References

References should be selected judiciously and be largely restricted to significant, published literature. References to unpublished data, manuscripts in preparation or submitted to other journals, progress reports, and unpublished papers given at annual meetings may not be cited in the reference list but may be noted in the text as unpublished data or personal communications (include mailing addresses). If consultants' reports or other documents of limited circulation must be cited, they should carry with them an availability statement explaining where the document can be obtained. Citations of literature in the text should be carefully checked against those in the reference list and vice versa to ensure exact correspondence. Nearly every manuscript submitted to the Journal contains errors in the references.

Tables

Tables are used to present repetitive data and should be as economical of space as possible. Design tables to fit a 1-, 1 ½-, or 2-column width of the Journal.

Type each on a separate page and number with arabic numerals.

Use horizontal lines above and below the headings and below the columns, and seldom elsewhere. Never use vertical lines; leave extra space instead.

Table captions should be succinct and identify the purpose of the table sufficiently well to allow the table to stand on its own.

Indicate table footnotes by superscript lowercase letters and type them below the table.

Place the tables after the list of references.

Note that text tables are not numbered, are typed within the text, and seldom need horizontal lines.

Figures

Provide photographic reproductions, laser printouts, or the original artwork (no larger than 8.5×11 in.) of each illustration. Provide four sets of illustrations for review purposes. Each figure or group of figures should be planned to fit, after appropriate reduction, into the area of either one or two columns of text. The maximum finished size of a one-column illustration is 8.6×23.7 cm (3.4×9.3 in.) and that of a two-column illustration is 18.2×23.7 cm (7.2×9.3 in.). The figures (including halftones) must be numbered consecutively in Arabic numerals, and each one must be referred to in the text and must be self-explanatory. All terms, abbreviations, and symbols must correspond with those in the text. Only essential labelling should be used, with detailed information given in the caption.

Figures should not be mounted, stapled, or clipped. When possible, figures should be grouped and be done with the same or similar type and size of lettering.

Type legends in succession on a separate page.

Line drawings should be made with black India ink or computer-generated in black on high-quality white paper or other comparable material. For computer-generated graphics, supply a laser print at the highest resolution available. All lines must be sufficiently thick (0.5 points minimum) to reproduce well, and all symbols, superscripts, subscripts, and decimal points must be in good proportion to the rest of the drawing and large enough to allow for any necessary reduction without loss of detail. Avoid small open symbols; these tend to fill in upon reproduction. Lettering produced by dot matrix printers or typewriters, or by hand, is not acceptable. Any coordinate lines to appear should be ruled in. Maps must include geographic coordinates to ensure proper identification of study locations. Add bar scales to maps, photomicrographs, equipment diagrams, etc.

Photographs should be continuous tone on glossy paper. These figures should be prepared in the final published size. Type the author's name and figure name on a strip of paper and fasten to the back of the print. Do not write on the illustration itself.

Page 4: Instructions for Authors

Color plates are very expensive to produce and should only be used where the color being presented is essential to the understanding of the text. Extra costs for the reproduction of color plates are charged to the author. Submit only photographs of the highest quality for color reproduction. We prefer to use color photographs, but will accept drawings, color negatives, slides, or film positives.

NRC Research Press prefers the submission of electronic graphic files for accepted manuscripts and will use these electronic files whenever possible. If electronic files are not available for production, paper versions of the figures will be scanned. Note that the scanner will easily reproduce flaws (e.g., correction fluid, smudges). Submission of noncontinuous (screened) photographs and scanned illustrations printed out on laser printers is not recommended as moirés develop; a moiré is a noticeable, unwanted pattern generated by rescanning or rescreening an illustration that already contains a dot pattern.

Preparation of electronic graphic files

Authors must supply copies of the original electronic files (i.e., the files directly from the software application in which they were created) and high-quality laser proofs of the images. Electronic files (i.e., figure number and figure content) should match the laser proofs. On the disk label, identify (i) the software application and version; (ii) file name(s), size, and extension; and (iii) if the files have been imported from another software. If you have compressed your files, indicate what compression format was used. PC or Macintosh versions of True Type or Type 1 fonts should be used. Do not use bitmap or nonstandard fonts. Electronic graphics can be accepted on the following disks: 3 ½" disks, 100 MB Zip cartridge, and CD-ROM.

All figures should be submitted at their final published size. For figures with several parts (e.g., a, b, c, d, etc.) created using the same software application, assemble them into one file rather than sending several files.

To reduce the possibility of problems at output time, keep your artwork as simple as possible. Avoid complicated textures and shadings, especially in vector illustration programs.

Bitmap (raster) files --- Bitmaps are image files produced using a grid format in which each square (or pixel) is set to one level of black, colour or grey. One square is equal to one dot/pixel, hence "dots per inch" (dpi). Typically, bitmaps are used for photographic images. (*.tif format is preferred.)

The proper resolution should be used when submitting bitmap artwork. The minimum requirements for resolution are 600 dpi for line art, 1200 dpi for finelines (line art with fine lines or shading), 300 dpi for halftones and colour, and 600 dpi for combinations (halftones with lettering outside the photo area).

All colour files submitted must be as CMYK (cyan, magenta, yellow, and black). These colours are used in full-colour commerical printing. RGB graphics (red, green, and blue; colours specifically used to produce an image on a monitor) will not print correctly.

Vector files --- Vector files are image files produced using elements such as lines and shapes. Typically these files are used for line drawings.

The preferred software application of NRC Research Press for creating vector images is CorelDraw! (versions 5.0 and 8.0). For other applications that can be used, see electronic graphics list at http://www.nrc.ca/cisti/journals/elegraph.html.

Bitmaps inside vector files --- Bitmaps can be imported into vector/draw applications only for the purpose of adding and overlaying information, lines, text, etc. Bitmaps should not be resized, cropped, rotated, or otherwise manipulated after importing.

Mathematical expressions, equations, and formulae

Leave three spaces above and below lines that have much superscript material, and above and below equations and formulae. In the various expressions, place each component in its correct position.

Show all symbols clearly. In the margin, spell out Greek letters the first time they occur, and distinguish between lowercase I and the numeral one, and between capital O and the numeral zero. Make other explanatory notes similarly.

Dates

Dates may be written in the sequence day-month-year without internal punctuation (On 9 October 1983 the...), or the alternative sequence month-day-year may be used with the year offset by commas (On October 9, 1983, the...).

Reference citations in text

Name-and-year system

The Journal uses the name-and-year system of citation; that is, the surname of the author(s) and the year of publication are inserted in the text at an appropriate point: "Brown (1983) compared..." or "...were compared (Brown 1983)." If the reference has more than two authors, include only the surname of the first author followed by "et al." (not italicized): "Brown et al. (1983) compared..." or "...were compared (Brown et al. 1983)."

Personal communications

Personal communications are not listed in the reference list. Using parentheses in the text, state the name and mailing address of the communicator followed by "personal communication."

Unpublished data

If an unpublished book or article has been accepted for publication, list it in the reference list section followed by the notation "In press." Only those manuscripts that are in galley or page proof stage or for which there is an acceptance letter can be considered in press. If an article is submitted but not yet accepted, state the name and address of the author of the unpublished material followed by the notation "unpublished data" in the text and do not include it in the reference list.

Reference lists

References should be listed at the end of the paper in alphabetical order according to surnames of the first author. References with the same first author are listed in the following order. (1) Papers with one author only are listed first in chronological order, beginning with the earliest paper. (2) Papers with dual authorship follow and are listed in alphabetical order by the last name of the second author. (3) Papers with three or more authors appear after the dual-authored papers and are arranged chronologically.

The following bibliographic citations illustrate the punctuation, style, and abbreviations (according to CASSI or BIOSIS Serial Sources) for references.

Journal article

Peterman, R.M. 1982. Model of salmon age structure and its use in preseason forecasting and studies of marine survival. Can. J. Fish. Aquat. Sci. 39: 1444-1452.

Entire issue of journal

Gordon, D.C., Jr., and Hourston, A.S. (Editors). 1983. Proceedings of the Symposium on the Dynamics of Turbid Coastal Environments. Can. J. Fish. Aquat. Sci. 40(Suppl. 1).

Book in a series

Scott, W.B., and Crossman, E.J. 1973. Freshwater fishes of Canada. Bull. Fish. Res. Board Can. No. 184.

Book not in a series

LeBlond, P.H., and Mysak, L.A. 1978. Waves in the ocean. Elsevier, New York.

Part of book

Healey, M.C. 1980. The ecology of juvenile salmon in Georgia Strait, British Columbia. In Salmonid ecosystems of the North Pacific. Edited by W.J. Neil and D.C. Himsworth. Oregon State University Press, Corvallis, Oreg. pp. 203-229.

Corporate author

American Public Health Association, American Water Works Association, and Water Pollution Control Federation. 1975. Standard methods for the examination of water and wastewater. 14th ed. Washington, D.C.

Page 6: Instructions for Authors

Theses

Kutty, M.N. Some studies on the respiratory quotient in goldfish and rainbow trout. Ph.D. thesis, University of Toronto, Toronto, Ont. Natl. Libr. Can., Can. Theses Microfilm No. 646.

Reports

Smith, J.E. 1981. Catch and efforts statistics of the Canadian groundfish fishery on the Pacific coast in 1980. Can. Tech. Rep. Fish. Aquat. Sci. No. 1032.

Translation

Koike, A., and Ogura. 1977. Selectivity of meshes and entrances of shrimp traps and crab traps. J. Tokyo Univ. Fish. 64: 1-11. (Translated from Japanese by Can. Transl. Fish. Aguat. Sci. 4950, 1983.)

Time

A colon should be used as the separator between hour and minute and between minute and second. The symbols "h," "min," and "s" are not used, since they are symbols for hour, minute, and second in the sense of duration or the length of time. Thus, "12 h 30 min" expresses a measured time of twelve hours and thirty minutes duration whereas 12:30 refers to the time of day.

Appendix

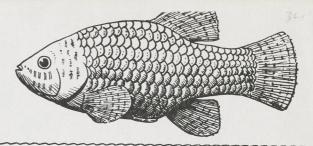
Abbreviations

Abbreviate terms denoting units of weight and measurement in the text only when they are preceded by numerals.

Word List

The spelling of the following words is frequently inconsistent in submitted manuscripts. We prefer that authors adhere to the Journal's house style for these commonly used terms:

Desert Fishes Gouncil



"Dedicated to the Phesenvation of Amenica's Desent Fishes"
407 West Line Street
Bishop, California 93514
March 28, 1980

To: Members and other interested parties

From: Executive Committee

Subject: Proceedings of 1978 Symposium

We are pleased, at long last, to break the literary silence which has prevailed for nearly a decade and send you a copy of our 1978 proceedings. We trust that you will find it an interesting and valuable document. We are especially indebted to Jim Deacon, his staff, and the U.N.L.V. printing department for making this publication a reality.

We are also pleased that the proceedings of the 1979 symposium are "in the mill" and should be out by mid-summer. Hopefully, from here on in, we will be able to stay on top of the problem of proceedings publication.

However, printing costs are constantly increasing, and financing of the proceedings has taken a huge chunk out of the very limited Council bank account. We are therefore asking all recipients to reimburse the Council to the extent of \$2.00 each to cover cost of production and mailing. Please make checks payable to the Desert Fishes Council and mail to us at 407 W. Line St., Bishop, CA 93514.

Many thanks for your cooperation - and your patience.

Sincerely,

E. P. Pister

Executive Secretary

Desert Fishes Council Membership

Membership is open to any person or organization interested in or engaged in the management, protection, or scientific study of desert fishes, or some related phase of desert fish conservation.

Membership is on a calendar year basis (Jan. 1 - Dec. 31) and payment is due in advance. Annual dues (not to be confused with meeting registration fees) are \$25 US (regular), \$35 (sustaining) or \$15 (student) and include subscription to the Proceedings of the Desert Fishes Council. Members from Latin American countries are not charged dues, but must renew membership annually. Additional contributions are solicited to support travel grants to help defray travel costs of students, and deserving professionals, to allow them to make presentations at annual meetings.

APPLICATION FOR MEMBERSHIP

Send Completed Form To:

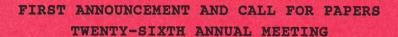
Dr. Paul C. Marsh, Membership Chair, Desert Fishes Council Arizona State University, Department of Biology Box 871501, Tempe AZ 85287-1501 USA

Voice: (602)-965-2977; FAX: (602)-965-2519; Internet: FISH.DR@ASU.EDU

Please enroll me in the Desert Fishes Council (DFC) in accordance with the classification I have checked below. I understand that all classes of membership include a subscription to the Council's annual Proceedings. All memberships correspond with a calendar year and are payable in advance. All memberships must be paid in U.S. Dollars, which must be included with the application (personal checks accepted for domestic applications; International Money Orders or International Bank Drafts for foreign applications). Membership dues are waived for members from Latin American countries, but membership must be renewed annually.

N	ew or renewal. If renewal, do not complete information below unless changed
Name: _	
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	RATES (U.S. Dollars)
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	\$15.00 Student (Domestic or Foreign) Family - \$35.00 (2nd Member in Immediate Family; 1 Proceedings)
	Sustaining - \$35.00 Sustaining Life Member - \$625
	Patron (Companies and Corporations) - \$1,000 (Single Payment)
	Latin American complementary membership (no charge) additional donation for DFC travel grants (or specify other use:
	TOTAL PAYMENT ENCLOSED (personal checks accepted for domestic application
	International Money Orders or International Bank Drafts for foreign applications).

* * DESERT FISHES COUNCIL * *





The 26th Annual Meeting of the Desert Fishes Council (DFC) will be held at National Park Service Headquarters, Furnace Creek, Death Valley National Monument, CA, from 17-20 Nov. (Thursday-Sunday) 1994. Registration will begin on Wednesday evening (16th), followed on Thursday morning by 2 1/2 days of technical and agency reports, special symposia, and other societal/social activities. Field trips will be held on Sunday (20th).

Participants are responsible for travel and room reservations. Details on accommodations, highway/airplane travel, etc., will be provided in a second (early summer) mailing. Questions prior to the second mailing can be directed to Phil Pister, P.O. Box 337, Bishop CA 93515, (619)-872-8751 (FAX and voice). 1993 dues are needed as soon as possible (mailing label of proceedings will include a red check mark if dues are current).

ABSTRACTS ARE REQUIRED FOR ACCEPTANCE of papers, agency reports, and posters. Space is limited, so acceptance and scheduling will be in the order received. No presentation will be scheduled without receipt of abstract on or before th deadline below. Abstracts will be disregarded if submitted to DFC officials other than those designated below.

ABSTRACTS MUST BE SUBMITTED IN ELEC-TRONIC FORMAT. Arrangements for submission of hard copy (only for those without access to computers) must be made with Michael Douglas prior to submittal (see below). Abstracts submitted on hardcopy without prior approval will be disregarded.

BILINGUAL INSTRUCTIONS TO AUTHORS ARE PROVIDED in the DFC Proceedings Vol. 26, which accompanies this mailing. Individuals who receive a meeting announcement without an accompanying DFC Proceedings, or those with questions concerning abstract submittal, should contact Dean Hendrickson (see below).

AGENCY REPORTS WILL BE HANDLED AS FOLLOWS: U.S. Federal and State agencies, agencies in México, and private groups will be solicited for abstracts summarizing regionwide or agencywide activities. Nonsolicited (individual) reports from larger U.S. Federal Agencies (for example), are also desired. Individuals should first coordinate with Nadine Kanim (USFWS-Sacramento) (916-978-4866; FAX 916-978-4619).

ORAL PRESENTATIONS will be 15 minutes (including questions); each presenter is limited to one oral paper. Compliance will be strictly enforced. Poster presentations are also encouraged.

DEADLINES FOR RECEIPT OF ELECTRONIC ABSTRACTS is 23 Sept. 1994 (Friday).

Mail to Dr. Dean A. Hendrickson Texas Memorial Museum University of Texas Austin, TX 78705 USA

Tel.: (512)-471-9774

FAX: (512)-471-9775

Bitnet: DEANHEND@UTXVM

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DEADLINES FOR RECEIPT OF HARDCOPY ABSTRACTS is 16 Sept. 1994 (Friday).

Mail to Dr. Michael E. Douglas
Department of Zoology
Arizona State Univ.
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Desert Fishes Council Membership

Membership is open to any person or organization interested in or engaged in the management, protection, or scientific study of desert fishes, or some related phase of desert fish conservation.

Membership is on a calendar year basis (Jan. 1 - Dec. 31) and payment is due in advance. Annual dues (not to be confused with meeting registration fees) are \$25 US (regular), \$35 (sustaining) or \$15 (student) and include subscription to the Proceedings of the Desert Fishes Council. Members from Latin American countries are not charged dues, but must renew membership annually. Additional contributions are solicited to support travel grants to help defray travel costs of students, and deserving professionals, to allow them to make presentations at annual meetings.

APPLICATION FOR MEMBERSHIP

Send Completed Form To:

Dr. Paul C. Marsh, Membership Chair, Desert Fishes Council Arizona State University, Department of Biology Box 871501, Tempe AZ 85287-1501 USA

Voice: (602)-965-2977; FAX: (602)-965-2519; Internet: FISH.DR@ASU.EDU

Please enroll me in the Desert Fishes Council (DFC) in accordance with the classification I have checked below. I understand that all classes of membership include a subscription to the Council's annual Proceedings. All memberships correspond with a calendar year and are payable in advance. All memberships must be paid in U.S. Dollars, which must be included with the application (personal checks accepted for domestic applications; International Money Orders or International Bank Drafts for foreign applications). Membership dues are waived for members from Latin American countries, but membership must be renewed annually.

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