May 5, 1980 Francis C. H. Lum USDA Soil Cons. Service 2828 Chiles Rd. Davis, CA 95616 Dear Mr. Lum: California Trout is a statewide organization of anglers dedicated to the protection, restoration, and enhancement of wild trout and their habitat. One of our major concerns is the preservation of genetic diversity of the state's wild trout stocks and we have engaged in projects and programs dealing with rare, endangered, threatened and sensitive trout species. A current concern is the survival of the so-called Goose Lake Rainbow. This fish likely, in reality, is a Redband Trout ("Salmo newberryi" proposed by Behnke) or at least a Redband-derivitive species or subspecies. The Goose Lake trout has behavioral and physical qualities of great interest to us, and recent electrophoresis analysis proves it carries distinguishable genetic characteristics. The fish is threatened from desiccation of its lake home and loss of available spawning/nursery areas. Few viable tributaries remain. One such loss is directly attributable to a SCS project on Willow Creek some years ago which, because of erosion and deterioration, currently prevents upstream migration. We are advised SCS has conceived some ideas to correct this problem at Willow Creek and we commend you for your concern and foresight. However we further understand you feel you cannot proceed on the project without "non-federal" participation. This is disconcerting, because it will take time for organizations like CalTrout and agencies like the state Department of Fish and Game to locate and secure the non-federal share. We're both working on it. If SCS were to proceed with preliminary engineering and design of the project, two important things would be achieved: 1. Crucial time would be saved, probably enabling the project to be installed a full spawning year earlier than if you wait. 2. A more fully evolved and developed plan proposal would make it easier for DFG and CalTrout to successfully approach non-federal sources for funds. The Goose Lake Redband is in trouble. We urge you to begin immediately with engineering and design of your idea for restoring the Willow Creek spawning run. Should you grant our request we are confident the non-federal funds can be found and the project operating in time to forestall a potential disaster. May we please have your decision soon? Richard H. May, Pres.



Soil Conservation Service 2828 Chiles Road Davis, CA 95616 MAY ? 0 1980

May 15, 1980

Richard H. May, President California Trout P. O. Box 2046 San Francisco, California 94126

Dear Mr. May:

We are well aware of the fishery problems on Willow Creek and would like to assist in the solution to the problems. We have a Resource Conservation and Development Project area, covering Lassen and Modoc counties, that could cost-share in improving fish and wildlife habitat in Willow Creek. Attached is a brochure that will give you a general idea about the RC&D Program. RC&D cost-sharing is about 50 percent for both the engineering and construction costs.

Under the program, we must have a sponsor for the project before we can proceed with preparation of a work plan and an environmental impact statement, if it is needed. The following are the responsibilities of a sponsoring organization:

- 1. Acquire land rights and necessary permits
- 2. Furnish the local cost-share
- 3. Operate and maintain the project

A sponsor can be public agency or special district that has the authority to do this work. Sometimes it is necessary for more than one agency or district to be a sponsor, especially if one does not have all of the necessary authority.

You indicate in your letter that you have been working with the Department of fish and Game on funding of the local cost-share. That agency would make a good sponsor for this type of project. We suggest you continue to work with them on becoming a sponsor to the project. If your organization is willing to cost-share on the project, it probably could also be a sponsor. As soon as the sponsorship is determined, we can proceed with the preparation of a work plan and EIS.

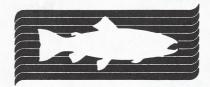
We appreciate your interest and cooperation on the Willow Creek problem and look forward to working with you and the Department of Fish and Game. If you have any questions, please let us know.

Sincerely,

FRANCIS C. H. LUM
State Conservationist

cc: E. C. Fullerton, Director,
Department of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, California 95814

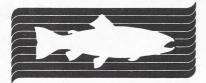
Enclosure



MEMO

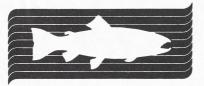
KEEPER OF THE STREAMS

Bob -I think things are changing in Calif, 1.e. a much broader concern for species deverity is evolving, and not all eggs are thrown into the genetics analysis basket. "If it looks er behaves different, keep it separate until me learn more." The Gasse Lake thing is critical. no spawning our from the lake this



MEMO

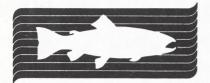
year, in either Calif. or Oregon. I am forwarding a copy of your letter to Patterson (plus meno to me) to John Dienetalt who is heading the DFG effort in our Redband Project. John is pretty well decided we ought to work with GL stock in pursuit of this project (rather than Oregon or Wyoming stocks). If this becomes the decision,



3 MEMO

KEEPER OF THE STREAMS

it seems to me some care and skill should be exercised in the selection of male + female specimens for sperm + egg taking. Would you think someone of your skill and experience should supervise this aper-ation? Should the Willow a., Lassen a., etc fish be kept apart? Will a harsh Mother nature have pre-selected, so we need not be selective?



MEMO

I do not believe the Willow Cr. fish have been examined by Gall. I believe his low chomosome-count fish came from Lassen Cr. I hope Patterson can get you some specimens.

> Regards, Deck May



P.O. BOX 2046 - SAN FRANCISCO, CA 94126

Coope Willow Cor

1980 chared





Dr. Robt Behnle Dept. Fish + Wildlife Colorado State Univ. 7t. Collins, CO 80523

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Department of Fishery and Wildlife Biology

27 August 1980



Colorado State University Fort Collins, Colorado 80523

Mr. Craig Busack
Department of Animal Science
University of California
Davis, CA 95616

Dear Craig:

Thanks for a copy of your ms on Paiute trout. Normally, this paper would come to me for review by the Canadian Journal, but only last week I was requested to review a submitted paper on \underline{S} . $\underline{salar} \times \underline{S}$. \underline{trutta} hybridization (based on electrophoresis), so I may not receive your paper as Johanna Reinhart, the editor, tries to spread out the reviewing process.

I might suggest that you could elevate the paper to a more confident level of sophistication by avoiding statements that electrophoresis is superior to morphological data. This type of comment is so characteristic of electrophoretic papers that it has become a cliche and makes the author appear defensive. Simply, one technique samples the metabolic genome, the other the regulatory. Both are useful and complementary. Merely point out that you detected hybridization in Cottonwood Creek specimens electrophoretically that you couldn't detect with meristic characters. Or, as you did to some extent, elaborate on the usefulness of both methods (especially in groups of relatively recent separation). For example, Yellowstone cutthroat trout, fine-spotted Snake River cutthroat trout, Bonneville cutthroat, and Colorado River cutthroat can't be consistently separated by electrophoresis, yet, there are genetic based sharp ecological differences of great significance for fish management and striking differences in coloration and spotting useful for classification.

Although I believe you are correct that the Cottonwood Creek trout have some rainbow trout genes, I have some reservations. Only the MDH-2 pattern strongly indicates rainbow influence. I note in Loudenslager and Gall's recent paper, S. c. henshawi from Poison Flat Creek has a higher proportion of the MDH-2 100 allele than Cottonwood Creek fish. I have never examined specimens from Poison Flat Creek and can't comment on their relative purity.

As I recall, Eldon Vestal brought Paiute trout to Cottonwood Creek in 1946 but most of the specimens came from Coyote and/or Corral Creek -- a stock(s) that you have no data on. The founder's principle could have played a role by greatly increasing the frequency of a rare allele. The fact that the Cottonwood Creek sample averages 24 gillrakers and all have basibranchial

Mr. Craig Busack 27 August 1980 Page 2 teeth (the character that is typically most sensitive to rainbow trout influence) leads me to believe that if there are rainbow trout alleles in the population, the effect is extremely slight. I only hope that someone in Cal. F. & G. doesn't use your data to claim that the Cottonwood Creek population must be eradicated because they are hybrids. This would create dissention and be a set back for native trout restoration projects. The great elaboration on demonstrating that the Silver King Creek fish consist of Paiute trout and hybrids and that hybridication is progressing toward a climax hybrid swarm (until the Creek was poisoned again), could be condensed. If the reverse was true -- that the hybrids and pure Paiutes are maintaining reproductive isolation -- then the great depth of detail would be necessary. However, since there is not one stream in the Lahontan basin where native cutthroat and rainbow trout (or hybrids) coexist, and the 1949 plant of rainbows into Silver King Creek resulted in a hybrid swarm by 1963, it is entirely predictable that hybridization, once underway, would eventually create a hybrid swarm, and there is no need to prove the obvious to such a degree. I would point out that it was the Heenan Lake, Lahontan cutthroat that was stocked into White Cliff Lake and got into Silver King Creek to further add to the hybrid swarm of 1963. Thus, for a fair discussion of Lahontan cutthroat influence, you should have data on the allelic frequency of the Heenan Lake stock. If I do receive your paper for review, I've probably given you all of the comments I would make. The content of your work is impressive and I would certainly recommend it for publication. Enclosed is a copy of a rough draft of a paper in Great Basin trouts with some discussion of the Paiute trout. This paper was prepared for a symposium on desert fishes. The appers of the symposium will be published as a book by John Wiley. My paper will be considerably expanded and modified before publication. Let's hope you do get back into trout systematic and evolutionary research. Your paper indicates a potential for great things to come. Sincerely. Robert Behnke Associate Professor RJB:kle Encl.



October 3, 1980

Mr. Bob Behnke
Dept. of Fishery and
 Wildlife Biology
Colorado State University
Ft. Collins, CO 80523

Dear Bob:

I have now had the opportunity to read the sections of your manuscript you sent on September 19, 1980.

I think it very good and the general outline into which these sections fit seems very sound.

I have a few stylistic changes to suggest, but will wait until I have more manuscript.

As to the maps and figures; Yes, I would like them as glossy prints.

I'm really pleased to know that the work is going forward in tandem with the U.S.F.W.S. monograph.

Best Regards,

Richard Abel

RA/pp





Mr. Bob Behnke
Dept. of Fishery and
 Wildlife Biology
Colorado State University
Ft. Collins, CO 80523

hyporial gapen - IGFA mentions Champag Press - Smith to review - Style = substance difficult to shift gears - any obvious greations overlooked??

9418 204th St. E. Graham, Wa. 98338 October 7, 1980

Dr. Robert Behnke Department of Fishery and Wildlife Biology Colorado State University Fort Collins, Colorado 80523

Dear Bob,

It has been awhile since we exchanged letters. Last time you told me you were revising your Monograph on Native Western Trouts into a book for Champoeg Press. Has it come out yet?

My own book on cutthroat trout is well under way. This last summer I made trips to the Two Ocean Pass area and the upper Yellowstone, the Bear Lake/ Bear River country of Utah and Idaho, then late in August the Silver King Creek area with biologists from the California Department of Fish and Game to study Paiute trout.

I plan to visit Colorado sometime next summer and that is why I am writing. The main purpose of the trip is to visit locations where I would have a good chance of seeing the three Colorado cutthroat subspecies in something akin to their native habitat, and flyfishing for those that are permitted. I also want to spend time with Colorado Division of Wildlife biologists, and then stop in Fort Collins to meet and talk with you. Perhaps we could take in some of the fishing and some of the field trips together.

Also while in Fort Collins I would like to talk to someone in the geology department. I have several questions about the geological events that enabled the cutthroat to invade the river systems of Colorado. Can you suggest someone I might contact?

I am looking forward to meeting you in Fort Collins sometime nest summer. Can you perhaps give me some pointers on when would be the best time to come to Colorado and where would be good places to visit to get a feel for the habitat of the greenback cutthroat, the Colorado River cutthroat, and the Rio Grande cutthroat?

Best personal regards,

Patrick C. Trotter

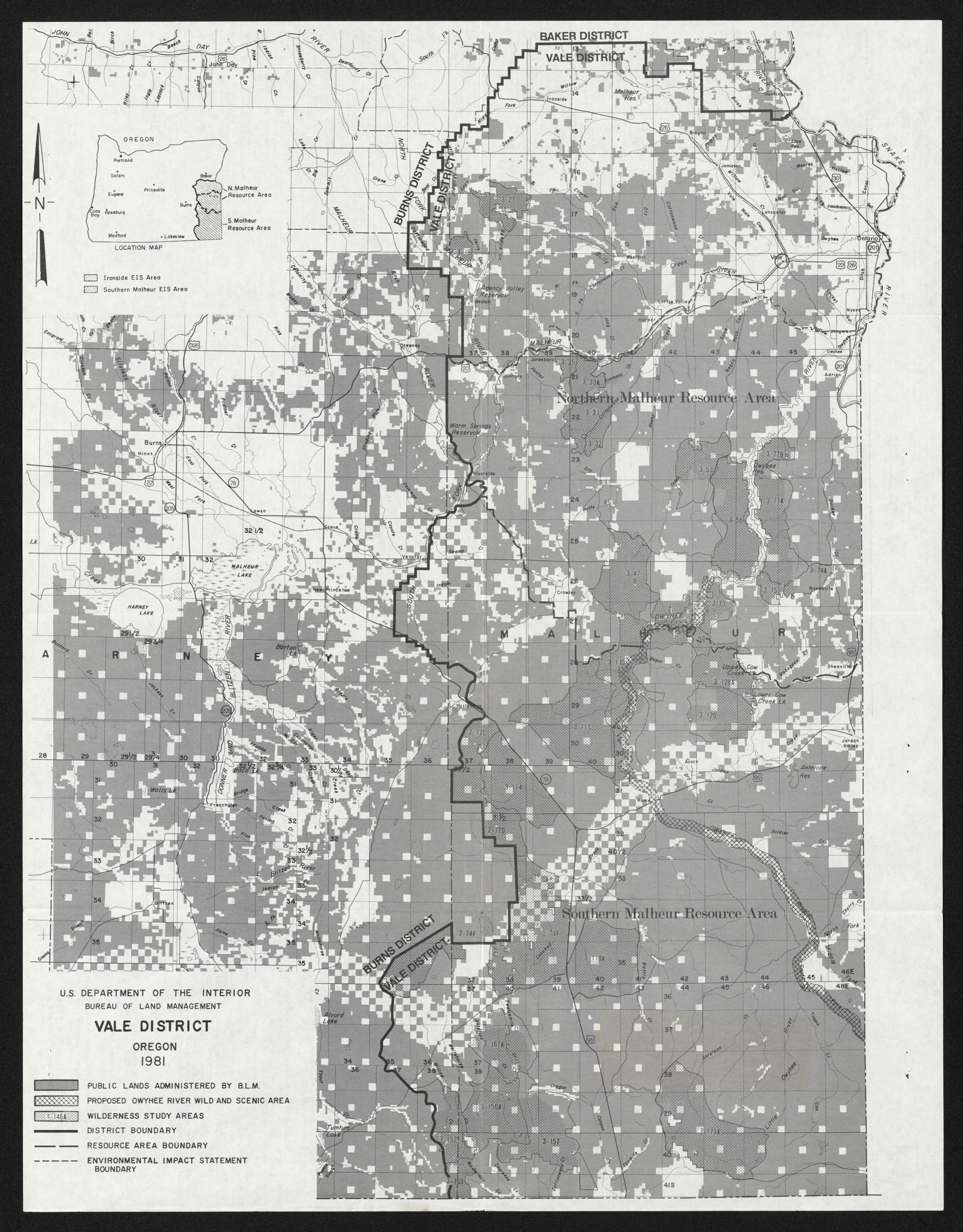
Dr. Patrick C. Trotter 9418 204th St. E. Graham, Wa. 98338





writing that

Dr. Robert Behnke Department of Fishery and Wildlife Biology Colorado State University Fort Collins, Colorado 80523



ABOUT THE AREA

The public lands included in the Southern Malheur Resource Area are located in the southern half of Malheur County. This resource area and the Northern Malheur Resource Area comprise the Vale District. The Vale District forms a rough rectangle in the southeastern corner of Oregon, approximately 175 by 60 miles which for the most part coincides with the boundaries of Malheur County. The BLM administers the public land in both resource areas from the district office in Vale, Oregon. A summary of acreage in the Southern Malheur EIS area is as follows:

	S. Malheur RA	Pct Total	South Half N. Malheur RA	Pct Total	S. Malheur ES Area	Pct Total
Bureau of Land Management	2,636,605	80.3	1.324.900	87.4	3.961,471	82.5
Other Federal	81,270	2.5	40,297	2.6	121,567	2.5
Private	369,298	11.2	113,039	7.5	482,337	10.1
State	196,214	6.0	37,419	2.5	233,633	4.9
Total	3,283,387	100.0	1,515,621	100.0	4,799,088	100.0

The most extensive land form is a gently sloping to rolling lava plateau with elevations above 4,000 feet. This plateau has been extensively dissected into canyons with vertical cliffs by the Owyhee River and its tributaries. A variety of physiographic prominences such as Saddle Butte, Sheepshead and Trout Creek Mountains contrast with the broad expanse of Barren Valley which dominates the northern half of the resource area. The largest population center within the area is Jordan Valley with its 1980 population estimate of 478.

The major industry in the area is agriculture which is mostly devoted to the harvesting of hay and livestock graz-

The leading use of public land is livestock grazing. In the resource area a total of 67 livestock operators are licensed to utilize about 203,104 animal unit months (AUM's) off the Federal range. The predominant livestock

The resource area provides wildlife habitat for big game animals including mule deer and pronghorn antelope Game birds include sage grouse, chukar, valley and mountain quail and a variety of waterfowl species. Several streams within the area support native trout.

Threatened species confirmed to be in the Vale District are the Kit fox, Northern bald eagle and the American peregrine falcon. In addition, the following species are probable threatened or endangered candidates: Preble's shrew, Swainson's hawk, Ferruginous hawk, western snowy plover, long-billed curlew, Great Basin white-faced ibis, and the Whitehorse cutthroat trout. Also, there are at least eight sensitive plant species occuring within the resource area that are listed as probable candidates for threatened or endangered status.

Some of the diverse recreational activities pursued on public land are hunting and fishing, hiking, sightseeing, whitewater boating, rockhounding and horseback riding. A main attraction in the resource area is the Owyhee River which is a potential addition to the national wild and scenic rivers system.

Wilderness review on public lands continues to be a highly visible and emotional program area for BLM. The Bureau has just completed an inventory which has identified candidate areas for wilderness designation by the U.S. Congress. These potential wilderness areas must be managed to protect wilderness values while they are being studied to determine whether or not they should be recommended to the Congress for wilderness designation. Since the recommendation is to be based on all public land values, we plan to develop recommenda for the Wilderness Study Areas (WSA's) as part of this planning effort. Ultimately an Environmental Impact Statement (EIS) will be prepared which addresses WSA's to be submitted for Congressional review.

There has been considerable interest in the development of geothermal, oil and gas and uranium in the resource area. Currently speculation is running high in southern Malheur County where exploration has revealed a uranium field containing low-grade, high tonnage mineralization at shallow depths.

Certain localities of the resource area are known for their important cultural resources. Cultural resources consist of those fragile and nonrenewable remains of human activity, occupation, or endeavor, reflected in districts, sites, structures, buildings, objects, artifacts, ruins, works of art, architecture, and important natural features. The laws, executive orders, regulations, and Bureau policies direct that cultural resources be considered prior to any Federally initiated or approved action which may affect them.

HOW TO RESPOND

The following sections on rangelands, wildlife, recreation and other resource users identify possible issues or management concerns. These are written as statements and numbered. If you wish to make comments on an issue please use the enclosed postpaid response form. We will then evaluate each response to arrive at a final list of issues and concerns

RANGE LANDS

Rangelands in the Vale District comprise a variety of complex ecosystems composed of plant and animal communities and basic soil types. These ecosystems are a source of economic and social benefit, some critical to the well being of local communities. The key to unlocking these benefits is wise management of the vegetative resource. Water quantity and quality; soil productivity and stability; wildlife habitat; forage for livestock and wild horses; and aesthetics are tied to vegetation. The Bureau of Land Management therefore considers the maintenance and improvement of the vegetative component of these ecosystems as a prime management objective. To meet this objective the following key issues or concerns must be resolved:

VEGETATIVE ALLOCATIONS

Proper allocation of vegetation for livestock, wild horses, wildlife, watershed production, visual management and recreation is a major issue with the livestock industry. Suitability standards will identify where and how much an area should be grazed by livestock.

There is also a need to consider the total average annual production, basic plant maintenance requirements, the present levels of consumptive use, the preferences of consuming users of plant species, and the minimum acceptable levels of nonconsumptive use such as wildlife cover, watershed protection and visual quality. In addition to vegetation and animal requirements, the economic dependency of range users on public land must be calculated and considered.

2 LIVESTOCK GRAZING

A recommended level of grazing management will be determined for grazing allotments within the Southern Malheur resource area. This planning effort will determine the need for livestock use adjustments, both up and down, and the specific timing for bringing livestock use in line with grazing capacity; season of use, number and class of livestock; range improvements, etc. Also of concern will be the segregation and special treatment of riparian zones and areas where livestock, wildlife and watershed values are in competition for the vegetation that is produced. Presently there are 14 existing Allotment Management Plans (AMP's) which may need to be revised in the resource area. Planning will identify the ment livestock grazing systems. There is a possibility that livestock operators may be shifted from one allotment to another to bring grazing use in balance with grazing capacities.

WILDLIFE

Wildlife, is owned and controlled by the State, whereas the Bureau of Land Management is directly concerned and responsible for the protection, development and management of wildlife habitat on public lands. In order to properly complete our planning effort, we need to know what management measures are need to mitigate or improve habitat quality on sites/areas known to be utilized by important wildlife species. This would include principle deer winter ranges, antelope ranges and periphery areas adjacent to water (riparian zones). The protection of threatened and endangered species habitat would receive the highest priority. To meet our objectives the following possible issues will have to be resolved through the planning system:

- 3. Habitat protection and enhancement of wild, native fishes, particularly trout, will be emphasized. Protecting these habitats may conflict with other activities such as livestock grazing, mining, and recreation, including ORV use and angling.
- Riparian vegetation provides critical habitats for desert fishes and many terrestial wildlife species. Protecting these areas may conflict with livestock grazing, which severely degrades riparian vegetation in some
- 5. The recent surge of mining activity in the Southern Malheur Resource Area may create water quality problems that degrade fish habitat.
- 6. Introduction of Big Horn Sheep into remote areas of Resource Area may create competition for forage with livestock and other wildlife species.
- 7. Protection of Threatened and Endangered Species may conflict with other BLM goals and activities. For example wild horses which receives special management consideration from BLM may be severely impacting Lepedim lavissii, an endangered plant found in the Whitehorse desert.

WILD HORSES

Management of Wild Horses on the public lands is of national public conern. Wild free-roaming horses are under the jurisdiction of the Secretary of the Interior and are managed by BLM as an integral part of the natural systems on public lands. They and their habitat will be managed and controlled in a manner designed to achieve and maintain a thriving and natural ecological balance on the public lands and a thriving population of sound, healthy animals. Through this planning effort we will make decisions for the management, protection and control of feral horse populations in the Southern Malheur Resource Area, including the establishment of specifically designated ranges. To meet these objectives the following possible issues must be addressed:

- 8. Determination of appropriate management levels of wild free-roaming horses on designated areas of
- Determining the needs for soil and watershed protection, domestic livestock, maintenance of environmental quality, wildlife, wilderness potential, and other factors along with the biological requirements of wild and free-roaming horses. Designated ranges would be considered only where self-sustaining herds could maintain themselves within their established utilization and migratory patterns and only in those areas capable of being managed as a unit to assure sustained yield of forage without jeopardy to other resources

WILDERNESS

The inventory phase of the wilderness review for Oregon was completed in November, 1980. This inventory identified 15 Wilderness Study Areas (WSA's) consisting of approximately 775,000 acres within the Southern Malheur Planning Area. The decision on three areas (300,000 acres) adjoining Idaho was deferred pending the resolution of an appeal filed in Idaho. The purpose of further study in the identified WSA's will be to consider all the resources, uses and values, to identify and resolve conflicts between competing uses and values, and to determine whether an area's most appropriate use would, in fact, be wilderness. The end result of the studies will be recommendations as to a study area's wilderness suitability or nonsuitability.

In Section 603(c) of the Federal Land Policy and Management Act, Congress required BLM to manage public lands in a manner which does not impair their suitability for preservation as wilderness. Lands are released from this interim management requirement when it is determined through the initial or intensive inventories that they do not have wilderness characteristics. Any areas which have been eliminated from further wilderness review, that are under protest or appeal, will remain under interim management until the protests and/or appeals are resolved. Areas with wilderness characteristics (that is, wilderness study areas) remain under the interim management policy until Congress either makes the areas part of the National Wilderness Preservation System (NWPS) or decides against wilderness designation.

Issues of major concern that evolve from the interim management requirements are:

- 10. Foregone multiple resource uses.
- 11. The possibility of impairing the suitability of the area for preservation as wilderness as a result of grandfathered uses, by allowing activities which cumulatively impact wilderness values, or by allowing those activities which have low rehabilitation potential.

RECREATION

Pressure on existing unique or limited recreation resources continues to increase and ironically the very values that attract people are being threatened because of overuse. Coupled with this, man's activities other than for recreation, have created change in existing landscape values. Major concerns have been expressed for the

12. OWYHEE RIVER

The Owyhee River is considered by many publications and individuals, to be one of the most challenging and scenic whitewater rivers in the northwest. Use of the Owyhee for whitewater river running has increased nearly 500% per year since 1974. Of major concern are the varied and sometimes conflicting needs, including visitor use allocation, access development, recreation maintenance of facilities, management plan development, etc., for management of the multiple uses of the river.

13. JORDAN CRATER RESEARCH NATURAL AREA (RNA) Jordan Crater RNA is slowly gaining popularity, not only from the scientific and educational communities,

Administrative concerns include the need for protection of the ecological communities as well as employing various interpretive techniques for the recreation public. Of major concern are the safety hazards associated with public use of the area.

but from this recreation public as well.

Saddle Butte Lava Tubes have long been recognized by the spelunking (exploring caves) interests throughout the region. Of concern in the management of this cave system would be providing access for the public, protection from vandalism, hazard identification, and facility development

Access is the prime concern for sportsmen engaged in the activities. Through the planning process, access needs to public lands will be identified and recommendations formulated to insure general public access. In some instances there is a need to reduce or eliminate access to control overuse

16. VISUAL RESOURCE MANAGEMENT (VRM)

Visual quality objectives and visual absorption capability for all public lands will be determined. Visual resource management classes for all public lands in the planning area will be established.

The protectability of each area according to the particular VRM standard, and the foregone multiple resource uses resulting from the application of these standards will be a future concern.

The hobby of collecting petrified wood in the McDermitt area has resulted in significant adverse environmental impacts, i.e., open pits, surface mining waste materials, destruction of plants. A major concern in excavated areas is the danger to livestock and the public from open holes.

USE OF OFF-ROAD VEHICLES

Public concern over damage to the land has led to Federal regulation of off-road vehicle (ORV) use. While the Bureau of Land Management recognizes ORV recreation as an acceptable use of the public lands it will be accommodated only to the extent that it is compatible with other resource values and uses. To meet this objective BLM must designate all public land within the resource area as either open, limited or closed to ORV travel. By regulations these designations must be completed within one year after the completion of the management framework plan.

- 18. Prior to making designations the public would be consulted giving them an opportunity to express their view. Designations of restricted and closed areas will be based on the following criteria:
- The ability of the land and its resources to withstand and sustain off-road vehicle use impacts.
- Consideration of the scenic qualities of the land, and its cultural, ecological, and environmental values.
- The need for public use areas for recreation use.

 Consideration of off-road vehicle use impacts on other lands, use, and resources. The potential hazards to public health and safety, other than the normal risks involved in off-road ve-
- The existing or potential quality and quantity of recreational experiences available.
- Consideration of the need to minimize harassment of wildlife or significant disruption of wildlife

THREATENED OR ENDANGERED SPECIES

On December 28, 1973, the Endangered Species Act (ESA) of 1973 became law and superceded similar acts passed in 1966 and 1969. It was declared in Section 2 of this law that all Federal departments and agencies shall utilize their authorities to conserve plant and animal species officially listed in Section 4. This national policy is repeated and expanded in Section 7 which briefly sets forth procedures to be used and requirements to be met by Federal departments and agencies in order to comply with the Act. Section 7 mandates have three objections of the Act. Section 7 mandates have the Act. Section 8 ma tives: conserving listed species, ensuring that the continued existence of listed species is not jeopardized, and ensuring that the critical habitats of listed species are not destroyed or adversely modified. These mandates are non-discretionary and are supported by civil and criminal penalties. Citizen lawsuits are authorized and could result in penalties being assessed against responsible officials of Federal agencies for noncompliance. It is also implied by Section 7 that adequate cooperation, consultation, and assistance should occur in the endangered species conservation effort. In complicance BLM must take action, through its planning effort, to ensure that identifed Threatened or Endangered species are maintained and protected.

19. Public participation in the location and identification of threatened, endangered, or sensitive plant and animal species currently listed on the Federal and State of Oregon lists is desired and welcomed

20. LAND TENURE ADJUSTMENTS

Lands within the planning area, particularly when found in a fragmented ownership pattern, will be prioritized according to its potential for disposition and/or acquisition. This prioritization will be based upon not only current use(s), but the resource values involved and potential use of the lands. Consideration will also be given to how adjacent lands are being used and their potential. If lands are found unsuitable for disposition in this planning effort, the lands will remain under BLM administration, but will be subject to review every five years with regard to tenure adjustments.

Criteria which could lead to the disposition of federal lands include:

- a. That the tract, because of its location or other characteristics, is difficult and uneconomic to manage
- as part of the public lands or is part of a program of another federal department or agency. That the tract was acquired for a specific purpose and the tract is no longer required for that or any
- c. That disposal of such a tract will serve important public objectives, including, but not limited to, the expansion of communities and economic development which could otherwise not be achieved.

Criteria which could lead to the acquisition of lands not now administered by BLM include:

- That high consideration will be given to tracts that provide more value to the public than the costs of
- the acquisition, providing the present owner is willing to part with the lands. That any acquisition must enhance the overall manageability of public lands. That high considerations will be given to reciprocal easements between BLM and private individuals
- when such easements will be in the public interest. 21. LAND USE ALLOCATIONS

Within the MFP, the allocation of federal lands will consider (but not be limited to) such uses as: (1) agricultural leasing; (2) public purposes, including recreation, sanitary landfills, schools, etc., (3) rights-ofway or for roads, communication sites, canals, ditches, etc.; (4) commercial uses; and (5) residential

22. TRESPASS ABATEMENT Unauthorized uses of public land will be identified and prioritized for termination and/or legalization under permit, lease, right-of-way, or grant.

23. WITHDRAWAL REVIEW

Several withdrawals which affect federal lands in the planning area are in existence. These withdrawals are administered solely or jointly by federal or state agencies including BLM. With the exception of those federal lands now held as part of an Indian Reservation, Natonal Forest or National Park System, National Wildlife Refuge System, National Wild & Scenic River System, National System of Trails, or other lands administered by the Fish and Wildlife Service, all withdrawals now in effect are to be reviewed by 1991 throughout the Bureau to determine if the withdrawals are serving the purpose for which they were intended. With regard to this planning effort, BLM will review its own protective and administrative withdrawals to determine if they are still required or whether the withdrawal should be revoked. The planning effort will then prioritize those Bureau withdrawals that should be reviewed.

MINERALS

The development of geothermal, uranium, oil and gas is a matter of high interest and consequently the BLM must work to determine how to serve national energy needs while protecting other public land uses. We must also consider private surface values that overlie Federal minerals where the surface and subsurface estates have

24. DEVELOPMENT

The MFP area will be evaluated to identify areas suitable for uranium mining and oil and gas leasing and any typical stipulations that should be applied to such areas. Areas that should not be developed for easons such as critical wildlife habitat, socio-economic considerations or water and soil resources considerations will also be identified

25. SOCIAL AND ECONOMIC IMPACTS

Large scale, accelerated changes in public land resources uses such as for oil and gas and uranium developments that may cause social and economic impacts on local communities, will be considered.

26. REHABILITATION OF LANDS

Lands distributed by mineral exploration and development need to be rehabilitated to an environmentally acceptable level.

CULTURAL RESOURCES

The BLM defines cultural resources as those archaeological, historical and other scientific values that are of importance to man's intellectual and historic orientation. Unlike other resources that the Bureau manages, such as rangeland or minerals, cultural resources have little or no economic value, so they cannot realistically be measured in terms of dollars and cents. The true value of cultural resources is based on an intangible quality—our heritage as a people. Cultural resources are unique and significant and as such deserve protection and preservation because they are of value to all Americans.

Based upon collected data, we will deterine whether the impacts of any proposed action would be acceptable or unacceptable with respect to the preservation and protection of cultural resources. We will also consult with State and interagency sources on significance of sites and eligibility for National Register inclusion of cultural sites or areas. Avoidance or mitigation measures will also be determined for other resource use impacts. This would include consideration of such factors as determining to what extent typical range improvements would impact cultural resource values.

- 27. Since the BLM is committed to the management of public lands for multiple use, the protection and management of cultural resources often conflicts with the management of the other BLM programs including but not limited to range, wildlife, fire, recreation, minerals, lands, and watershed.
- 28. Frequently an academic institution or a consulting firm is desirous of conducting research involving cultural resources located on public lands. This research may conflict with the management of other BLM

FIRE MANAGEMENT

Fire prescription can be an inexpensive and effective method of achieving and maintaining certain desired range conditions that would otherwise be uneconomical. Presently fire is being viewed as an effective tool for the management of public rangelands. In our planning we will consider the use of prescription burns for the purpose of reducing hazardous fuels, reducing density and cover of brush, improving forage quality and yield, improving wildlife habitat, enhancing aesthetic appearance and improving watershed conditi

29. The use of wild or controlled fire to achieve these management goals can be controversial and of public concern because of the inherent destructive nature of fire and because the normal emphasis is on "putting out" fires and not starting them.

AIR QUALITY

For the most part existing Federal, State and local laws and regulations regulate those activities which cause air pollution on public lands. All activities will be assessed for their impact on air quality.

30. Land use allocations and management practices will be recommended to maintain or improve existing air quality levels.

WATER

Bureau policy requires that all watershed protection and management activities on public lands will be planned and administered to attain the widest range of beneficial uses without degradation of the environment, risk to public health or safety or loss of public values. The Bureau is also required by federal law to meet minimum water quality standards. This usually will involve adoption of State approved "best management practices" to correct existing problems and mitigate or avoid future waste quality problems.

31. It is, therefore, the Bureau's intent to protect, maintain, restore, and/or enhance the quality of water on all BLM-administered lands so that its utility for other dependent ecosystems, including present or desired human environments, will be maintained equal to or above legal water quality criteria.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN (ACEC's)

An ACEC is defined as an area where special management attention is required to protect and prevent in reparable damage to important historic, cultural or scenic values, fish and wildlife resources to other natural systems or processes or to protect life and safety from natural hazards.

In order for an area to be considered for designation as an ACEC it must meet four identification criteria: relevance, importance, criticalness, and protectability. Public participation in the identification process is desired. Suggestions or nominations of ACEC's on public lands should include the following elements:

legal description and/or map or aerial photo showing the location of ACEC.

- a detailed description of why you think an area warrants ACEC designation. Remember that in all cases the relevance and importance criteria must be met.
- objective evidence the value is of more than local significance (for example, information or testimony from research entities, recognized scientists or consulting groups).
- your name, address and telephone number

Areas will be evaluated on their importance and relevance to determine which will be designated ACEC's in the final land use plan.

WHAT HAPPENS NOW

The issues and management concerns published here will be analyzed along with additional public concerns and issues identified in response to this brochure. Tentative planning criteria will be developed from this analysis, which will be finalized at a later date, will ultimately serve as the basis for forming management framework plan Resource inventories in progress at this time will be analyzed along with existing resource data of record to

determine the condition, capability trend, and potential attainable through management. The results of this analysis will then be compared with current and future social and economic demands for the resources to develop proposals for the management of each resource. These management plan proposals for each resource will be analyzed for multiple use conflicts with the other resources. The tentative planning criteria developed earlier will then be reviewed (and revised if necessary) so

that they may be used in developing alternative management decisions to resolve issues and to mitigate con-Public meetings will be held to present the proposed management framework plan alternatives and to answer

general planning questions. Final alternatives will then be developed from which a preferred plan alternative will be selected about August 1982. The preferred management plan along with the other alternatives concerning grazing will be subject to further

analysis through a Grazing Management Environmental Impact Statement. Following is a schedule of the planning phases and opportunities for public participation

Federal Register and newspaper announcements of planning intention and plan status. Public identification of issues and concerns, and nomination of ACEC's. A 45-day response period is provided.

Public identification of planning criteria which will be used to guide development of the management

framework plan alternatives. A 30-day response period is provided after draft criteria are published. One or more public meetings may be held to accommodate personal contact with the planning team.

Winter 1981-82 Advertised public meetings will be held to present draft management framework plan alternatives and to answe questions relevant to planning. Written comments will be accepted within 30 days of the meetings

Additional alternatives plus an expression of public preference of one alternative will be sought after.

A management framework plan was completed in 1979 for all resources except grazing management for the Northern Malheur Resource Area. Because of recent changes in federal regulations that require consideration of ACEC's, wilderness values, new inventory data, and public participation in identification of issues and planning criteria, the plan must be amended. Also, proposed new right-of-way corridors in the recent Western Regional Corridor Study must be considered. Therefore, public participation at the various steps addressed above will be applicable to the Northern Malheur Resource Area, as well.

Planning for the Fublic Lands in the Southern Malheur EIS Area

An Opportunity for Public Comment **United States Department of the Interior**

> **Bureau of Land Management** Vale District Office P.O. Box 700 Vale, Oregon 97918 (503) 473-3144

> > January, 1980

Dear Concerned Citizen:

The Bureau of Land Management is in the early stages of preparing a comprehensive land use plan for public lands administered in the Southern Malheur Resource Area of the Vale District. The land use plan, which is called a "Category D" Management Framework Plan (MFP), will be prepared for about 2.6 million total federal acres located in the southern half of Malheur County. In conjunction with this effort the Bureau will be amending an existing Management Framework Plan, for the southern portion of the Northern Resource Area, to address additional inventory data, Areas of Critical Environmental Concern (ACEC's), Wilderness Studies, and Right-of-Way Corridors not previously known or required during the original planning process. Together the two areas make up the Southern Malheur EIS area which is subject to a grazing environmental impact statement due for completion in September 1983.

A "Category D" plan is one that must go through the entire planning sequence no later than the end of September 1983. When complete this plan will establish specific land use allocations for all resources within the resource area. The MFP process results in decisions as to how the various resources will be managed to provide maximum public

This plan will fulfill requirements concerning public lands and resource planning as described in 43 CFR Part 1600 which in., lements the Federal Land Policy and Management Act of 1976.

The public is involved throughout the planning process in order to insure that sound information is gathered, identify the issues or problems and to help resolve conflicts in resource use. At this time we would like for you to examine the issues that are presented in this mailer. Your response will help us design planning criteria which will guide our approach to resolving issues in a timely and efficient manner. The draft of our land use plan which will address solutions to these issues will be available for public review and comment sometime in May, 1982.

We hope that you will take the time to carefully and critically analyze the enclosed issues as well as any we may have missed. Please use the attached response form to make your comments and indicate whether or not you would like to receive any future mailings concerning this plan.

Sincerely yours,

Fearl M. Parker

District Manager

Learl M Parker

UNITED D STATES DEPARTMENT OF THE IN
BUREAU OF LAND MANAGEMENT
VALE DISTRICT
P.O. BOX 700 (365 "A" STREET, WEST)
VALE, OREGON 97918



★U.S. GOVERNMENT PRINTING OFFICE: 1976-223-606

SPEED-MEMO	PART NUMBER DATE
TO PIRIL	1 8/11/80 SUBJECT
Dept. of Fishery and Wildlife Biology Colorado State University FROM Ft. Collins, Colo. 80523	Publication: Monograph of
FROM Ft. Collins, Colo. 80523	
Willis Evans	Western Trouts
FAWL Unit Forest Service R-5	
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REPLY (USE THIS SPACE FOR REPLY. SIGN AND DATE. RETURN PART 2 TO SENDER. RETAIN PART 1)

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FORM AD-311(REV. 5-68)

U.S. DEPARTMENT OF AGRICULTURE FOREST SERVICE

PACIFIC SOUTHWEST REGION SAN FRANCISCO, CALIFORNIA 94111

PENALTY FOR PRIVATE USE, \$300

willing spris.

AN EQUAL OPPORTUNITY EMPLOYER



Mr. Bob Behnke Dept. of Fishery and Wildlife Biology Colorado State University Ft. Collins, CO 80523

Leadville, Colorado

Professor Bob Behnke Department of Fisheries Biology Colorado State University Fort Collins, CO 80523

Dear Bob:

You asked that I give you all the information about the Twin Lakes Yellow Fin Cutthroat I have learned.

The first introduction to the fish the Leadville people called the "real natives" was at Twin Lakes in 1954. I was fishing with Frank Bozig who was a second generation Leadvillite. We were fishing the spring area on the southwest shore of the upper lake. It was opening day of trout season. Our catch consisted of mostly Rainbows and a couple of Lake Trout. Frank caught one fish which he informed me was one of the "real natives." He said that this fish was the first he had caught from Twin Lakes in more than 10 years. He also stated that the only place he ever caught them in Twin Lakes was where we were fishing. We spent some time examining the fish and I had many questions to ask. Cutthroats were new to me as I had been raised in Brook Trout -Lake Trout country. Frank was a very knowledgeable student of fish and could do a very good job of answering my questions. The features that I remember most about this fish was that the head was very well formed with strong teeth. There was no question in my mind that this fish was of a line of predatory fish. The second most dominent feature was that this fish had light tan to yellow halo rings around well formed small black spots. There were few spots forward from the dorsal fin. The spots were quite uniform in size - the ones on the dorsal were about the same size as the ones on the Caudel and body. Some spots were present on the belly near the anal area. This characteristic was never seen by me in Cutthroats until I saw the Cutthroats of Walker Lake, Nevada in 1955. The mid-side was quite silvery from the pectral to the pelvic fins with a magenta tint as Frank called it. A yellow hue covered the area from the pelvic to the caudel and the caudel was quite yellow, with a bit of red at the base of the rays. The anal fin was more yellow toward the tip and more orange to red to the base. The pectral and pelvic had less yellow, the former being the least yellow. The belly had orange-red areas forward of the pelvic and forward of the anal. Frank had pictures taken of the fish and I will get them to you as soon as I get copies from his relatives here in Leadville. Frank also had pictures of other fish caught as far back as the 1870's. Verle Vorhies also had some pictures that dated back to the 1870's, one in particular showed his uncle with 2 fish in the 15 to 20 pound class. I am going to try to contact his relatives in Canon City and in Waterloo, Iowa, to try to get these pictures too.

Later in the summer of 1954 Frank introduced me to a population of real Cutthroats at Timberline Lake. The fish were spawning in the inlet about the first week in June. We walked over crusted snow drifts in the early morning to get there. These fish were decidedly the same as the one I saw at Twin Lakes; however, they were not as large. The largest was about 24" long and weighed about 5½ lbs. Frank said that the fish were transported to Timberline by horse many years before. He said that many other lakes also got them; however, Timberline was the only one he knew of where the fish could spawn. The Brook Trout in Timberline were never very numerous because the spawning bed freezes up in the winter and kills the eggs. When I viewed the spawning area in February, the stream had froze out of its banks and disappeared into the snow. The spawning area was frozen solid and was dry. The last of the real Cutthroats I saw was in 1958 when we brought two fish to the Leadville hatchery for brood stock. They were dumped in with other Cutthroats and we gave up on the project.

Professor Bob Behnke Page 2

Frank also took me to several other places where the real Cutthroats also existed. These places were beaver ponds that were stocked by old timers in order to have a bit of private fishing. Some of the drainages I remember were Mitchell Creek, Bennett Creek, Glacier Creek, Texas Creek, Crystal Creek, Pine Creek, No Name Creek, and Mill Creek. There were others too, no doubt. As I understand it, anyone could bring a cream can and get fish at the hatchery. I got fish this way from the Leadville hatchery 'til the mid-60's.

If we ever find these fish again, I think the characteristics most prominent on which we may identify them will be the predatory head and the haloed spots. The spots on the belly at the anal may also help. All the fish I saw had this.

Ted Birdsill and I intend to check Timberline during spawning time next spring.

As you know, we are going to open a museum of fish in 1982 and wish to have the most accurate displays possible. I already have many species and strains, but I need information on where I can get good quality specimen of the Rainbow trout strains and the Sunapee Trout. The Lake for Sunapei was the Sawtooth Lake in Idaho. What town is that near? Please advise on the strains of Rainbow.

Any time you are in our area, stop by and see us!

Tight lines.....

Del Canty

P.O. Box 1512 Leadville, CO 80461

Phone 486-0769

Del Canty P.O. Box 1512 Leadville, CO 80461





Yellowfin

Professor Bob Behnke Department of Fisheries Biology Colorado State University Fort Collins, CO 80523





MILKWOOD

Hi Bob & - sally -Now that Christon is well ver, I'm findly getting in the Holder spirit! Hey, win't that about the 34 n forth time Heat Nelson ran of with some hussy? Wall John is officially out of me book paid off and overefteny - gist could work under that haid of pressure, especially with his nagging back & wife! The manuscript has been reviewed by the editor and the final copy + all drawings will be tuned in or Jan 31, 1981. When you get your comp. copy, semente, this one is written for the "common man". We don't find account will and ray counts and Well that shit. I had in waied while writing this both the good ship "Blacky" and it crew down at the Borkeley yest honton many years ago. Can 's you see the boys in that bout trying to read a Hopkink Type book: "Hey Mo-Fo, What the hell is a Mo-Fo gill racker count - 2 guest Want to know what kind of Mo-Fo kin Fix I caught! Best wichen She, Molly of Ross

9699 Melten Rd. Mantece, Ca. 95 334





The Behnkes

3429 E. Prospect St.

Ft. Collins, Co. 80525

OFFICE MEMO

TO:

FROM:

SUBJECT:

REMARKS:

Date

6/3/80

Dr. Behute

I am heaving tooling to Souli Arabia, I hope I will see for aga

Bost Wishes.

Hunoud.



Hi Bob and family,

Hope you are all well and enjoying the holidays. I'm in san Diego for a few weeks visiting the folks. Weather here is terrific! I plan to spend a few days in the desert photographing. Fred Allendorf tells me he found no brook trout alleles in the bull trout samples from last summer - I'm a bit surprised, but not disappointed. I'm about finished with a first draft of our cuthroat manuscript - should be Sending if down within a month. Sure enjoyed the evening spent with you and the family "The air up there ... is very pure and fine, in October. Hope '83 is a

"The air up there... is very pure and june, bracing and delicious. And why shouldn't it be? good year for you. - Leo

May the meaning of the Season be deeper Its friendships stronger and its hopes brighter As Christmas comes to you this year

Leo Marnell



Original painting by Boulder, Colorado Ken Carlson Copyright 1980



DR. H.I.S.THIRLAWAY Water Warden & Librarian/Curator Tel. Newbury (0635) 43342 18 SPEEN LANE
NEWBURY
BERKSHIRE

30 August-1980 4 Sept-1980.

Dear ProJeson Behake,

Many thanks for your

Very weefre and substantier letter and

Very weefre and substantier letter and

Je- frinten the subject of cotte and release.

It revely was a revelation to be tread the

haterie.

I have no or two questies.

The Times quote suggested an asoute of south of south of south of south that.

Bouch o Ball's sample was 16. The mottably rote of 87% is, on the face get, conicidable. In the another experient?

[I have written to the Federal Agencia to cake the question — no replie to date] I have get the greater of Range of Range also enquied of Range Apellowy, last the may been his course also write after the confeace west hart.

Anglig Lessus on our trout steams way not be as light as it was. (More wealth & Societis more leisure since the was!) To take our host fotolas fiere en to Aven (Haufolis) - abest 10 acres 15000 years i larger by 10 year. average widte) 150 dags season, 2 fisherhan for day wasiam, Back fishing 10 hours for visit_ that is 3,000 leur fer year. These, admitedly extrene, figure give 300 hour/acre/year which is not for of your liver figure at which a cold + release regretion might be effective Anolle factor - file! Last year we removed 500 lbs by weight of file from the above fishery. Fisherman killed roughly 1000 lbs weight of trout (hour) last year. Hew way founds did de files have? I have enlisted someone from a research laboratory to help he with a cases and mellodo of cutal. Menulia, it seems that by foliar of law visites).
Voluntary cotal & release is not hamplefue to serse suggester of the Times' report. The wethout is dayfly and upsteam hypoth which usually results in the fish being conglet in the lift or the corner of the jaw-so do gills are rainly raphired. I am trying to achieve a forther whereby we reed stock but ravely, if at all. Lack you for your time on this

suggett - In a much wiser han!

Knidesi' regards Har Theling

Dr. H.I.S. Thirlsway The Piscetorial Society 18 Speen Lane Newbury, Berkshire

- chezy Air Mail (it ! t! t! !!)

Wear Wr. Thurlaway:

If you check the Times article, citing Mr. Holloway's paper, you will note that the 87% mortality (caught on flies [from Bouck & B:11]) and the 2,800 rainbows caught on baited hooks, refer to separate works. Undoubtedly, the reference to the "2,800 rainbows" of which I in 4 died after being caught on bait, is as obtained from," A national Symposium on: Catch and Release Fishery Proceedings. In this solume (cited in a paper I sent you and available for \$.00 from the California Cooperative Fishery Unit, Humboldt State University, arcata, California 95521) is an article by R.S. Wydoski which summarizes the results of 12 studies in which four species of trout and atlantic salmon were caught andreleased on bait and mortality recorded. a total of 2859 fish are included in Wydoski's summary and they suffered a 25% mortality (average of all 12 studies). This is misleading, however; because several of the studies were made in hatchery raceways where a worm basted book is immediately attacked and the trout quickly jerked out, hooked in the jaw. These saceway studies show only 3 to 5 % mortality of bait caught trout and belower the average mortality of all 12 studies are summed. Actually, about a 40% mortality of

is a general average for bait caught fish

under matural conditions, Mr. Holloway must have read wydoski's great number of studies summarized, demonstrating very low (1 to 10%) mortality on trout caught and released on flies and lures. I can not tell from the Times article just what Mr. Holloway's point of view happens to be, but if he is throwing out these figures to support a position against catch- andrelease angling, he is guilty of flagsant intellectual dishonesty.

I would modify or clarify some of my former statements regarding the amount of fishing pressure necessary before to overexploit a trout population (the amount of pressure needed before catch- and -release works a's and demonstrable effect). American fishing passure typically includes a large segment of anglers fishing for newly stocked hatchery trout and a considerable number of "townist" fishermen of little skell. These angless, which make up 50% or more of most american figures on angling intensity, I catch few wild trout. Your anglers are, on average, much more skilled than the angles

making up Cemerican statistics and I would externate that 500 hours per acre of fishing pressure on american waters as more comparable to about 200 hours on your private streams in regards to the catch of the anglers. Also, the characteristics of the stream influence the catch. Many Comerican revers have dense protective reparian vegetation, making many areas unfishable. Open, meadow streams, such as your chalk streams, are much more conclucive to exploiting a greater proportion of a trout population. I would urge that you set up a controlled study to get some actual data on catch- and release angling o Because adult trout do not move very for from their home range, sections of the same stream of 1/2 or I mile in length can be managed under normal regulations and catch-and-release regulations : and Over a period of at least three years, statistics should be compiled on catch-per-man-hour, average size, To more than 12 in., To more than 15 in., etc. that are recorded in the two sections. Your river is probably highly productive. It may turn out that with predator

control and a no-kill fishery, the trout population will reach a limit and then the growth rate will sharply decline . Such a situation would call for a "slot" limit -kell the trout less than a certain size (for ex, 10 in.) and above a certain size (for ex. 16 in.) and release the fish between these size limits. There are almost unlimited opportunties to apply special regulations in creative evays to obtain the results you want -- higher catch rate, larger average sije, some higher proportion of trophy size fish, etc. However, unless you have factual data, you well never prove the efficacy of catch- and-release fishing to the doubters. Sincerely,

BERKELEY • DAVIS • IRVINE • LOS ANGELES • RIVERSIDE • SAN DIEGO • SAN FRANCISCO



SANTA BARBARA • SANTA CRUZ

COLLEGE OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES AGRICULTURAL EXPERIMENT STATION AQUACULTURE PROGRAM ANIMAL SCIENCE DEPARTMENT UNIVERSITY OF CALIFORNIA DAVIS, CALIFORNIA 95616 (916) 752-7600

August 3, 1981

Robert J. Behnke Department of Wildlife and Fisheries Biology Colorado State University Fort Collins, Colorado

Dear Bob:

I want to thank you for your letter and comments on my manuscript. As you probably expect, I will continue to respectfully disagree with you on most points in your letter.

First, I must say that inspite of the few areas where we disagree, there is general agreement between us with regard to <u>parasalmo</u> evolution. It is unfortunate however, that you do not seem to place any value on electrophoretic or cytogenetic data when it does not agree with your classification. In the long run it will be considerably more productive to be supportive of each other's efforts than for you to make unfounded statements concerning the value of cytogenetic and electrophoretic data.

In your letter, the first paragraph is very misleading. In my work I have used not one, but two methods of clustering taxa and/or populations. The dendrogram clustered using UPGMA and the Nei similarity index is phenetic. The WAGNER network, which uses presence or absence of alleles, and a very different clustering algorithm, is a cladistic network. This network does represent evolutionary or speciation events, using the information contained in the data. It is a network not a tree, because ancestral allelic states have not been assumed. Although not necessarily the case, the shape of the phenetic and cladistic dendrograms are quite similar for parasalmo, and not much different from the assumed phylogeny in your monograph.

With regard to the comments in Systematic Zoology: a few quotes from J. Farris taken out of context should hardly cause us to abandon our methods. You must recall that he found fault with electrophoresis, immunogenetics, and DNA hybridization. Just because he didn't address the problems with meristic and morphological studies does not mean they don't exist. Moreover, I have stated in my manuscript that the final classification should include all we know about the genetics, morphology, life history, and ecology of these taxa. As such, I have collected data on chromosomes, electrophoresis, and even meristic and morphometric data. I am currently working on a univariate and multivariate analysis of the cutthroat trout populations that I did electrophoresis on.

You also state that rates of divergence for regulatory genes are much more rapid that for structural genes within parasalmo. You use evidence from the ecological and morphological variability with the subgenus. How do you know that the variability is determined by regulatory genes? To my knowledge there are no established methods to assess variation in regulatory genes. Certainly no one has made an effort in trout or salmon. Thus, your statements are entirely speculation.

Furthermore, you don't seem to appreciate that there is both a genetic and environmental component to morphological and life history traits. Data on the heritabilities for life history characters for parasalmo are unavailable to my knowledge. However, information is available on production characters for parasalmo and on life history characters for Atlantic salmon: Refstie, Steine, and Gjedrem (1977) estimated variance components for the percentage of fish smolting at one year of age. They found that stocking density had a significant environmental effect, and that the sire component of h^2 was 0.06 and the dam component was 0.08 - 0.24. Heritabilities for production characters in trout are of similar magnitude. As you can see, the data available suggests a considerable environmental influence on life history traits.

You say that we sample relatively few genes. This is true, however at least we can state how many we are sampling and give reasonable estimates of allele frequencies at the polymorphic loci. We acknowledge that some alleles go undetected (page 58). Inspite of these acknowledge limitations I will stand by my conviction that this technique provides the overall best method todate, to analyze population genetic data in fisheries management.

I also have a few comments with regard to your most specific criticism: the Bear River drainage trout and the fine-spotted Snake River trout. We seem to have very different views concerning the ability of fisheries managers to grasp taxonomic principles and incorporate them into management plans if given the opportunity. You compromise what you know is the correct classification inorder to protect trout populations. I try to educate the fish manager so he (or she) understands how proper classification can be even better than well intended missclassification in efforts to protect and restore trout populations. I think that African gobbies and North American trout should be classified using the same foundations and principles.

My interest is not in proposing new classifications, or revising the old, but in establishing the relationships among the populations using all means available. I acknowledge your expertise with the historical classification and the application of names to taxa and geographic regions.

Genetic data on the fine-spotted Snake River tonut suggests virtual genetic identity with large-spotted Snake River, Yellowstone, and Bear River drainage trout. I say in my report that "we believe that the Snake River fine-spotted cutthroat trout should be considered as part of a morphologically and ecologically S. c. bouvieri, not a new subspecies". I consider this to be my statement of opinion and one to which I am entitled. I believe these forms are like green and brown frogs! If you, or someone else, desires to submit a bonafide description of a new subspecies that's fine with me. I will not however, continue to refer to the fine-spotted morph as an undescribed subspecies. It has been ten years since you first started using that phrase. Data on chromosomes, electrophoresis, morphology, distribution, and ecology are available. The fine-spotted should either be described as a subspecies or be omitted from the listing.

My objective with the Bonneville Basin trout is to clearly demonstrate that the genetic data suggests two invasions of the Bonneville Basin, and that as such the populations in the Bear River drainage and the Snake Valley should not have the same subspecies designation. I do not think they diverged 8,000 years ago within the Bonneville Basin. I think there was an invasion of substantial antiquity by ancestral trout similar to pleuriticus which gave rise to the extant populations in the Snake Valley. And, a more recent invasion of the Bonneville Basin by bouvieri when the Bear River drainage was diverted from the Snake River drainage to the B.B. Mr. Mark Martin at BYU is currently going to try to analyze populations from eastern Utah in both the Bonneville Basin and Colorado River drainage. Maybe he will provide clues to the origins of the trout in those areas. He has never done any electrophoresis before and neither has his major professor, so I would be quite cautious with their results. Mark spent a couple of days with me this summer, and hopefully I will have a chance to help him with his electromorph identification.

Because of the morphological similarity and genetic similarity I feel the trout in the Snake River, Bear River, and Yellowstone River should have the same taxonomic designation. Should it be bouvieri or utah? Because of the morphological dissimilarity and the presence of several alleles that are absent in pleuriticus I do not think the Snake Valley should be so designated. Should it be utah or a new designation? I am open to suggestions concerning the nomenclature of these fishes.

Just because they have in the same basin does not mean they should have the same taxonomic designation. If this criteria were used the trout (lewisi) in the northern Columbia would be the same as the trout in the southern Columbia (bouvieri). The same would apply to the east slope. Carl Bond and a student had a paper in Copeia, I think in 1971, that demonstrated multiple invasions of the Harney Basin in Oregon. They recognized two subspecies of redside shinners Richardsonius balteatus. Thus, my recognition of multiple invasions and more than a single subspecies of cutthroat trout within the Bonneville Basin is not inconsistent with accepted procedure.

My position at Davis has ended.....I will be at the North American Salmon Research Center, St. Andrews, New Brunswick, Canada EOG 2XO. I will be working on the genetics of life history traits in Atlantic salmon.

Eric J/Loudens/ager

Trouble Maker First Class

Loudens Tager UNIVERSITY OF CALIFORNIA

Animal Science 0340

DAVIS, CALIFORNIA 95616



Robert Behave Dept. of Wildlife and Fisheries Biology Colorado State University Fort Collins, (O 80523

Memorandum

TO: Bob Behnke

DATE: 10/14/8/

FROM: Jam Mullan

Glad, naturally, that EPA publication was of benefit. I spent the last 2 days across the border in Chrada seeing the Carabian porten of the Okanogan Ruin dramage first-hand and obtaining some sockeye Shouples for Fred Utter. This was a must before I come out with my soclare Jublication, but the Important fact regarding the try was that In Keith Sandircook flew over from Vancouver to get a first-land New of the only salmon that now migrate into Canada though the states. Sandercook is in Charge of the huge Salmon inhancement program in B.C. and is a gled - Abelieve he can be reached at the following address should you wish t stillow up the implication of what I CONSERVE AMERICA'S ENERGY Chancement Services Branch, Light of Frisherus and Oceans, Save Energy and You Serve America! Horth Vancouver, BC V7P 4L3

As you perhaps have heard B.C. has haid. Some fantastic Usults in the last few years with hatchery propagation of salmon. This has been particularly True of orho, with returns (catch and seaspened) of up to 40% (this 40%, not ofiniperent) and average Or typical returns of 20-30%. Most of the success Les bein attributed to improved diets (Organ montpellet) and low loading densities in the hitchenes, althought of support that the inshow Strict of Georgia his been Ignally important, Coho, as you are no doubtaware, are puranty of value in their 3 rd year of life. Jewinile Ocho Monelly spend about 13 months in spesh water before migrating to the Ocean in May of their second year Aflife. Jacks, which spend only about 6 mes in the ocean before returning to spawn, are of little value at 10-15" or so. Only a handful of coho ever hor t 4015 years of lige.

Cridntly BC fisheris people have neutral 2-4 apperimental lots of Coho (100,000 fish) which lave been Codedwire togged. Sandercook was not at all clear as to how this was achieved but meheated that it consisted of two baths in steroid duing different periods of their juneable development, and that the technique was perhaps 9772 effective. they preliminary Usults indicate that such spish are growing much larger (16 lbs as 3 year fish) then Am neutered releases and may stry in the Catch over a period of your rather then being Cought or spaining And Chying in then 3 rd year of life. This is the advantage of Chinoole, which may be hawisted at ages 3-8, primarily 3-5, depuling on stock Characteristics, and which of Course Much larger sizes and Therefore Contribute more bromers to the harrest ofm a gwin yon-cliss,

Af this true, and Sandercook has my Confidence, then the occurrence of 30-60 lb coho On a regular besis is wither reach. One of the reasons why these experiment dury been Conducted is because the orho hatchery programs have been to successful. Will an average 28 To Mum on releases, Latching Iscapments have been excession to the point where they have been in inbanisment, I understand one hatchery sold I million dollars worth of years coho. Under These accumstances it is of no Consequence if 90% of the bromas produced from latching releases her return to the Latchery of orign. I wish I could supply mon details, as I Inn you are intersted, but this is the best of On de for the moment, and from one bottle of Solot, which wish't really necessary.

Bob Willy indicated that Bob Martin was very out at the abriqueque meeting and that he had faller for since I had seen him hot 3 yrs ago in Dancouver. Martin should Lave stryet on as Chief in La Where he was extremely effective, but he wented to go to the top. I Unember the morning Bot Jankens set him up with blick Strond, and while I didn't see the seltimate Consequences that morning, it did bother me, and body. and, of course, over the years, I've monitoud the relationship and the deterioration of Martin with absolutely my joy. dill the you up on that dile, Oncumstances permitting of Course. Cleers, Im

UNITED STATES

DEPARTMENT OF THE INTERIOR Japashyan BWALD PIFIECS ERVICE U. S. Fish and Wildlife Service Fisheries Assistance Office Leavenworth National Fish Hatchery Route 1, Box 123A

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INT. 423



THE DEPARTMENT OF GAME

1-8-82

DR. BEHNKE,

FIRST LET ME APOLOGIZE FOR THE LENGTH OF TIME BETWEEN WHEN I RECEIVED YOUR LETTER AND THE PRESENT. IT TOOK SOME TIME TO PULL THE PROPER MATERIALS TOGETHER UNDER THE PRESSURES OF FIELD WORK AND HOLLOAYS.

I HAVE ENCLOSED FIVE OF OUR PAST ANNUAL REPORTS

AND PLACED YOU ON OUR MAILING LIST FOR FUTURE

PUBLICATIONS (WE SHOULD HAVE ANOTHER ONE OUT IN A

MONTH OR TWO), IN TRYING TO MAKE SENSE OF THEM

I' WOULD SUGGEST STARTING WITH THE 1980 b. REPORT

AND WORKING BACKWARDS IN TIME, STYLE AND CONTENT

HAVE NOT REMAINED CONSTANT OVER THE YEARS, SO PLEASE

PALDON THE POUGH EDGES,

AS FAR AS AN 'OFFICIAL' GAME DEPARTMENT STATEMENT IN REGARDS TO STEELHEAD MANAGEMENT AS PRACTICED IN WASHINGTON, I HAVE ENCLOSED A COPY OF WOG'S DRAFT STRATEGIC PLAN" ON THIS SUBJECT. ON THE SECOND PAGE IS THE OVERALL MANAGEMENT GOAL WHICH IS PROBABLY WHAT SHOULD BE GIVEN AS AN OFFICIAL STATEMENT.

I SYMPATHIZE WITH YOUR CONCERN FOR PRESERVING

THE GENETIC DIVERSITY OF NATIVE FISH POPULATIONS. THE

WILD RUN OF STEELHEAD THAT OCCURS IN THE KALAMA

RIVER IS A SELF SUSTAINING POPULATION, HOWEVER IT

APPEARS (FROM OUR STUDIES) THAT A SIGNIFICANT ADDITION

OF HATCHERY STEELHEAD GENES OCCURS EACH SPAWNING SEASON. DATA SUGGESTS THAT THESE HATCHERY "CONTAMINATES" ARE PRESENT IN "WILD" OUTGOING SMOUTS. WE OD NOT YET KNOW IF THESE GENES WILL APPEAR ALSO IN THE RETURNING ADULTS, MORE ON THIS LATER.

THANK YOU FOR YOUR OFFER TO INCLUDE AN OFFICIAL!

GAME DEPARTMENT STATEMENT AND ANY REVISIONS WHICH

MAY RESULT FROM OUR DIALOGUE, IF YOU HAVE ANY

QUESTIONS OR WANT THE LATEST UPDATE ON OUR FINDINGS

DO NOT HESITATE TO WRITE OR CALL. THANK YOU FOR

RESPONDING TO MY COMMENTS.

SINCERELY, Markle. Chtal

P.S. MY PHONE # 15 1-206-425-9584 ADDRESS = 2649 FIR ST. LONGUIEW, WA 98632 306 - Did you publish a "lawishly color illustrated" that tit ± 1980?

We hope this letter finds you all well and happy after a <u>terrific</u> 1983 --- and anticipating an even more wonderful 1984. These past few years have seen us grow----in height (boys), girth (parents) and, hopefully, wisdom and joy in all of us.



Bill is active in Chilton Engineering, and busy with numerous extra projects, such as Elko Chamber of Commerce, where he's been president this year, Rotary, Nevada Presbytery, Nevada State Public Works Board, song leader of Cub Scout Pack 353 (from which he just "graduated", along with younger son Jim), church choir, etc. In between and through he shares joy and a zest for living with those with whom he comes in contact. He traveled twice to Pomona for reunions - Boys' Brigade (75th anniversary in May) and a high school class reunion. He and Ann celebrated their 20th wedding anniversary in August.

Ann has P.E.O., Elko Community Orchestra (she's still the single second violin---it's a rather smallish orchestra), Elko General Hospital Auxiliary and church choir, plus keeping track of the 3 "ranch students" we room and board (high schoolers whose ranch homes are too far out of town for daily commuting) during the school year. She is also secretary for the YMCA board (fledgling group) and treasurer for Youth Soccer. Bill and Ann are in the adult handbell choir at church too.



Matt, at $13\frac{1}{2}$, loves 8th grade, plays cornet in the band and piano at home, does well in what he does-Scouts (is a Star, nearly a Life), acolyte, cooking, golf, soccer, etc.



Jim as a 5th grader is just graduated last month into Boy Scouts, also loves soccer, Little Leaguer in the summer, went to church camp last and this summer, golfs and is a fun boy. He just turned 11. Rings handbells, too, with enthusiasm. Started French horn recently.

This summer we enjoyed housing Demarise Hammer, a U of Arizona Chemical Engineering major working at Newmont Gold Mine for $2\frac{1}{2}$ months. We hope she comes back next summer, too. Christian Tvede, Rotary Exchange student from Hammel, Denmark, has "dropped in and out" since his arrival in August. He attends Elko High School, and, as one of our "ranch girls" put it, "Everyone would like to host Christian, he's such a neat kid!" He gets along with everyone very easily, and, like the other Rotary students we've housed through the last 8+ years, has spread joy and goodwill to his associates.

We hope our procrastination of the past few years has not caused too many lost contacts---and that we can "recharge our batteries" to keep these annual connections. Our Best Wishes to each of you for a marvelous year ahead.

The Bill Nisbet Family



Greetings and Good Wishes for Happiness in the Coming Vear

Bill 4 Cenn Prisiber Matt & Jin

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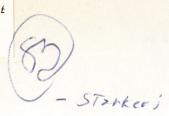
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Mr. & Mrs. Wm. A. Nisbet 540 - 13th Street Elko, Nevada 89801





Dr. 1 Mars. Robert Behave 3429 E. Prospect St. Port Collins Colorado 80521

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Dear Bob, Sally, Cynthia

GREETINGS!

1983 was truly an adventuresome one for the 4 Schrecks as we went to Nigeria, England and Scotland for the summer. Carl left for Nigeria in early June to teach fisheries and discuss research at the Univ. of Jos. Jacque, Steve and Lyn joined him there 2 weeks later for an incredible, enjoyable time. We were centered in Jos, a city of 100,000 people located on a high plateau in north-central Nigeria at the tip of the Sudan. Just north of the equator, the climate was a lovely 85°; the terrain looked much like Colorado's foothills with eucalyptus, acacia and orchids replacing aspen! We went on a real safari and were charged by a HUGE wild elephant! The tremendous kindess of the Nigerians, special festivities and sightseeing trips gave us all first-hand glimpses of life styles very It was a time each one of us will treasure always.

different from ours yet very similar.

After Nigeria we then toured England and Scotland. Highlights were Stonehenge, London, Yorkshire, Derbyshire and lovely Lake Windemere. The Scottish Highlands captivated us with

our best memories being at Loch Ness where we stayed in an old hunting lodge and fished on Loch Ness. Alas, no Nessie! We also enjoyed the beauty and serenity of the Hebrides Islands off of the western coast of Scotland. Imagine sitting on a heather hill high above blue bays watching tartan clad dancers, bagpipes and athletes at Highland Games. Lyn won 2nd prize in a running race!

Home is always super too. Carl has had a busy, fruitful year at work despite a fire in one of his labs this Fall. He's Head coach for the Corvallis Youth Soccer, was Steve's assistant coach and plays adult soccer. So Carl's spare time can be spelled "S-O-C-C-E-R"!

Jacque works part-time for the school district primarily with children with learning disabilities. She was appointed to the City-County Library Board and an intermediate school curriculum review committee as well as being Vice President with Carl at the elementary school. She is coach for Lyn's 2nd Olympics of the Mind team. Last year's team was 3rd in state and won the most creative award in its category.

Steve and Lyn continue to be good students and athletes. Lyn is on an exhibition gymnastics team, 4-H and extra 5th grade classes. Steve traveled to several cities in Oregon to play soccer and was selected for special instruction by a former Olympics coach. He is now in basketball and extra academic 7th grade endeavors.

Even if Big Brother is watching, we wish you a peaceful and beautiful 1984.

As always, Arl Jacque, Steve Lyn



Jacque & Carl Schreck 3060 N.W.Seneca Place Corvallis, OR 97330 The R Behnke Family

3429 E. Prospect aue.

Halling, Colo 80521

A PA



COLLEGE OF LETTERS & SCIENCE

MONTANA STATE UNIVERSITY, BOZEMAN 59717

12 January 1983

Messrs. Herb Beattie and Urbie Nash Chairmen Research and Projects Committee Trout Unlimited 501 Church Street, NE Vienna VA 22180

Dear Herb and Urbie:

Your plans to have us all get together here in Bozeman for a Scientific Advisory Board meeting as part of the TU Annual Meeting sound wonderful. High time we did this. Count me in.

I will develop some ideas to contribute in the session on research objectives, and I'll prepare the 30-minute talk on recent research which you request. If you'd like to pin a title on the talk, it should be: "How Wild Trout Use Stream Habitat."

With regard to your request for suggestions, mine would be that our presentations be kept rather informal, i.e., seminar-type talks, not presentations of written "papers." The former promote discussion more than the latter do, and relaxed talks by specialists in their field tend to be more informative by including tentative ideas, as well as firmly established fact.

Please, let's not try to publish the talks. Publishing research findings in places other than the professional journals tends to accomplish very little. Distribution to the real users cannot be as thorough as in professional journals. Long-term availability of information in journals is greater than in miscellaneous publications; Ten years from now it will be hard for someone to find an out-of-print TU booklet, whereas, every college town will have a library containing the journal. Credibility of information in miscellaneous publications is far lower than in journals, since journals put all articles through the testing and alteration of a rigorous board of reviewers who specialize in the field. It simply will not be worth the time and effort of the authors and an editor to assemble a publication of this kind. Moreover, publishing the material will severely limit what can be said. For example, I could report on all sorts of interesting new work being done by students and myself in a talk--but in a written paper, I could not ethically report on this, because I would be publishing someone elses work or would risk printing inconclusive, "half-baked" and perhaps misleading findings.

Sincerely,

Ray J. White

They

Associate Professor of Fisheries

cc Bob Belinke

December 6,1989

Dr. R.J. Behnke

C.S. U. Dep. of F. W.

Coloraelo Ft. Collins, U.S.A

M. Saadati
P. D. Box 5 89
Mashael 41735
TRAN

Dear Dr. Behnke

Thank you for your letter, g. have got it addays ago.

because I had written my POBO & number wrong, 3589 instate

589 (Any way of was realy good to hear from you again.

Dear Pr. Behnlee, I have decided to leave this country.

I am not able to story any more. I thank the best way which
I can leave; is to get an acceptance (admission) from

one of the university of U.S.A. I would be groutfull if
I tou help me, that is a chance for me to work with you

again and Dinish my work. I prefer to come backs

to fort. Collins, or if it is not possible at list same when
in Colorado or Mid west of U.S.

The Problem that I have is the exchange value of is dollar. One Rollar was about 70 Rials when you were here and how know is about 80 Rials if you can get from the Bank. But, I have to obtain from the black market, that it coast 1200 Rials (120 Tomans). I have a small apartment in Mashed. It coast about 15000000 Rials 120 guill have (18 9 sourt) 12000 purth myself. This amount is not enough to con winced the american embassy in Turky or India to get vise, even it I have Indoor from a new american university. I lake I can manage my living expense

Colorado State University

Apon recommendation of the Haculty of Colorado State University, The State Board of Agriculture, governing hourd of the University, has conferred upon

Mohammad Ali G. Saadati

the Begree of

Master of Science

Giben under the seal of Colorado State University at Fort Collins, Colorado this 20th day of May, nineteen hundred and seventy-eight

a. R. Chambelain.

Dean of the Graduate School

President of the Board

Robert H. Berls 2751 Unicorn Lane, N.W. Washington, D.C. 20015

12 February 1985

Dear Bob,

Thanks very much for your long letter setting out the taxonomic flaws in Schwiebert's TROUT. As you suspected, the second edition still contains them.

Tompero has decided that my review can't appear until the September issue rather than the June issue as previously scheduled, so he gave me another month to do it. And as you doub! less know work tends to expand to fill the time allotted for it.

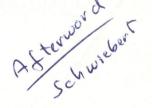
The second edition of TROUT contains an "afterword" which provides Schwiebert a place to reply to critics of the first edition. I have enclosed the six pages, that are pertinent to our correspondence. If you would be so kind to read them and let me know if anything in them causes you to amend your letter to me, I would much appreciate it. (I take it from your letter that you have not seen the new edition.) Schwiebert uses the KNANKKKKKK conversation with Aldo Leopold as a way of wiggling out of his taxonomic errors, it seems to me.

Sincerely,

Robert H Porla

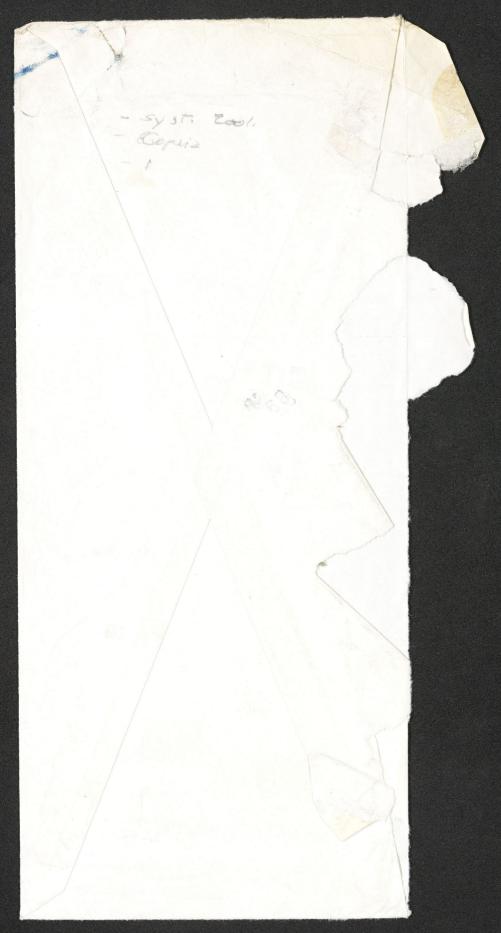
And its typical

Robert H. Berls 2751 Unicorn Lane, NW. Washington, D.C. 20015





Dr. Robert J. Behnke
Department of Fishery and Wildlife
Biology
Colorado State University
Fort Collins, Colorado
80523



elo 26-37

1628 / AFTERWORD

He's Simply making excuses for their lack of research. He had much of this waterial adam the words the book and particularly when he words the cuthorout ardicle for fly potential.

in their political careers, perhaps when Roosevelt was governor in Albany or Pinchot was governor at Harrisburg. It suggests that no evidence of their fishing exists in the register at Henryville House. Its conjectures include the possibility that anglers otherwise familiar with the history of the Brodheads might have confused the president with his son, Brigadier General Theodore Roosevelt, who did fish there often. And finally, it cruelly explored the probability that Charles Ross, the guide who assisted them, was senile and confused about Roosevelt during the last years of his life, when he was our warden at Henryville.

The essay seemed so plausible and scholarly that an average reader could not have known it triggered a mixture of anger and mirth among the men who had actually fished with Henryville Charlie.

Senility? we laughed together. Henryoille Charlie never had a senile moment in his whole life!

The painstakingly fabricated case that doubts the story of Roosevelt on the Brodheads is easily refuted, since it clearly lacks other firsthand testimony and regional background affecting its evidence.

Roosevelt and Pinchot were political allies in the Taft Administration. Pinchot resigned over the coal and timber scandals that he discovered in Washington, and such corruption played a role in creating their self-exile from the Republican hierarchy. Their names are missing from the Henry-ville register, because they were not staying there. Governor Pinchot lived nearby on the Delaware, at the family estate in Milford. Brigadier General Roosevelt was a regular on the Brodheads before the Second World War, and it is silly to suggest that its disciples might have confused the president with his son. The young general is pictured on the Haase farm stretch of the Brodheads in *The Anglers' Club Story*, which was privately published in 1956, and he died at Utah Beach in Normandy.

Henryville Charlie was fully active and alert until his last illness, and the old poacher had guided (there was a Wisconsin guide who served three on the Brule) two American presidents.

Ross was lovably austere about their skills on the river. Roosevelt could fish, he said. Coolidge couldn't.

Other criticism of *Trout* focused on the complex taxonomy of the fish themselves. Our first monographs were extensive lists of species and subspecies, particularly in the work of Barton Evermann and David Starr Jordan. Such systems of classification are seldom static or complete. Our American taxonomy of fishes is no exception, yet few anglers seem to understand its steady evolution.

One Western writer seemed startled by the changing list of American species and subspecies. *The book is filled*, he concluded testily, *with fish nobody ever heard of.*

Since fresh information has always intrigued and excited me, such criticism is puzzlingly sad. History suggests that only change is predictable

and fixed too.

How Its to changing century and substitutes rays supplentrails, collation checklist

Our eagerly bolster the tion or a criteria. Jordan a

Rod those cyc Everman rainbow, Europe.

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Ais 50-100 years believed and fixed. Science verifies that premise, and biology is ripe with examples

How has ichthyology changed?

Its taxonomy itself has passed through many cycles, and it is still changing. Our systems of classification have their roots in the eighteenthcentury work of Linnaeus in Sweden. His vardsticks for identifying species and subspecies were simple. Fish specimens using the Linnaean method were studied in terms of their physical character. Such morphological features as gillrakers, teeth patterns, distribution of fins, the number of rays supporting each fin, structure of skull and jaws, pyloric caecae of their entrails, vertebrae, and scale counts were collated and compared. The collation of such physical data gradually evolved into the physiological checklists we have used to define a species or subspecies.

Our early monographs are filled with errors. Biologists searched eagerly for unknown species, both to multiply our knowledge and to bolster their careers. Many species were described in terms of configuration or average size or color, which are variables that fail to meet Linnaean criteria. Many species described in the work of famous ichthyologists like Jordan and Evermann have largely been abandoned in recent years.

Roderick Haig-Brown wrote engagingly in The Western Angler about those cycles of change. During the half century that followed Jordan and Evermann, biologists largely agreed that our basic species were the rainbow, brook trout, cutthroat, and the brown trout introduced from Europe.

Other species included the arctic char, Dolly Varden, lake trout, and the richly colored golden trout from California. Haig-Brown was satisfied of the Depression years, was finally complete. His opinion is still widely — By Breeges shared among both biologists and angless. But it that his relatively simple list of species, which echoed the best ichthyology shared among both biologists and anglers. But time has proved Haig-Brown wrong.

What has happened?

Several things have happened to erode our certitude about existing taxonomy.

It is important to understand that its past collations of physical details was done manually, with notebooks and relatively few specimens. Memory was both a limitation and a tool. The scope of comparative data was confining and sparse. Computers have utterly transformed such work. Past data were rooted in hundreds and hundreds of specimens before the Cybernetic Revolution. Computers allow our modern ichthyologists to collate data from thousands and thousands of specimens. The judgments on species and morphology and subspecies spilling from their circuitry threaten to change much conventional wisdom, and biology is not the only thing they are changing.

Knowledge has exploded in virtually every field since midcentury, with education and technical training more widespread than ever before. Fisheries biology is exploding too.

Bull Tro

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AFTERWORD 1630 / Both government and other institutions have supported field work at S a scope dwarfing past efforts. Doctoral studies have multiplied swiftly, fi swelling our spate of new information. Such factors were seldom obvious to the fishing community, and the ecological movement had its impact too. The Environmental Policy Act of 1969 was the principal catalyst. It was easier to write the law, the late Starker Leopold explained over dinner in d Montana, than follow it. (How's that? somebody asked. T Leopold was the primary consultant in biology to the Department of iı the Interior over many years, particularly for the National Park Service. L Leopold lectured in biology at the University of California, and he had h played a major role in publishing his father's masterpiece, A Sand County fi Almanac. Nobody asked the field people, Leopold explained drily, and they were the key to the law. The Environmental Policy Act required the field personnel of the Fish 0 h and Wildlife Service to evaluate any proposed project in terms of its impact on rare and endangered species. It was a sensible function of the 0 law. a But it was rooted in a fallacy. Congress seemingly believed that science had fully described our ir N species, their populations, and their distribution. The first Environmental Impact Statements submitted under the law were routed to the Fish and Wildlife biologists. The field workers were asked to review each project for SI h its effects on the ecology. The field workers quickly pinpointed the fallacy of the law. We can't e ir perform our duties, the biologists told their administrators. We've never spent the money or time to know what's really out there. g N The confession was startling. Funds were allocated to fill in the voids. Perhaps the spate of field lia work triggered by the passage of the Environmental Policy Act of 1969 was as important as the law itself. We discovered things, Leopold explained, we never knew existed—including CY cl fish! The studies were filled with surprises. Our western mountains apth parently concealed a number of unfamiliar species and subspecies. Collan tion of specimens altered many past theories of relationships between m th trout stocks, particularly the suspected ties between the so-called golden cl trout, and our familiar rainbow and cutthroat species. The field studies were a fresh wind. n And its weather is still changing. tc Several new species and subspecies have been identified in recent aı years. The status of a few subspecies is still unclear. Some might still be St designated as a full-fledged species. bl New species include the Gila and Apache trout of New Mexico and Arizona. The Mexican golden trout was discovered in the Sierra Madre country. The precise classification of many subspecies is still a riddle. Some Nat now

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xico and a Madre lle. Some taxonomists argue that such subspecies as the Paiute, Alvord, Humboldt, Snake, Moriah, red-band, and greenback trout deserve consideration as full species. Others consider them exotic subspecies of cutthroats.

Cutthroat taxonomy is also puzzling. To Schwerbert

The Pacific drainages sustain a distinct subspecies, along with the fine-spotted strain of Jackson Hole and the Yellowstone cutthroats. Other distinct subspecies are known from the Utah, Colorado, Green, and Rio Grande watersheds. Some cutthroat strains, like the original Pyramid and Twin Lakes stocks, have been lost. The attempts at restoring Pyramid Lake in Nevada are based on cutthroat plantings of fish that are identical in Linnaean terms (their physical yardsticks match perfectly) but lack the hereditary life span to reach the average sizes recorded at Pyramid in frontier times.

Such genetic factors are critical.

Modern genetic theory has played no role in the evolution of taxonomy. It has roots little more than a century old, in the work on plant heredity described by Gregor Mendel in 1866.

His work was half-forgotten and ignored for thirty-odd years, until others began to discover its importance. K. E. Correns, Hugo De Vries, and Erich Tschermak-Seysenegg all verified Mendel's observations early in this century. William Bateson republished Mendel's findings with his *Mendel's Principles of Heredity* in 1902.

Mendel had discovered that specific traits were hereditary, and that such factors were inherited separately. Before his work, the patterns of hybrids were known and widely used, but were still rooted in trial-and-error methods. Mendel speculated that specific biochemical triggers were involved. Thomas Hunt Morgan demonstrated the triggering roles of genes and chromosomes in a lifetime of research, and was awarded the Nobel Prize in 1938.

Gregor Mendel was fully vindicated, and other pieces of his Mendelian puzzle fell into place.

W. E. Seifriz and others were exploring the secrets of protoplasm and cytoplasm in those years, and a growing volume of fresh data was changing our perspective of heredity completely. Caspersson had proved that chromosomes contained nucleic proteins in 1936, and that such materials were largely deoxyribonucleic acids.* His microspectrophotometric studies had unravelled a major secret. It had been widely assumed that such nucleic proteins might consist of a repetitive series of tetranucleotides, including adenylic, cytidylic, guanylic, and thymidylic components. But such speculation puzzled over the fact that such structures were too chemically similar to explain the variables in genetic codings. Genetic and cytogenetic studies had clearly pinpointed the chromosome as the structure containing the genes before the Second World War.

Other work quickly demonstrated that too many biochemical variables existed to make the theory of repetitive tetranucleotides tenable.

^{*} Deoxyribonucleic acids are popularly called DNA.

Several types of deoxyribonucleic acid were found to exist, and the studies of Avery, MacLeod, and McCarty strongly pointed to its role as a primary genetic component. Other evidence accumulated from widespread sources. Arthur Mirsky reported that deoxyribonucleic acid was a primary constituent of the genes themselves in 1949.

The studies that followed seemed to prove that deoxyribonucleic acids were the primary genetic materials from bacteria to mammals.

Chargaff began to demonstrate that deoxyribonucleic compounds were widely variable, proving that they possessed the properties to serve as our primary genetic triggers. Watson and Crick conceived their system of interlocking helical structures to explain the physical character of deoxyribonucleic compounds. The interlocking helical strands were found to display a highly specific hydrogen bonding. Watson and Crick also found that such hydrogen bonding between adenine and thymine, or between guanylic and cytosinylic components, could explain the principles outlined earlier in Chargaff's work.

The full puzzle is still unsolved.

But science has taken some giant steps in genetics which suggest that both fish culture and taxonomy must evolve radically in the future. Our simple list of species, which was widely accepted when Haig-Brown published *The Western Angler* in 1947, is subject to growing doubt.

Ichthyology had satisfied itself that riverine populations of rainbow trout, which did not migrate to the Pacific, were identical to the seagoing steelhead. The nineteenth-century monographs of Jordan and Evermann were jettisoned, because the taxonomic system found the rainbow and steelhead alike. But the system itself is based on the *Systema Naturae* of 1735, and it cannot explain the differences in behavior and size that obviously separate the rainbow and steelhead.

Genetics can explain them, and the differences between other strains, but our knowledge of genetics is too recent to embrace taxonomy. The intricate secrets of wildness, life span, migration, and growth are all hidden in genetic codes.

What does it mean to taxonomy? Leopold chuckled. It means everybody's right. Linnaean disciples who limit the classification of species to comparative physical details, and find the rainbow and steelhead identical are right pas long as they exclude deoxyribonucleic coding.

But modern electrochromatography can isolate the precise mixtures of amino acids, peptides, nucleotides, and colloidal materials like proteins and lipoproteins. Such substances of low molecular weight can be identified in electrophoresis, allowing us to pinpoint the genetic differences in separate tissue samples.

What does it mean in fish?

It means that the genetic coding in tissue samples taken from nonmigratory rainbows and steelhead are not alike, although the fish are structurally identical. The anadromous behavior of steelhead stocks is not merely chance, but is genetically transmitted. Winter and summer migrations are coded into the chromosomes too, and summer steelhead stay

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longer in their parent rivers before leaving for the sea. Summer, winter, and nonmigratory stocks seldom mate together, although they are alike in terms of Linnaean classification. The subtle variations in their genetic codes, the deoxyribonucleic pieces of the puzzle, are not alike.

And both sides are right.

The rainbow is a single species in terms of conventional taxonomy, which excludes our knowledge of genetic tissue coding. Electrophoresis tells us there are three species, each with its unique character, but is excluded from taxonomy.

Future biology is less clear.

Since genetic coding holds the secrets of wildness, size, rates of growth, migration, habitat preferences, and life span, it might become the primary factor in future fisheries management. It can help us match appropriate genetic stocks to proposed habitat, or select strains for their desired behavior.

There are obvious examples.

We might choose wild strains with long life-span heredity to get optimum results in a particularly fertile habitat with fine spawning grounds. We might utilize wild strains from desiccating watersheds, since their evolution in desertlike temperatures suggests a population able to survive in marginally warm streams. Summer steelhead might be introduced, since they are running over a longer season and in better weather than their winter-run cousins. The duration of their migrations at sea is also genetically coded in their tissues. The small steelhead called jacks or grilse have their physical character and behavior in their genes, just as the giant steelhead of British Columbia have their unique qualities encoded into their heredity. The atypically long saltwater migrations of the Sustut and Kispiox and Babine strains, lasting two and three years, result from the ticking of their genetic clocks.

Biologists are still unravelling such secrets, and our steadily growing knowledge of genetics is changing both fisheries management and taxonomy. Fish culture has created commercial sources of protein, but its role in sport fishing is still mixed. The failure of hatchery strains to cope with shrinking habitat and dams has multiplied our respect for wildness, and we are beginning to understand that fish culture has usually atrophied to the poverty of poultry farming.

Fly hatches are complicated too.

Each year I get letters from readers complaining about the Latin taxonomy involved in hatch matching. Most start with a weak joke about failing Datin in a brief choirboy period. Some are obviously baffled by taxonomy, and others ask plaintively about using the popular English names.

Still others talk of snobbery.

Like those who think the taxonomy of fishes was complete thirty-odd years ago, these fishermen are missing the point.

There are hundreds and hundreds of aquatic insects that are important fly hatches. Fewer than fifty have widely accepted popular names.

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(grow pedsuticism)

ROANOKE COLLEGE

Salem, Virginia 24153

Department of Biology

20 September 1985

(703) 389-2351

Bob Behnhe Calovado State Fishing Unit Fort Callins, CO

DISAR BOO:

Thanks for your remarks regarding Parasalmo, I noted with interest that Regan (1914) throught the Pacific trants and Orcoshynchus formed a natural group is Salmo s.s. Prior to reading salmonid literature for the Va fishes book, I was completely unaware of the wealth of systematic problems and interesting stories in the trants. I am glad we do not have any white fishes in Virginia.

Jigmentation patterns of gairdneri (or m. ividens) vs newpenzyi. The illustration in Behnhe (1979;149) (western Salmo monograph) indicates that the distal tips of dossal, and and pelvics to be pale in newlengi vs premented in saindneri. All our color slides of Va vainbass have a pall-tipped smal and pelvic, sometimes pectoral. Is this a persistent expression of a redband trait in the cultured vain bow stock? I am aware of the appoint hybrid origin of the California rainbows, but it seems remarkable that such a distinct character wanted remain offer years of hosteling culture.

I wonder if the new-wave morphometric types from Michigan to help with species and subspecies systematics in the western salmands, Julian Homphies is currently tackling Founded in 1842

over

Behnhe (2) the Centrarchidae, or maybe just Legomis, a good primer granp for Porasalmo. I have greatly enjoyed reading your requires. Would you please place me on your require mailing list. I would very much like a copy of your western Salmo monograph, or the orderes to write fait, Best, Nos Brikh

WILLIAM R. WILKERSON Director



STATE OF WASHINGTON

DEPARTMENT OF FISHERIES

115 General Administration Building • Olympia, Washington 98504 • (206) 753-6600 • (SCAN) 234-6600

June 20, 1987

Dr. Robert J. Behnke Dept. of Fishery & Wildlife Biology Colorado State University Ft. Collins, Colorado 80523

Dear Bob:

Greetings. I'm writing to send you a collection of recent reprints (some not really so recent I guess) and to let you know that I will be in Denver for most of the month of July. Margaret, Sarah, and I will be back in Colorado for vacation next month.

If it would be convenient for you, I would like to come up to Ft. Collins (probably early in the month) to say hello and talk a little about salmonids (esp. Pacific salmon). I would appreciate it if you could drop me a short note indicating what days and times would be best for you and sending me your office telephone number so that I can give you a call before coming up. Please write to me at my mother's address:

c/o 1535 S. Gaylord Denver, Colorado 20210.

Hope to see you in a couple of weeks.

Best regards,

gram

James B. Shaklee Biologist

PS: I have also enclosed a reprint of a general review article by Fred Utter and some of his colleagues which describes the type of work I am presently involved in.

3

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lost all of my horse in my jobe and lube, I have not done enything but I beel I am in the end ob line! so I think it coast me to loss every thing I have here to get Ph. D. then I will have more apportunity to bird Job some where in this world. I am almost 42 Man and if I don't be able to binush my study, in one or two years I would nort be able to binush it at all.

with this letter o'll sent you a copy of my master degree in the ease ab need. also I would be grate built it you sent me Berry's adress.

Reama has best regard for gon and you burnily

Persians Be, Ormide, Dielar (& hope to see you seem)

M. Saadate 89 - Dee - 6

Hough review January 3, 1990 Mr. M. Saadati Department of Environment P.O. Box 589 Mashad 91735 Iran Dear Mohamad: My advise is to persevere, do not let yourself become depressed to the point where you cannot function--keep trying and explore all options. I recall that Iranians are "very clever". Your problem concerns transferring your Iranian assets into foreign assets without losing 90% or more of their value (as assets) concerns with black market exchange), to demonstrate the financial security necessary to be accepted for immigration into a foreign country. When I was in Iran, this was very simple, I bought American Express checks in U.S. dollars with rials. Perhaps the time will come when this can be done again. I enclose a C.S.U. financial support statement, showing that about \$20,000 per year is required before a foreign student is admitted. I called the International Advisor at the Grad School to inquire how Iranian students at C.S.U. are presently being funded. Most are being supported by the government. There are some Iranian students paying their own way or funded by their families. I was told that for such students, money is deposited in the Bank Melle in Iran which converted rials to U.S. dollars, sent to C.S.U. to support the student. Thus, there is a possible mechanism to convert rials into dollars to pay for education in a foreign county. I don't know what the conversion rate is, but it must be much better than the black market rate. I suspect that acceptance into this program for foreign education is not a simple matter and requires some friends in the government. Would administrators in the Department of Environment support your application for Ph.D. study in the U.S. (or another country)? I noted a recent book review of: "Snakes of Iran" by Mahmoud Latifi, published by your department in 1985. Thus, some scientific work appears to be supported by your department. The fishes of Iran would be a most appropriate publication for the department-based on your proposed Ph.D. work. Hopefully, the political atmosphere in your country will become more enlightened in the near future. Until then, however, because of the poor relations with the U.S., make inquiries at other foreign embassies; for example, Canada. What financial requirements do other countries have for immigration? I sent your corrected address to Brian Coad at Canadian National Museum (I sent all Iranian and Saudi Arabian specimens for deposit at Coad's museum). I inquired if there might be an opportunity for you in Canada and if he knew of any Iranians in your situation -- how did they convert their money?

Mr. M. Saadati January 3, 1990 Page 2

Barry Nehring's address is: Colorado Division of Wildlife, 2300 South Townsend, Montrose, Colorado 81401. If you write to Barry, ask him if he knows Fred Herrington's address. Fred may still have Iranian contacts which could be useful. Last time I saw Fred, he was trying to influence the Iranian government to let Mr. Firouz out of prison. What happened to Firouz?

I plan to seek further advice from Iranians at C.S.U. I have the name of a person in Engineering but have not been able to contact him. If I learn something of interest I'll let you know. Good luck and stand tall.

Sincerely,

Robert S. Behnke Professor, Fishery Biology Department of Fishery & wildlife Biology

RSB:dj

Dept. of Env. P.O.Box 589 91735 : 60 Mashad To : Dr. Robert J Behaling C.S.U. Department of Fishery and w Fort Collins, 80523

Snakes of Iran Copeis

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Brian Coad
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P.O. Box 3443, STATION
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KIPEPY



and sound has any of her

fold obligation: raising the kids, running a business and take care of the environment.

That's why we are lousy letter writers. We are also in and around the house because of the baby. It is better for her to live in a well known "habitat" and not too many new impressions at a time. We look foreward to next year, when she will be a little more grown up and transportation will be less of a moving activity.

In summer we spent two weeks in Italy at the sea where we visited Venice, the glass factories of Murano, the mountainous ALPEN; we had a relaxing and sunny time there. Now we look foreward to a skiing holiday in Switzerland in early January.

Over here everything runs smooth compared to other parts of the world. Our economy goes up again although the number of unemployed people is still around 8%.

People talk about AIDS and SDI, feline leukemia and infectious peritonitis/serositis.

Politically we still await the united States of Europe! There is still a long way to go, although Portugal and Spain become new members of the common market. Travelling has become a bit easier but still we miss a common currency, more political things in common less ego-thoughts of the nations.

Our environment seems to die of pollution such as sour rain and waters, washing powders spray gases and chemicals. Even on the pharmaceutical field people try to get rid of animal experiments, more-fold testing, unnecessary killing of (laboratory) animals for research purposes etc.

We are also proud of having had the second German in space. Mr. Messerschmidt is the husband of a girl who went to school together with me and we got to know him in person before he went on his mission. He is an intelligent and humble guy.

For today that's about it! We wish all of you a very good time! Hope to see some of you soon. So long

Carl and fairily

21986







Dear friends,

Again it's x-mas time and we like to send our best wishes to you. May the holidays to come be joyful, peaceful and warm, the new year meet you in good health, success and hppyness. We all do wish you the best.

Now I'd like to inform you on some changes that took place here.

As you have realized last year we moved to a place of our own. We live at Sindelfingen, where my office is located in a quiet neighbourhood close to the forests. We do have a lot of fresh air, bird's songs, trees and plants, hiking and outdoor facilities such as childrens playgrounds, barbeque places, dogtraining tracks, sledge courses, small skiing slopes jogging and gymnastic parcours.

These last months we were busy in reconstruction, remodeling and renewing our bungalow which has now-finally come to a status which we consider to be close to what we whished to have. We now are prepared to welcome more overseas visitors without having to live "squeezed in".

Since June 29 we are one more member of the family.

JULIA Stephanie was born that day and we all are happy to have a healthy, nice, friendly, prospering little daughter. Miki, 5 years already, is a sensitive fellow who loves to paint, learns poems, dances and plays music on the flute. Carolin a boy type girl is having balley classes, climbs trees, helps me to treat animals and works with hammer and screwdriver in the house.

As you can imagine, Monica and I have at least a three-

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Department of Fishery and Wildlife Biology



Colorado State University Fort Collins, Colorado 80523

23 June 1986

Mr. Barry Nehring Colorado Division of Wildlife 2300 South Townsend Montrose, CO 81401

Dear Barry:

Many thanks for your comments and critique of my critique of instream flow methodologies; your response is much appreciated.

My report was written for the Salt River Project in Arizona where water rights are presently in the process of adjudication. The objective is to try to avoid the knee-jerk, know nothing demands of negotiators representing state and federal agencies, Indian tribes, etc. who parrot cliches such as, "must perform IFIM", "HEP", etc. without any understanding of the most significant issues involved in any proposed changes in a flow regime (I'm sure you know the type of people I have in mind). Since my critique was not written for publication or wide dissemination, and I wanted to emphasize the critical importance of the human element of experience and expertise as opposed to a mechanical rule book approach to environmental assessment, I highlighted only you as an example. It takes some years of experience, even by the brightest of people, before the problem of the "illusion of technique" becomes apparent. I didn't know if Rick Anderson had reached this plateau yet. In any event, I didn't mean to ignore Rick's contribution, only that it was simpler to base my human factor example on one person.

When I write such reports, I usually attempt to reemphasize certain key points by elaboration and additional examples. I hammered this report out over a weekend as a rush job. When I read it through for the first time, I realized I missed an opportunity for some obvious elaboration and example of the conditions most favorable for optimizing predictive accuracy of any habitat model. You picked up on this right away and made the correct synthesis, but I doubt anyone else would see the obvious. This concerns the restraints of "stable, isolated, and highly recurrent" (and the use of narrow niche species in a relatively homogeneous environment). A river such as the Gunnison, regulated by a great storage project essentially transforms (or at least has the potential to) a highly variable and unpredictable environment into a controlled (stable, recurrent) environment. Although trout species have broad niches, the early life history--incubating eggs and newly hatched young have extremely narrow niches. Under such conditions it can be rapidly learned what flows produce strong and weak year-classes because there is strong direct cause-and-effect relationships, essentially uncomplicated by other influences, between flows in critical river segments with yearBarry Nehring 23 June 1986 Page 2

class strength. That is, the biomass of the accumulated year-classes is highly dependent on the individual success of each year-class, which, in turn, has a strong dependency on flows during spawning, incubation and for 8-12 weeks after hatching. In natural, uncontrolled environments, where surplus reproduction occurs (most warm-water species and trout streams not exposed to great annual fluctuations (Ca.100 or more:1) between minimum and maximum flows), other, much more complex and interacting factors such as food supply, competitors, predators, etc. determine biomass of a species (the accumulated year-classes) and the accuracy of any predictive model can be expected to go astray.

The only point on which we might disagree concerns your optimism that, "incredibly complex and highly predictive" models can be a reality (broadly applicable to a range of environments and species associations?), because additional components and complexities can be built into a model.

I would point out that this would only be possible where the new components have strong "linkage" to each other--strong, direct cause-andeffect relationships. I can't conceive of many factors that behave in this manner. For example, if we are to construct HSI curves accurately reflecting nature and want to model the effects of nutrient enrichment on trout biomass in a stream, to be accurate, there must be a linear relationship between nutrients and trout biomass. Considering the complexities of getting the nutrients into primary production, transferring the primary production into secondary and tertiary production and their availability to the trout (ignoring the highly variable and uncontrolled input of allochthonous terrestrial food into the trout's diet), it is understandable why the literature on the subject reveals such a tremendous range of variation between nutrients, invertebrate diversity and production and trout production--there are certainly trends apparent, but not trends with tight linear relationships needed to construct predictive models of general application. Long term monitoring of a specific trout population in a specific environment would allow for a relatively accurate model for that specific environment if the components being monitored show great regularity (highly recurrent) in their cause-andeffect relationships, but the model would not be transferrable to a different environment with the same expected accuracy. When numerous independent or weakly linked variables are used to construct a predictive model, there is a random tendency for them to cancel each other and render the model predictively worthless. For an example of this phenomenon see Layher and Maughan, 1985. Relations between habitat variables and channel catfish populations in prairie streams. Trans. A.F.S. 114(6): 771-781. A completely objective, quantitative, seemingly highly sophisticated study to develop a model to predict channel catfish biomass, which simply doesn't work. An example of the "illusion of technique".

I am still sometimes amazed at the range of natural variation found

Barry Nehring 23 June 1986 Page 3

even in simple and stable ecosystems between nutrients and fish production or biomass. Bill McConnell had some students conduct microcosm experiments with known factors of enrichment and Dave Galat's Ph.D. thesis concerned microcosms of Pyramid Lake water, algae and invertebrates to define tui chub production. After a few months, microcosms with the same species, starting out under identical conditions and maintained under completely uniform conditions might exhibit several fold differences in accumulated biomass. What was apparent was consistent trends--species low on the trophic level (carp and tui chubs) produce more biomass per unit of time than smallmouth bass, but the data revealed the impossibility of accurately and consistently predicting what a species biomass would be given a known enrichment factor.

With examples such as this in mind, I do not believe that any future models (of general application over a range of environments) will ever predict biomass of a species associated with changes of certain environmental variables in a consistently accurate manner. Only in controlled environments (stable and highly recurrent) such as regulated rivers where simple and direct cause-and-effect relationships between one or very few factors can be demonstrated such as flow and year-class strength can predictive accuracy be expected. The danger is that too many people want the machine to do their thinking and decision making. There can be no adequate substitute for human experience and expertise. I would admit, however, that the demand for people running around the country making IFIM analyses has provided employment for many of our students who can't otherwise find jobs.

Sincerely,

Bob

Robert J. Behnke Professor, Fishery Biology

RJB:ew

NATHANIEL PRYOR REED POST OFFICE BOX 375 Hobe Sound, Florida 33455

August 13, 1986

The Honorable William P. Horn Assistant Secretary for Fish and Wildlife and Parks U.S. Department of Interior Washington, D.C. 20240

Dear Bill,

Thank you for your thoughtful letter of July 29.

I accept your recommendation with enthusiasm and would urge you to include Bob Behnke in the blue ribbon

If such a committee is formed, I have some further thoughts on Atlantic Salmon opportunities.

With best wishes,

Nathaniel P. Reed

NPR: jb

There were sweetish Saluan Hatchedies tuanno and thansands of young feel plus the same in Honday.

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bc 7 Behnke



United States Department of the Interior

OFFICE OF THE SECRETARY WASHINGTON, D.C. 20240

July 29, 1986

Mr. Nathaniel P. Reed P.O. Box 375 Hobe Sound, Florida 33455

Dear Nat:

Thank you for the invitation in your letter of June 19, 1986, to chair a committee investigating the genetic qualities of fish produced by Fish and Wildlife Service hatcheries. I share interest in this important topic with you, as do professional fishery biologists and many fishermen. I would like to suggest an alternative to the panel you proposed.

As you know, the American Fisheries Society (AFS) is composed of a broad array of talented, professional fishery scientists, many of whom are also dedicated anglers. A Fish Genetics Section is being formed within the AFS and at least two sessions at the 1986 annual meeting of the AFS deal with fish genetics. The AFS also is willing to provide impartial professional counsel on various matters relating to the use and management of fishery resources. I will talk with Mr. Carl Sullivan about formation of a blue-ribbon panel that would study all the genetic implications of current fish production and stocking practices of Federal, State, and private hatcheries. The panel should have representation of anglers, fishery managers, fish culturists, geneticists, and natural resource administrators. The panel would examine present practices, identify information gaps, and suggest policies to be implemented by management agencies. We would be pleased to participate in such an effort.

The Fish and Wildlife Service is doing some genetics work, especially in the lake trout and Pacific salmon programs, but the problem of maintaining the genetic integrity of the Nation's fish stocks extends far beyond the Federal sector. I think the approach I have suggested will be more productive than one aimed solely at Federal activities. I stand ready to cooperate with you in facilitating such work.

William P. Horn

Assistant Secretary for Fish and Wildlife and Parks

Memo from . . .

9-15-86

NATHANIEL REED

Boto Benke -I was merely eurious - Iquess I or I Should pay you - stinked the pot! Best Workers

Dr. Robt. Behnke Colorado State Univ. Dept. of Fishery Ft. Collins, CO 80523 NATHANIEL PRYOR REED
POST OFFICE BOX 375
HOBE SOUND, FLORIDA 33455



September 9, 1986

Mr. Nathaniel P. Reed Jupiter Island P. O. Box 375 Hobe Sound, FL 33455

Dear Nat:

Recently you sent me a copy of comments by Bob Behnke on the Salmon Genetics Research Program. I referred Dr. Behnke's comments to Dr. Gerry Friars, the Chief Scientist for the program, and his observations in response are attached.

As someone who knows little about genetics, I am nevertheless positive about the achievements of the research program here, particularly in relation to development of stocks for aquaculture, where the SGRP has played a lead role. Further, some of the ancilliary research activities which were spawned incidentally to the genetics research may be as, or more, significant to long-term salmon management. Some of those are referred to in their Annual Report. But there are many others that have taken place over the 10 years of the SGRP program. Come up and see what is happening some time. You pass nearby every time you go to fish the Cascapedia or Restigouche.

Best regards.

Sincerely,

Wilfred M. Carter

President

Management Board

WMC/em

Enclosure

CC: Dr. Gerry Friars



MEMORANDUM

TO: Dr. W. M. Carter

DATE: September 4, 1986

FROM: G. W. Friars

SUBJECT: Comments on a letter to

Mr. Reed from Bob Behnke

The letter has some worthwhile viewpoints. However, the author makes some "wide sweeping" statements that are not well supported. Some comments on the issues raised are as follows:

- 1. The matter of preserving genes from unique stocks has received considerable attention in view of the fact that Atlantic salmon populations from seven different river systems have been incorporated into gene pools of Strains A and B (Table 1, SGRP 1986 Annual Report).
- 2. In connection with plants and animals selected for agricultural production being allowed to fend for themselves, the author needs to take note of the stocking of wild turkey habitats in Pennsylvania using gene pools from domesticated sources, the populations of feral horses in the Western United States, the success of the University of Alberta synthetic populations of beef cattle under winter range conditions, the success of seedlings from cultivated strawberries under roadside conditions or (in the case of fish) the recent successes with stocks of splake in the Great Lakes.
- 3. Success with genetic control of furunculosis resistance has enhanced the splake development program in Ontario. The indications of a heritable resistance to our 1984 outbreak of this disease in the SGRP lends credence to the possibilities of success with Atlantic salmon. Certainly, the selection for resistance to disease has been meritous in chickens (Friars, G.W., J.R. Chambers, A. Kennedy and A.D. Smith, 1971. Avian Diseases 16: 2 10).
- 4. The reference to tranferrin alleles in Oregon Coho salmon inadvertently points to the weakness of studies with single genes in quantitative traits, particularly where a correlated trait like return rate is involved. The book ("Introduction to Natural Selection" by Clifford Johnson, University Press, Baltimore) points out the need for the consideration of multiple genes and hence quantitative analysis of traits in natural populations.
- 5. The reference to the poor understanding of evolutionary processes on the part of quantitative, population geneticists needs to consider the fact that both fields have common roots in the pioneer work of

page 2 W.M. Carter people such as R.A. Fisher and Sewall Wright. The use of techniques developed in agriculture become more and more appropriate where the author eludes to the fact that wild stocks are 6. subjected to environments influenced by man as in the case of "dam blocking tributary, acid rain". A further consideration of this nature encompasses the fact that modern fishing techniques have enhanced the ability to exploit Atlantic salmon stock in feeding areas such as the Greenland Sea. The fact that tagged fish from Big Salmon River have never been recovered in this fishery has important implications for Salmon stock management. The author emphasizes the role of selection in breeding work. 7. However, the mating system is tremendously important, particularly where inbreeding tends to have detrimental effects when populations stem from small numbers of effective parents. There seems to be a general failure to recognize the fact that cage-reared samples of populations can enhance programs with release-and-return studies. The use of pedigrees and the rearing of sib groups in the two environments allows propogation of "ability-to return-genes" that would be impossible with only released samples of populations. Hopefully, some of the points raised will be helpful to you. GWF Gerry c.c. J.K. Bailey J.M. Anderson



Sheraton Frankfurt

D-6000 FRANKFURT/MAIN 75, WEST GERMANY, FLUGHAFEN FRANKFURT RHEIN-MAIN TELEFON: 069/6977-0 · TELEFAX: 069/69772209 · TELEX: 4189294

> TTT Sheraton WORLDWIDE HOTELS INNS RESORTS & ALL-SUITES

Have you ever visited Schulau. the welcome point for vessels sailing in and out of Hamburg Harbor on the Elbe? It's near where the Peters lived. We noticed this plaque for the first time on our last trip!



MALA AD WATER CHANGE OF CHANGE

AND WEW YEAR

1985-1986

FIROM LAVIDA MUDDO



San Jose del Cabo Baja California



Dr. Robert Behnke Colorado State University Dept. of Fishery & Wildlife Ft. Collins, CO 80523 BOX 375 HOBE SOUND, FLORIDA 33455





Game and Fish Department

528 South Adams Street Laramie, WY 82070

(307) 745-4046

BILL MORRIS
DIRECTOR

August 21, 1986

Dr. Robert Behnke Department of Fish and Wildlife Science Colorado State University Fort Collins, Colorado 80526

Dear Bob:

Received a copy of your report, "Critique of Instream Flow Methodoligies", from Jim Mullan. I found it very interesting, particularly the references to HQI, fish stocks, and adjustment of fish stocks to habitat. I'd like to visit with you more about HQI, either via the mails or in person in Fort Collins at your convenience.

As has been indicated HQI is used widely through Wyoming to quantify habitat associated with stream trout fisheries. That use has not been without difficulties, however. There is a tendency to want HQI (or perhaps any model) to do more than it is capable of doing. Often, HQI measurements are taken and score calculated followed by an estimate (usually multiple pass electroshocking) of standing stock. When the two "scores" don't agree people often quickly criticize HQI for not predicting within tight limits, the actual stock measured. I don't believe that it should be expected that HQI and point stock estimates would agree number for number in all cases. If that were the case, there would be no need for a model.

As I am sure that you know, HQI appears not to fit certain sorts of streams. For example, relatively steep canyon sorts of waters (such as, Middle Fork of Powder River) appear outside the limits of the model. HQI generally underpredicts stocks in such streams as the Middle Fork of Powder River. The resultant response by some is that the model ought to be refined such that it works on the problem streams as well. We are reluctant to "make the model fit" those sorts of cases because, should the result be unsatisfactory, greater question would be leveled at the model and process.

There has been considerable discussion about the degree of subjective judgement required by the HQI process. It occurs to me that such judgement is part and parcel, heart and soul of fishery management. It has been requested that HQI rating scales be decimalized such that judgement is reduced. Having been acquainted with HQI for some time, I would appreciate your thoughts as to the judgement required to make the model and process functional.

Dr. Robert Behnke August 21, 1986 Page 2 Allen has indicated that HQI could be used in flow analysis but that the process would be rather cumbersome. That is, in order to say anything meaningful about stocks and flows HQI measurements would have to be made for each flow for which information was desired. The process of modeling is often taken as a black box solution to problems across the spectrum of modeling. The results of modeling ought not to provide the "decision" but the framework for discussion upon which ultimate decisions might be based. The touchstone of most criticism of the HQI process is the amount of judgement required to complete the process. Judgement is difficult to quantify, particularly when amount of judgement is the focus. Fishery science is founded on judgement. There may not be a more difficult part of the world to assess than the number of fish in a section of stream. Swingle's classic studies illustrated that the only reliable way to find how many fish may be in a stream or pond is to drain the system and count the fish remaining. Allen is working with HQI this season towards evolution of Model III incorporating additional information from more streams. He has more information from such streams as Sand Creek and a range of others he has worked through the years. The results will be interesting. Would the morning (perhaps 10:00 a.m.) September 4 or 5, 1986 be alright for a visit about the HQI process? I would be glad to come to Fort Collins either day. Thanks for your assistance. Sincerely, Robert W. Wiley Supervisor, Fishery Research cc: Dr. Al Binns RWW/kc

Bob Wiley Supr. Fish Research 528 S. Adams St. Laramie, WY 82370



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Department of Fish & Wildlife Science
Colorado State University
Fort Collins, CO 80526

Dick Garal
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Junesu, AK 99801
11120 Glocier Huy



United States Department of the Interior



FISH AND WILDLIFE SERVICE NATIONAL ECOLOGY CENTER

2627 Redwing Road, Creekside One Fort Collins, Colorado 80526-2899

November 17, 1986

Dr. Robert Behnke
Fishery and Wildlife Biology Department
Wagar Hall
Colorado State University
Ft. Collins, CO 80523

Dear Dr. Behnke:

I would like to personally thank you for your review and comments on the brown trout and chinook salmon Habitat Suitability Index models. Your comments were beneficial in helping to explain the complex relationships that occur between these species and their habitats.

Enclosed are copies of the final publication for each species. If you would like additional copies, please feel free to contact me (303) 226-9421. Once again, thank you for your time and effort in reviewing the models.

Sincerely,

R. C. Solomon

National Ecology Center

Enclosures

R, & spown ble [les Marnell] Pollerd Parketury [ea1987] Vencouver Es. Hi Bob, I hope you and the family enjoyed the holiday season. Sorry for the handwritten note, but our secretary is still on holiday leave. Enclosed is our draff manuscript. This is an unedited first draft, so it clearly has a ways to go. Input from you and Fred should give it a big boost. I followed the format quidelines for the Canadian Journal of Aquatic Sciences. Busak and Gall's 1980 article is included as a format quide since their paper appeared in the Canadian Journal. Please give special attention to content and organization of the paper -- add, delete, or modify any statement(s) as you see fit. Frankly, I've worked so long and hard on this that I'm probably not able to do anything constructive beyond this point for now. But it's a start! Fred has an identical copy. After I receive your respective comments, I will try to synthesize our collective wisdom into an updated draft.
Note that blank sections have been left in the Methods portion for you and Fred to fill in the details of your lab procedures. Since I am not well versed in the

electrophoreris "arts", I am asking Fred to critically scrutinize my treatment of that data, and my interpretation. I'm sure that some material pertaining to this is poorly written. Aside from general review and editing, Bob, I would ask that you pay particular attention to the interpretations and ecological premises set forth in the Piscursion section. You have the strongest background in fish ecology and systematics among the three of us, thus, I'll count on you there to strengthen that part of the paper in particular.

One specific point that I would like to submit for your consideration concerns whether or not we should include a Figure' illustrating results of the Principal Component Analysis. I see that Busak and Gall did so in their

paper, what do you think?

Also, since I do not have access to a good library, the manuscript might be a little weak in the area of technical literature review. Accordingly, don't hesitate to draw upon your knowledge of the literature to strengthen this aspect of the paper as appropriate.

. . .

Tables 4 and 6 are still in rough draft form but will be typowritten in the next revision. Incidentally, the tables presented are open for discussion also. Some may be unnecessary or in need of revision. I suspect Fred will have some things to say about several pertaining to his work. There are still some typos in the draft, but rather than try to patch these up now, I decided to wait for input from you and Fred and try to take care of them in the revised draft.

this paper means a lot to me, both personally and professionally, so I'd appreciate your careful scrutiny. I would like to get this submitted and, hopefully accepted, by summer if possible.

why don't you plan a trip to Glacier next summer. I will be in the field much of August - would be nice to have you spend some back-country time with me.

Dear Bob and Sally,

This is letter writing day. Beautiful sun shine and warm weather predicted again today. Had lots of rain last week but still below normal.

Been reading and hearing about the many fish and birds dying near Reno at the reservoir. No one seems to have the answer as to reason.

Indications are that this will be the best salmon season in 15 years. The steelhead this past winter have been fabulous in the rivers.

Wondering if you saw the 3 parter on Cutthroat in Yellowstone on PBS. Good series....

Took a trip South last week in January. A nice 10 vacation with friends. Also visited the Wild Animal park near San Diego. We are members of long standing and always get a thrill out of seeing the animals and forl. They do a terrific job.....

On the return we stopped at Mojave airport for a look at the VOYAGER, wound the world plane.

Seems almost impossible that such a small plane with only 2 engines could accomplish such a feat. The 2 pilots deserve all the credit they are getting....

Looks as though it is wider than long and the crews cockpit is indeed very small....

The Villwock's daughter Nettie hopes to make a US tour with her fiance in May. She is in premed school and is a charming, vibrant young lady.....

Our friends from Spain, Tony and Fina will be in California on home leave from April 25 to May 25 and will come up during this period for a visit.... So you can see we are busy, busy, busy.

Hope all is well with you all, Robert, Cynthia, and , did you say a MULE?

That is it for the time being. How about Alaska and the Gards. Thought the 60 Minute special on the Segurist daughter was very good. Ruth did an outstanding job. That is it. Bye.

Love,

The designer and builder of the aircraft was present at the hangar. Looked very pleased with himself and the accomplishments. Guess eventually the plane will end up at the Smithsonian.

from Carmel to Monterey. His British owners of the Carmed abode evicted the tenants effective Feb. 10. We found some prospects for Carl in Monterey and he is now living in a nice apartment above Cannery Row overlooking the bay. He and cat Seiji are very happy and all is well.

We will leave for Baja middle of March. Our family was burned out since our last visit in May. The bus will be loaded as all our friends have been most generous in their contributions.....Have new radials on the bus and raring to go.

Speaking of the bus. VW of America has been conducting a search for an early vintage camper to be rehabbed and donated to the Ford museum in Detroit. We submitted but lost out to a 59'er. 27 years old and only 54,000 miles recorded. Bought in Southern California and from the photo they sent looks like kt was just driven off the assembly line. Also of note is the fact that they began importing VW campers in 56.

We think of you often. Didn't see Cymthia on TV but hope she had a good time at the Bowl.

If all goes well may make a trip that way in early summer or early fall depending on how our scheduled company works out.

PAUL & NANCY SEDON 16401 San Pablo Avenue, #325 San Pablo, CA 94806





Mr. & Mrs. Robert Behnke 3429 E. Prospect Fort Collins, Colorado 80521

100 mm of the control of the control

Gp 28th Bab Behnke: The harder and faster I sun, the further behind of get ist what's new? The new Litchery manager here at Leavenwall NFH is Greg Praticher, He was the assistant at the Nworshak NFH, so I asked him if he would answer any question that he felt confident about In the ISSU Elchnical advisor letter of Feb-11 th. His answers are attacked to your not and ISSU letter a fisherie brologist than the typical USFW 5 Salchen flake-top. The more I see of the mid-Col, the more Sparent of realize of am, so dilleur the Sack Rown to other. At times I believe an Collective Januare in bottomless. The menuscript you had Ward send over for seview looked pretty good, so I forwarded it to be Chapman, and he made Aninar corrections and returnelit to Ward. Chepman so one of the few around who his detailed conceptual overviews of the Cold, especially the Such K. There seems to be no end to the complish Of these systems. Revulales, I'm making pigges, finish pulling all the data touther, making some sense of it, and getting it published it will be a much. Revertheless, the only way to go - frustration and occasions expelaration

a deat allach on wenteral relapation be the reterement prolun One outcome of the sunbow steelhed delimine Amen is a masters these under blick Whitney, the of Wa, Comparing stulhed smalls "captured at Rock Island and Richy Reach dams for smalltofication and growth, using both otaleth and scales. Hen William is serte reduce hered on the student, who is both bright as hell and more as hell. The so called stulked Anolts passing the clams are an inculible mightie Of milget and giants, some observed, smoth and some not, with all kinds of intergrades. You Can you say what you are doing if you cannot define a small? They boys have been monetony The age o and age I Church smalls start downstream Ammediately and are gone from the trinslehee & 24-43 Ars. Generally speaking they are at Rock Island Dam 57 miles clownstrum on 48 km. The stulker smotts generally are less than a mile downstream in the Same time interest. a hell of a lot of them besome resident sambor trout, at least for a while on the Kalama. I suspect things are some what chifferent here on the mid-Cal. That is why kin and I are struggling with all this unknowns. Coastel stulhed appear to be much different then

Atten these long distance sunners upine. But, who really knows is specially with the interney dams and reserving.

In the seach for answers, die heen

Gething a bit of material. The Inclosed
M5 theses was picked up in the chagnet, but
down't have much meening for us, but I know
you would be interested.

Ancidently, an som familiar with winter Onions Of not I will send you some seeds in August. They are fort-proof and withwhil. This fool needs more such day to grow plents when virtually nothing else is available. I had more seen as heard of them until Rel Petted slowed them to me. I've her seating them sense early March.

> Oleen, Ima

Dr. V. V. Barsukov

Zoological Institute

Academy of Sciences, USSR

Dean Volodya:

Dean Volodya:

I recently talked with American people of the American delegation who have just been averanging the USSR-USA sport-fishing symposium. They have recommended that and Mrs. Dorofeevs be invited to the seymposium (feerhaps you can say a few world on peace and priendship to open the symposium and Mrs. Dorofeeva can present information on certain doviet salmoneds of interest to foreign anglers such as the Caspian trout, taimen, and lenok). Let me know if you have received world of this invitation.

The american delegation has just reterned from the USSR where they were a attempting to arrange townist angling trips for atlantic selmon, Salmo salar. Some problems were encountered put concerning basis information necessary for planning angling trips for selmon and my advice was sought to answer quotions, specifically on the salmon specifically on the salmon specifically on the salmon specifically on the peninsula. The most obvious problem concerns the timing of the angler trips to coincide with the timing of the angler trips to coincide with the salmon reuns in various riverso

From my familiarity with the Russian literature on 5. salar, such as Berg (1948), Academy publications you have sent to me such as "Ecologiya i systematika lososevidnykh ryb", and Voprosy Tkhtiologii, I summorized the following basic information on Barents and white fea salmon, with particular reference to the Kola Peninsula. The first, or "spring" ruen of salmon occurs soon after ice-out in may. This salmon of this run one troops called "zaledka". Summer-run selmon (in June) are called "zaledka". Summer-run selmon (in June) are called "zakroika". Grisle, or "tinda" begin to run up rivers in July. The

(2)

august - September. Don sono The autumn run selmon oromain in the river for one year and spawn the in the spring? theyes following gear their entry of Berg belleved that The spring? they following gear their entry of the most rivers such as the Pechora and Mengen, the automors almon In many rivers of the Kola Penursula, however, the autumn salmon are small in size (4-5 kg. Ponoi, Varguga rivers) because they spend only one or two years in the sea. These smaller cutumn salmon are called "listopadka". Before a successful & salmon angling program for foreign tourist can be established, a basic book of information must be available on the times, relative abundance, and greening and maximum siges of the salmon in each run for each river considered to be open for foreign anglers. How might such information be obtained? I mote that the academy has branches in Karelia and Kola (Murmansk Biological Institute) which have published papers on Karelian and Kola 5. Ralar The potential to bring in considerable amounts of foreign currency for salmon sport fishing is great, but cooperation among several agences Soviet agency will be necessary to realize this great fortential. I would like to see the academy become, what we call, the "lead agency" on the matter. Hopefully, you and Mrs. Dorofeeva will be at the symposium (planned for late deptember in Riga, Latvia) we will have much to discoss deptember in Riga, Latvia) we will have much to discoss the Trudy His of the Zoological Institute with your paper on Grockefishes and Dorofeeva's paper on Salmo marmoratus (with first report of hypethmoid bone), petting

Sincerely,

run, or "Zaledka" are the same as The autumn salmon, except that they remained at The mouth of the river or in estuary to overwinter. Committee of the commit



LEE WULFF PRODUCTIONS

BEAVERKILL ROAD, LEW BEACH, NEW YORK 12753 • 914 - 439 - 3798

June 11, 1987

Mr. Robert J. Behnke 3429 E. Prospect St. For Collins, COLO 80525

Dear Bob:

Enclosed is a copy of a letter to Donal O'Brien, Chairman of our management committee at the Atlantic Salmon Federation, U.S.

We've had policy discussions about the value of our research to the anglers who put up the money and the wisdom of continuing this type of research.

We'd appreciate it very much if you could give us your evaluation of our programs, and the wisdom of continuing this research as compared to selling the two million dollar facility and using the proceeds on our main problems which are political with Government regulations, Commercial overfishing and devastation by Indian bands.

If there is a fee for your evaluation please let me know and I'll cover it.

Sincerely

Literature on our research will go our under separate cover L.W.



LEE WULFF PRODUCTIONS

BEAVERKILL ROAD, LEW BEACH, NEW YORK 12753 • 914-439-3798

June 10, 1987

Mr. Donal O'Brien Suite 5600 30 Rockefeller Plaza New York, N.Y. 10112

Dear Don:

Thanks for your letter. But there was no need to send copies of Wilf's correspondence. St. Andrews is his baby and he favors it. Now we should make inquiries of unbiased and competent people who could answer these questions.

Is it wise to spend most of our money on genetic research when (a) most salmon anglers (who are putting up and have put up the money) think the Atlantic salmon is at the top of the heap already as fighting fish and, (b) our major problems are political in nature?

Since our return to anglers in superior fighting fish from this research over a period of seventeen years has been minimal and we compare it with the benefits we've gained in salmon conservation from our far less well funded political action would they, in our position, continue to pour money into research or sell the facility and use the money for political action?

As to your mention of the value of research in work on the whooping cranes and wood storks it doesn't fit our case at all. Those birds were threatened with extinction while the Atlantic salmon has never been on the endangered list and there has never been any fear of their extinction. So we are kin to the Conservation Organizations that have political rather than survival problems like the National Wildlife Federation, the Sierra Club and the like.

I'll write Bob Benke and ask him to get in touch with you.

Hope you're having some good salmon fishing. I'm looking forward to fishing with Joe on the Restigouche and I hope we can fish together one of these days.

Best regards,

cc Joseph F. Cullman 3rd

LEE WULFF PRODUCTIONS

BEAVERKILL ROAD, LEW BEACH, NEW YORK 12753



Mr. Robert J. Behnke T R O U T 3429 e. Prospect St. Fort Collins, COLO 80525

Montreal, 1st September 1987

Dr. Robert J. Behnke Department of Fishery and Wildlife Biology Colorado State University FORT COLLINS Colorado 80523 U.S.A.

Re: Salvelinus salvelinus, also type by virtual tautonymy

Dear Dr. Behnke:

You may be also interested to know why, in paragraph 2b of our last letter, we wrote that <u>Salvelinus salvelinus</u> is also a type by virtual tautonymy, in the case this were not obvious to you, which we do not know. We ignore also whether you may read French. The German word Salbling is the origin of the word <u>salvelinus</u> because when compared syllable by syllable, both words have the same structure, the one in German, the other in Latin.

As a preliminary remark, we note that your last name, Behnke, is of a general Germanic origin but here we do not know whether it is German, Swedish, Swiss, etc. So that in the table page-numbered 34 (taken from another text) sent herewith, you will see that there are several derivatives of the word salmo in languages of Central and Western Europe; these derivatives are in Romance languages, in Olde and younger English (which derived from the old Germanic), and in older and younger German.

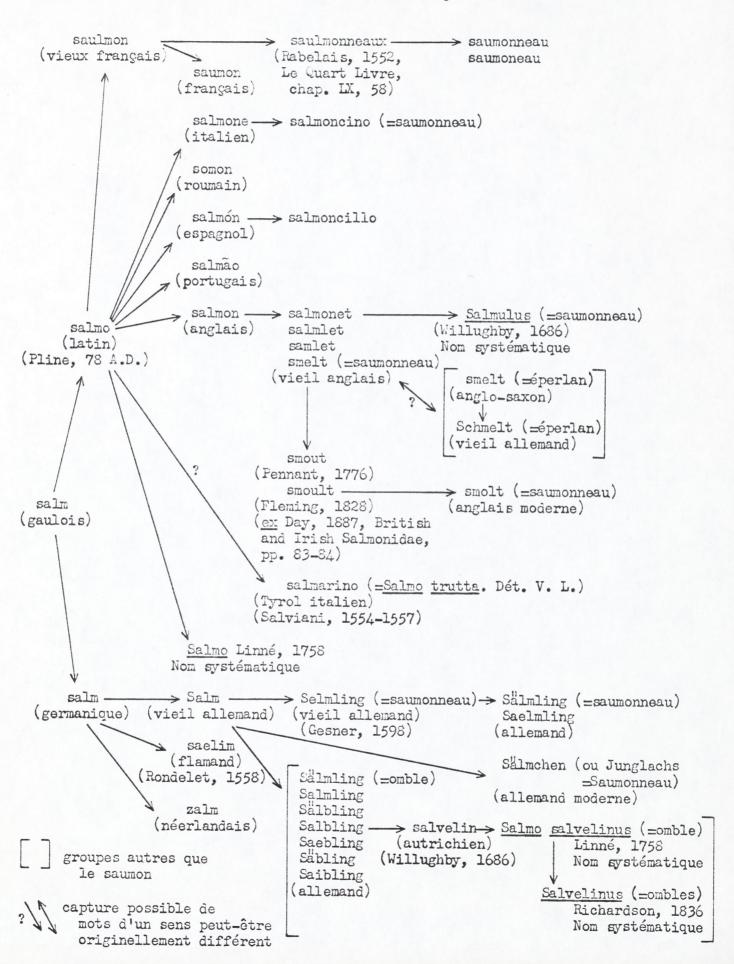
For the derivatives from German, there is:

salvelin \rightarrow <u>Salvelinus</u>: see at bottom of table page-numbered 34.

Your supposed acquaintance with German (as V. L.'s former professor, Karl F. Lagler, in University of Michigan [1948-1950] did) may help you to see where <u>Salvelinus</u> is from, that is, from the German word: Salbling.

Adultes ou gros saumons

Jeunes ou petits saumons



c. ARTEDI, Peter. 1738. Genera piscium. Ichthyologiae pars III. page 13. [Species] 10. Salmo pedalis [i. e. salmon one foot (long)];

maxilla superiore longiore [i.e. superior maxilla longer].

Pavelin Germanis [i.e. in German, (called) Salvelin; "Pavelin" is a misprint as seen from item a and b].

page 14. [Same species]. Locus in Austria ad urbem Lintz [i. e. location in Austria in THE NEIGHBOR-HOOD of Linz (and NOT AT Linz)].

d. ARTEDI, Peter. 1738. Synonymia nominum piscium. Ichthyologiae pars IV.
page 26. [Species] 11. Salmo pedalis [i.e. salmon one foot (long)];

maxilla superiore longiore. Art. [i. e. superior maxilla longer. Artedi (these phrases are the very Artedi's definition, first time given here)].

Salvelin Germanis [i.e. in German, (called) Salvelin].

e. LINNAEUS, Carolus. 1758. Systema naturae (10th edition).

page 309. [Species) 9.

Salmo salvelinus.

S[almo] pedalis [i. e. salmon one foot (long)];

maxilla superiore longiore. Art. [i. e.

superior maxilla longer. Artedi].

Habitat in Austria ad Lintz [i.e.
Habitat in Austria AT Linz ("at Linz"
is a mistake: see Artedi. 1738.
Genera piscium, p. 14, as Linnaeus was
an ulterior copier of Artedi)].

Conclusions.

a. To Latinize the name, subsequent authors only had to insert the suffix —us as did Linnaeus, to the Austrian (German) stem—word proposed by Willughby in 1686: Salvelin. Other authors like Ray, 1713, and Artedi, 1738 (2 publications from the latter author) only repeated Willughby's Salvelin, and from Ray to Linnaeus, they solely reiterated the habitat: in Austria in the neighborhood of ("at", by obvious mistake) Linz.

b. Indeed for his Austrian "population" Linnaeus created the species:
Salmo salvelinus.

4. 2. The German word from which derived Salvelin. Apart from all the other vulgar synonyms in any language, there are the following German (Germanic) ones as gathered from our table page-numbered 34, all of them for the fish species Salvelinus salvelinus (the bottom names in the table): Sälmling Salmling Sälbling Salbling Saebling Säbling Saibling Given the structure of the word Salvelin, we may be justified in supposing that this word was derived from either of the two Germanic) words: Sälbling = Salvelin. Salbling Indeed we do not know from which of these two German (Germanic) names was derived the name Salvelin because its original author, WILLUGHBY (1686), did not say it. We mention this because, also, we were not able, to date, to be informed which German (Germanic) names were in use in the neighborhood of Linz, Austria, at the time (1686 or so) when the word Salvelin was used by WILLUGHBY. Even when written by an English author -- who may have been fluently reading and even talking French -- it looks like if the name Salvelin was French or French-derived; and then, we may also figure that Salvelin was pronounced (or supposed by WILLUGHBY to be pronounced) with a Germanic "accent" at the end of the name, something like "salveline". But nobody decided about it, not even WILLUGHBY himseld. 3. Derivation of the word Salvelin. This is conjectural but it appears there is no other way around. After our proposal in paragraph 2 above: Sälbling = Salvelin, Salbling 5/ ...

5. then, the derivation is rather straightforward: in German: Säl-Salin WILLUGHBY's Linz, Austria: Sal--bin German: in WILLUGHBY's Linz, Austria: -ve--ling in German: in WILLUGHBY's Linz, Austria: -lin The only attempt at a "latinization" of the German (Germanic) word was its transfer from "-b-" to "-ve-" which was perhaps a natural move on the part of WILLUGHBY (else the word would has been or become "salblin" which, instead of being with the soft -- Latinoid --"-ve-", would have been with the labial occlusive [lip-stopped] consonant "-b-"). Now we are only left to explain the German (Germanic) word termination: "-ling". In German, it is a suffix, and it is used to form diminutives, as in Salming: Salmling, from the word "Salm-", a salmon, and, "-ling", a small or little animal, here, Salmling, a little the fish species, Salvelinus salvelinus, is a salmonoid fish that usually has a reduced size -- but not always. During the language (Austrian German) existence, the words were transformed from Sälmling, Salmling, which means: little salmon, to Sälbling, Salbling, with same meaning, finally to Saebling, Säbling and Saibling, always with the same acceptation. One of the actual (modern) word in Ur-German, for this species, is: Saibling. Conclusion from above parts 1, 2 and 3. The virtual tautonymy is as follows: Salbling = Salvelin = a little or small salmon = salmonoid fish, large or small = a salmon-like species = Salvelinus salvelinus. That's how. 6/ ...

7. In eastern North America it is admitted that Salmo alpinus [= Salvelinus alpinus = Salvelinus oquassa (State of Maine) = Salvelinus aureolus (State of New Hampshire) = Salvelinus marstoni (Province of Québec)] (BEHNKE, Robert J. 1980. A systematic review of the genus Salvelinus, p. 441-480. See p. 461) have its distribution from Maine --New-Hampshire and the Atlantic Provinces, up to the extreme Arctic regions. If it is spoken of Salmo alpinus of the Arctic the reference name may well be Arctic charr. But, as the socalled species Salmo alpinus [= Salvelinus alpinus] extends down to New England, and as it is possible to be the same species as in England, then, our position is to call the species by WILLUGHBY 1686 name: red charr (p. 196). Sincerely, locques F. Bergeron Jacques F. Bergeron c.c. MM. André Laforte, directeur Direction régionale de Montréal, Montréal Robert Parent, chef de service SAEF, Montréal

1. Salvelin and its Latin derivative salvelinus. Annotated references by Vianney LEGENDRE and Jacques F. BERGERON 2 September 1987 Artedi, Peter 1738. Genera piscium... Ichthyologiae pars III. duni Batavorum. Reprint 1962, J. Cramer et H. K. Swann. Historiae naturalis classica. J. Cramer, Weinheim. p. 13-14. Artedi, Peter 1738. Synonymia nominum piscium... Ichthyologiae pars IV. Lugduni Batavorum. Reprint 1962, J. Cramer et H. K. Swann. Historiae naturalis classica. J. Cramer, Weinheim. See p. 26. Behnke, Robert J. 1980. A systematic review of the genus Salvelinus, p. 441-480. In: Balon, Eugene K., Editor. Charrs, salmonoid fishes of the genus Salvelinus. W. Junk, The Hague, Netherlands. 928 p. See p. 461 Legendre, Vianney et Jacques F. Bergeron 1977. Liste des poissons d'eau douce du Québec. Prov. Qué., Minist. Tour. Chasse, Pêche. Montréal, 6 p. See p. 3, Salvelinus salvelinus, omble chevalier, red charr. Dactylogram. Also printed in: Bergeron, Jacques F. et Jacques Brousseau 1983. Guide des poissons d'eau douce du Québec. Prov. Qué., Minist. Loisir, Chasse, Pêche, Direct. gén. Faune. 240 p. See p. XIV. Le Jeune, Roger 1967. L'omble chevalier anadrome du Kagnersoualoudjouark. Prov. Qué., Minist. Tour. Chasse, Pêche, Serv. Faune Québec, Bull. no 10, 45 p. See p. 4-5. Linnaeus, Carolus 1758. Systema naturae... Editio decima, reformata. Tomus 1. 823 p. 1956. British Museum (Natural History), London. See p. 309. Plinius Secundus Major, Caius (79) 1509. Historia naturalis, lib. XXXVII. Venetiae, Jo. Rubeus. 280 [+ 10] folios. verso of folio 65, lines 16-17.

Roule, Louis 1920. Étude sur le saumon des eaux douces de la France... République française, Minist. Agric., Dir. gén. Eaux, Forêts, Pêche et Pisciculture. Paris, Imprimerie nationale. 178 p. See p. 57-63.

Willughby, Francis 1686. De historia piscium libri quatuor,... Theatro Sheldoniano, Oxonii (Oxford). [3] + 343 + 31 + [11] p., 186 pl. See p. 195, 196.

Zaunick, Rudolph 1953. Über den Fischnamen tecco bei Polemius Silvius und bei Anthimus, sowie über andere semasiologisch analoge Süsswasserfischnamen, p. 375-384. In: Kusch, Horst, Herausg. Festschrift Franz Dornseiff zum 65. Geburtstag. Volkseigener Betrieb bibliographisches Institut, Leipzig. Traduit de l'allemand par Vianney Legendre, Montréal, 1965. Prov. Québec, Minist. Tour., Chasse, Pêche, Serv. Faune. 48 p. See table page-numbered 34.

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SCOTT, W. Beverley, St-Andrews, N.-B.
TURGEON, Yvan, Québec
VAILLANCOURT, Pierre G., Jonquière
VECSEI, Paul, Montréal

Montreal, 3 September 1987

Dr. Robert J. Behnke:

From Joth mues of the magazine "Trout"

Jor Autumn 1986 and Spring 1987 I halfened to read the entireles

Jon The realband trout and the Painte cutthroat:

ROBERTS, Don. 1986. Reclusive realbands. Trout, 27(4): 12-18, 20-25.

BEHNKE, Robert J. 1986. About trout. Realbands trout. Trout, \$7(4): 34-39.

(with a ferronal fortunit).

Also there was a farcinating brown trout entirele.

BEHNKE, Robert J. 1987. Palinte cutthroat. Trout, 38(2): 50-54.

Nice photogranure of Salmo clothi selenivia.

Also Here is "The Minamichi in rack" with the Atlantic relevant and an article on New Hamshire "our namiche", so collab landocked salmon.

When I presented my son Pierre Legendre with your fitures from both issues of the magazine, be wanted these for himself.

Your sincerely

Phone 614-422-8560

Nov. 3, 1987

Vear Bob

Since getting back from my trip I've been behind on Several projects. We had a contract to sample the Shoreline of the Ohio River for fishes which took alot of time.

I'd like to thank you and Silly for the nice meals you provided during my visit and for letting me camp at your place. I would like to come back out to transfer your collections if you can suggest a good time. I can apply for travel funds which would pay transportation, room and board while I'm packing the Specimens. It would be most convenient to wrap the fish in Cheese cloth and seel in plestiz. The only moterials I don't have access to is alcohol to keep the specimens wet. The other stuff I can bring . Po you use ethanol or Bolcobal;

The reports I berrowed from you have been meiled back some time ago. They were very helpful especially the English translation. There is no doubt that Glubokovski regarded the stone ther as a freshwater resident form of his Salvelians albus the described two variations of albus Canadromon and lake resident populations) but did not investigate the stone cher. In Viktorovski's blue book (1978) he summores Glubokovski's work College of Biological Sciences this paragraph?

College of Zoology

As fer as I can toll Glube Keuski doesn't refer to the lake Kronotskoye endemics, S. Kronocius & S. schmidti. The latter species is very distract morphologically and the former is distract Karyelogically. It may be that Glub-Kouski lumpel these taxa with S. malma. What is confusing to the is the Lake Azabache predatory than has the Same Karyetoge as S. Kronocius.

The Kamehotke River Malma corresponds to the northern form in its Mirgotype. The Tryinese milina corresponds to the southern form

I have sent sequently information on the true agency in Chicago that handles the lowcost Detroit to Takeo reservations.

Since ly xeur, Ted

OSU

The Ohio State University

Museum of Zoology 1813 North High Street Columbus, Ohio 43210-1394



Pr. Robert J. Behnke Pepartment of Fishery and Wildlife Biology Colorado State University Fort Collins, Colorado 80523





SALT RIVER PROJECT

POST OFFICE BOX 52025 PHOENIX, ARIZONA 85072-2025 (602) 236-5900

February 24, 1988

Mr. Robert J. Behnke, Ph.D. 3429 East Prospect Road Fort Collins, Colorado 80525

Dear Bob:

Per our phone conversation of February 5, 1988, enclosed is a copy of the program for a University of Colorado School of Law seminar scheduled for March 31 - April 1, 1988 entitled: "Instream Flow Protection in the Western United States: A Practical Symposium." If your schedule permits, I would like for you to attend. According to the program, "academics" get a discounted registration rate of \$95.00. This letter comprises SRP's authorization for your attendance at the academics rate, plus your time.

I'm planning on attending the symposium myself and will look forward to seeing you there.

Sincerely yours,

Bill

William L. Warskow Manager Water Rights Division

njs Enclosure

xc: Craig Sommers (w/Enclosure)

General Information

Registration is \$145 if received by March 18, and \$170 thereafter. The fee includes a course notebook, lunches, and a reception Thursday afternoon. To register, return the attached form as soon as possible to the Natural Resources Law Center, Campus Box 401, Boulder, CO 80309-0401. Or register by phone, charging the fee to VISA or MasterCard, Telephone (303) 492-1288.

Discounts: Academics, representatives of public interest groups or the government - federal, state, local, or tribal - may come for \$95 (\$115 after March 18).

Refunds and Substitutions: Refunds, less \$25, will be available through Friday, March 25. Cancellations received March 26-30, will receive a refund of one-half the fee. There can be no refunds after the conference begins.

Continuing Legal Education: Colorado's Board of Continuing Legal and Judicial Education has granted 15 credit hours.

Location: Sessions will be held in the courtroom in the Fleming Law Building. University of Colorado, Boulder. Enter the University on Regent Drive, either east from Broadway or west from Colorado Avenue off 28th Street.

Accommodations: Blocks of rooms have been reserved for registrants. Please register directly with either hotel, mentioning this conference to obtain these rates. A deposit or credit card number is required to hold a reservation. Tarbel statistical as football of

The Broker Inn 555 30th St. Boulder, CO 80302 (303) 444-3330 or 12 state 1 - 11 File (800) 441-3330 (303) 449-3800 Single \$53/Double \$63

Must reserve by March 15

Best Western Boulder Inn 770 28th St. Boulder, CO 80302 Single and double \$39.95 Must reserve by March 15

Vis> 4168-3822-0004-1517 Staff to device some set to constant one Lawrence J. MacDonnell, Center Director Katherine Taylor, Conference Coordinator

INSTREAM FLOW PROTECTION IN THE WESTERN UNITED STATES: A PRACTICAL SYMPOSIUM March 31-April 1, 1988

Virtually all western states now provide some kind of legal recognition for instream flows. This symposium will address the different approaches taken in these states with emphasis on major issues, including the purposes for instream flows, related water quantities, enforcement of instream flow rights, federal instream flow claims, private instream flow claims, and transferring consumptive water rights to instream flow rights. Speakers include representatives from state agencies responsible for implementing instream flow programs, and also from federal agencies, the practicing bar, academia, environmental and public interest organizations.

CENTER ANNOUNCES JUNE NATURAL RESOURCES LAW PROGRAMS

The Natural Resources Law Center is offering for its June conference sequence a program on water quality issues (June 1-3) and on Indian natural resources law (June 8-10). Brochures on these programs will be mailed about April 1. For information please write or call the Center.

Natural Resources Law Center University of Colorado School of Law Campus Box 401 Boulder, Colorado 80309-0401 (303) 492-1288

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University of Colorado at Boulder

Natural Resources Law Center

University of Colorado School of Law

Instream Flow Protection in the **Western United States: A Practical Symposium**

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March 31-April 1, 1988

Fleming Law Building Boulder, Colorado

NSTREAM FLOW PROTECTION IN THE WESTERN UNITED STATES: A PRACTICAL SYMPOSIUM March 31-April 1, 1988

Thursday, March 31

8:30 Registration and coffee

9:00 Welcome and Introduction, Lawrence J. MacDonnell, Director, Natural Resources Law Center

9:15 An Overview of Instream Flow Programs and Strategies

As the economic, recreational, and aesthetic values of free-flowing waters gain increased recognition in the West, more states, federal agencies, Indian tribes, and private organizations are working to protect instream flows. The speaker will provide an overview of the various strategies taken in the western states for maintaining water levels in natural streambeds, and the controversies that are arising as a result of these efforts. Speaker:

Steven J. Shupe, Shupe & Associates, Santa Fe

10:30 Break

10:50 Establishing the Quantity of Necessary Flow

Stream transects, computer models, and judgment calls typically go into estimating the amount of flow needed to protect fish, recreation, and other benefits supported by free-flowing waters. The speaker and panelists will discuss the criteria used for establishing instream flow levels, and the strengths and weaknesses of the quantification methodologies currently used in western states.

Speaker:

Berton L. Lamb, U.S. Fish & Wildlife Service, Fort Collins, Colorado Panelists:

Bill Horton, Idaho Dept of Fish & Game
Tom Annear, Wyoming Game & Fish Dept.
Jay Skinner, Colorado Division of Wildlife
Clair Stalnaker, U.S. Fish & Wildlife Service
John L. Turner, California Dept. of Fish & Game
Christopher C. Estes, Statewide Instream Flow Coordinator, Alaska Dept.
of Fish & Game

12:15 Lunch

1:30 Practical Aspects of Enforcement

Establishing instream flow rights merely on paper does little to help protect free-flowing waters from new diversions and changes in water use along the rivers. The speakers and panelists will discuss attempts to translate paper rights into effective protection of instream flows through various enforcement strategies.

Speakers:

Kenneth Slattery and Bob Barwin, Washington Dept. of Ecology
Eugene Jencsok and Dan Merriman, Colorado Water Conservation

Panelists:

John Borden, Oregon Dept. of Water Resources Cindy Deacon Williams, Chief of Staff for Assemblyman Robert Campbell, California Legislature Bob Tuck, Consultant to the Yakima Indian Nation, Washington

Bob Tuck, Consultant to the Yakima Indian Nation, Washington Larry Peterman, Montana Dept. of Fish, Wildlife and Parks

5:00 Reception

Friday, April 1

8:45 Federal Instream Flow Claims Under State Law

The federal government has asserted claims for instream flows both in conjunction with its reserved rights and with its general management responsibilities. The panelists will discuss a number of related issues including instream flow rights associated with wilderness areas, integrating federal instream flow rights with state systems, and interstate implications of instream flow rights.

Panelists:

John R. Hill, Jr., U.S. Department of Justice, Denver Christopher H. Meyer, National Wildlife Federation, Boulder Richard A. Simms, Hinkle, Cox, Eaton, Coffield & Hensley, Santa Fe Harry W. Swainston, Deputy Attorney General, Nevada

10:40 Break

11:00 Controversies Over Private Instream Flow Appropriations

Private organizations and individuals have attempted, with limited success, to appropriate instream flows in a number of western states. The speakers will look at these attempts and discuss the pros and cons of establishing private instream flow rights.

Speaker:

Herb Dishlip, Arizona Dept. of Water Resources

Gary J. Prokosch, Water Resource Manager, Alaska Dept. of Natural Resources

Lori Potter, Managing Attorney, Sierra Club Legal Defense Fund, Denver David Robbins, Colorado Water Conservation Board

12:15 Lunch

1:30 Transferring Senior Water Rights to Instream Flow Protection

In many areas of the West, attempts are being made to enhance natural streamflows by dedicating senior irritation rights to the stream. The panelists will look at current attempts to acquire such rights, including an assessment of the economic and legal issues involved in transferring senior rights to instream flow protection.

Panelists:

Dave Livermore, The Nature Conservancy, Salt Lake City Professor Bonnie Colby (formerly Bonnie C. Saliba), Dept. of Agricultural Economics, University of Arizona

Tom Simmons, Waterwatch of Oregon Phillip Wallin, River Trust Alliance, Santa Fe

David Harrison, Moses, Wittemver, Harrison & Woodruff, Boulder

2:50 Break

10 Instream Flows, The Public Trust, and the Future of the West

Are current efforts at instream flow protection sufficient to meet the challenges of increasing water competition? Two noted commentators will conclude the conference with an update on the Public Trust Doctrine and their perspectives on the future of free-flowing waters in the western landscape.

Speakers: Professor

Professor Harrison C. Dunning, University of California School of Law, Davis

Professor Charles F. Wilkinson, University of Colorado School of Law, Boulder

5:00 Adjourn

FRANCES M. GREEN ATTORNEY AT LAW 1405 ARAPAHOE. SUITE 200 BOULDER COLORADO 80302 (303) 444-1188 March 15, 1988 Prof. Robert J. Behnke Department of Fishery & Wildlife Biology Colorado State University Fort Collins, CO 80523 Dear Prof. Behnke: Enclosed are the materials I borrowed on Friday. I have made copies for my files. I want to thank you again for taking the time to meet with me and Karin Sheldon. We very much appreciated your help, and we learned a great deal. I hope you won't mind if we call upon you again in the future if we have additional questions. It appears now that we will not be raising at trial in water court the fisheries issues addressed by your excellent comment on the Wetland Baseline Report prepared for the Holy Cross Wilderness Defense Fund. We have not made a final decision on this, however, and I should appreciate your remaining willing to testify at trial (or by deposition if you are not available the week of May 23 and May 30). Once again, thank you for your assistance. I will be in touch in the near future when we have made a final decision on strategy in the water case. Yours truly, Kelley Green Frances M. Green Counsel for Holy Cross Wilderness Defense Fund and Colorado Mountain Club FMG/wp Encl.



COLLEGE OF LETTERS AND SCIENCE DEPARTMENT OF BIOLOGICAL SCIENCES

(414) 963-4214 2**29**

August 9, 1988

Dr. Robert Behnke Department of Fishery and Wildlife Biology Colorado State University Fort Collins, Colorado 80523

Dear Bob:

Thanks for the letter which you sent in April. It looks like I will be going to the symposium in Japan after all. Dr. Yamazaki called with the offer of some travel money, and with his letter I have been able to obtain the additional funds from sources here at UWM. I have a permit to import tissues of salmonids fishes which I have been using when I obtain material from Canada. Do you know what additional paperwork I will need to bring items back from Japan? Are you coming directly back from the meeting? I may stay an additional week to do some sightseeing.

We have been working this summer on restriction maps of the rDNA in several salmonid species, including three species of <u>Salvelinus</u>, lake trout, brook trout, and arctic charr. We have identified a number of sites which are variable and I should have this data analyzed by the time of the meeting. With that data as a base, I would then like to examine other species of <u>Salvelinus</u>, including Asian species. In the long run, I am interested in sequencing a section of the rDNA from the different species. I have a PhD student who is working on this project.

We have been using nylon filters for our DNA work. These can be reprobed numerous times with different DNA probes, so I am trying to build up a library of filters for various species and stocks of salmonids which can be analyzed for additional genes as the probes become available.

I read an article recently in which the possibility of extracting DNA from preserved specimens was suggested. It might be interesting to try it sometime, initially from something for which a number of specimens are available. Would you be interested in collaborating with me on this?

I am looking forward to meeting you at the symposium and hearing your talk.

Sincerely yours,

Ruth B Phillips
Ruth B. Phillips



R. Phelips THE UNIVERSITY OF WISCONSIN-MILWAUKEE

DEPARTMENT OF BIOLOGICAL SCIENCES P.O. BOX 413 MILWAUKEE, WISCONSIN 53201





Dr. Robert Behnke Department of Fisheries and Wildlife Biology Colorado State University Fort Collins, Colorado 80523



November 29, 1988

Department of Fishery and Wildlife Biology Fort Collins, Colorado 80523

Mr. Ed Kochman Colorado Division of Wildlife 6060 Broadway Denver, CO 80216

Dear Eddy:

After our discussion last Wednesday, I thought that I should attempt to put into writing the major points I raised in relation to my position on the matter of a license fee increase.

I agree that the Division will require a significant increase in revenue to operate the overall fisheries program at an adequate level. My reservations concern how the increased revenues will be allocated to various aspects of the program. I view my concerns as similar to a businessman considering how capital might be invested to maximize development and return in the future. As such, when I reviewed the July 1988 draft of "Today's Strategy -- Tomorrow's Wildlife ... a Comprehensive Management Plan for the Colorado Division of Wildlife," I did so in regards to how increased revenue might be spent. When I critiqued the coldwater stream fishery projections and observed the enormous gap between what might reasonably be produced naturally by wild trout populations and the catch necessary to meet the projections, I feared that the strategy to fill this gap would be a massive increase in the production of catchable hatchery trout (which would essentially require all of the increased revenue).

In relation to sound investment in the future and maximizing return on investment, I view the management strategy of catchable trout stocking as a loser -- a necessary evil that must be contained with strong efforts on maximizing returns of this program. I doubt if valid data exists to more precisely define the present subsidy that current fisheries programs grant to those anglers who fish predominantly for catchable trout or what proportion of all anglers catch what proportion of all catchable trout stocked. If such data do exist, I would expect it would demonstrate that no more than 10% of all licensed anglers catch 50% or more of all the catchable trout taken by all anglers. What proportion of the statewide total for angling days is dependent on catchable trout stocking, and what is the cost per angler to support such fisheries? These types of data would reveal the unfair distribution of "wealth" inherent in a largescale catchable program and why such a program must be contained in a period of revenue expansion if we are concerned with sound investments for the future. In relation to maximizing returns on catchable trout stocking, I believe that considerable progress has been made during the past 10-15 years, mainly by ceasing indiscriminant stream stocking where percent return was low and diverting these fish to ponds and lakes. Much further improvement can be made, however. The DOW still lacks a clearly stated policy on catchable stocking in relation to percent return. For example, a statement to the effect that sites which fail to return a catch of 60% or 70% of the stocked fish will not be stocked in the

Mr. Ed Kochman November 29, 1988 Page 2

future. The only "policy" statement concerning catchable trout I found in "Today's Strategy" is that catchable trout will be stocked in streams only where habitat limits the production of wild trout. Actually, there are probably very few streams in Colorado where the trout population is not "limited" by habitat; otherwise, habitat improvement could have no effect (if a population is not habitat limited, then it expands to the limit of its food supply -- which, typically, occurs only in regulated rivers below dams such as in the Frying Pan River).

Michigan has ceased all catchable stocking in its trout streams. Pennsylvania has a policy which states that any stream supporting 30 pounds of wild trout per acre will not be stocked with catchables. This may be rather drastic for Colorado, especially in heavily fished streams, but I would like to see a stocking program for all presently stocked streams similar to what is done on such rivers as the Poudre and South Platte where most sections are unstocked wild trout waters (with or without special regulations) and selected intensively used sites are stocked. Such a policy acts to segregate the wild trout enthusiast from the catchable trout angler. In any event, I would strongly oppose any increase in the stocking of catchable trout in streams with viable wild trout populations. Any increase in catchable stocking in wild trout streams is contrary to all modern management trends in the U. S. Colorado is a leader in wild trout management by special regulations. Let's not reverse this trend.

In relation to increasing the catch in streams without the stocking of catchables, the recent success of stocking fingerlings of wild Colorado River rainbow trout on top of a "pure" brown trout population in the South Fork Rio Grande is exciting news. How many miles and acres of present brown trout streams might have increased use and catch if this type of management strategy were greatly expanded?

One of the highest priorities for investment in the future is the rehabilitation of streams on BLM and USFS (and state school) lands that now sustain no or insignificant trout populations due to past livestock induced degradation. I cited the example of the rehabilitation of Otter Creek, Nebraska, as an example and raised the question of how many Otter Creek situations we have in Colorado where these results could be duplicated. I would estimate that at least 1,000 miles of streams in Colorado could be vastly improved with protection from livestock. This type of "self improvement" of rehabilitated streams is the most costeffective habitat improvement possible. With the recent release of GAO report RCED-88-105 on public rangelands (June 1988), I believe the time is ripe for DOW to take an ambitious, determined, and "friendly aggressive" stance on better multiple use management of watersheds on public land.

Mr. Ed Kochman November 29, 1988 Page 3

The Colorado Springs chapter of Trout Unlimited has a joint project with the USFS concerning grazing management strategies and trout stream protection and rehabilitation. Trout Unlimited would be a strong protagonist and cooperator in any program for improved multiple use management that DOW might develop. What is the degree of expertise and determination in DOW to launch such a program? Might we expect to see a clear statement in a "Today's Strategy" plan to the effect that DOW clearly recognizes the great potential to restore trout streams and trout populations in watersheds degraded by multiple use land management and with clear directions for an active and successful program?

Ponds, lakes, and reservoirs with more than five times the surface area in comparison to trout streams obviously hold the greatest significance in the big picture of salmonid fish management, recreational use, and sound investment. How can return on investment be increased? What are viable, cost-effective alternatives to catchable stocking?

About 20 years ago, Nick Klein demonstrated that even in the most heavily fished lakes (such as West Lake with >2,000 hr./acre/yr. angling pressure), the stocking of fingerling trout (rainbows and browns) yielded returns of 20 to 100 lbs. of catch for each pound stocked. (In 1973 I arranged to stock 1,900 Snake River cutthroat trout weighing in total 2 lbs. in West Lake. In 1974 more than 300 lbs. of Snake River cutthroat were caught.) In the early 1970s when I was with the Cooperative Fish Unit, I initiated a study on the performance of two strains of cutthroat trout in North Michigan Lake. The resulting publication by Trojnar and Behnke (1974. Trans. Am. Fish Soc.) discussed the great potential for lake management of using interspecific and intraspecific diversity in an attempt to maximize total resource utilization by a management strategy by "polyculture" or "niche packing."

How would you characterize the present DOW salmonid lake management strategy in relation to maximizing cost/benefits by experimenting with different species and different strains (interspecific and intraspecific diversity) and stocking them at various sizes? Since virtually all lake stocking is made with no expectation of natural reproduction, why not stock sterile fish? With no energy diverted to gonad development, sterile fish might be expected to have a greatly extended lifespan and greatly increased maximum size.

With a creative and intelligent lake management program making use of interspecific and intraspecific diversity and by the stocking of sterile fish, I would expect that total salmonid catch could be increased by at least 25% in the 100,000+ acres of Colorado lakes and reservoirs without an increase in catchable stocking.

These points sum up my position in relation to cost-effective investment in the future of Colorado's salmonid fisheries, although there is much

Mr. Ed Kochman November 29, 1988 Page 4

more I could discuss. As I pointed out, nothing I have seen to date remotely indicates how any increased revenue might be allocated. As a corporate member of Colorado's anglers, I would like to see some indication of how the money will be spent. I would also like to see some indication of the initiation or activation of programs such as I discuss in this letter that would tell me that increased revenue will be a sound investment to maximize future returns.

Sincerely,

Robert J. Behnke

Professor, Fishery Biology

RJB/kc

January 3, 1988 Dear Bob Thank you for your translation of the two paragraphs in Viktorovsky's paper. This is very helpfal. From Glubokovsky's osteological papers I felt he Considered the white ther of Lake Kronotskoye only slightly different from albus of the Kamchetke River. He lumped the lake population with albus and believed the stone char probably belongs with albus also. Bused on morphology there is no doubt albus and schmidti are distinct species. Also albus is clearly severalle from confluentus. If the specimens we received from Viktorousky are Krenecius there is no doubt this form is different from albus. However, it is more difficult to separate Kronocius from malma, What I don't get is the Karyotype of the "predatory char" at Lake Azabache done by Vasilyer is exactly like that of Kronocius which is sufficed to be endemic to take Kronotskope. Again it is hard to believe Viktorovsky would confuse lenconnend with the form Si malma Curilus which his a lenconcens - like Keryotype. Vuktorovskys technique doesn't allow him to astalish one diglard number of for The Kergotype so he woully lists 2n = 78-80 for allow or 2n 76-78 for molma melma, What I thought was more important was The arm number of 98 for the melma group The U.S. dollar Keeps dropping against the Japanese you so that U.S. traveles don't have a chance of making much out of a trip to . Jajan. I alled about round trip our fare on U.S. Carmer through that Thyonese travel agency. Its about 800 Glander to Tokyo. There are daily flights out of letrost or Chrago. Because I have to teach this Sammer at Stone Lab field station on Leke Erre and grabally cen't get to Fart Collins in July or August It would be bother to try and make the trip in February or Merch I could find a student to help package the fish. What do you think? I'd like to put your specimens in OSU's collections. Meybe we can work something out.

Sincerely pus

Ted M. Cavender
THE OHIO STATE UNIVERSITY
0390-200390-361-3905







Dr. Robert Behnke
Department of Fishery
and Wildlife Biology
Fort Collins, Colorado 80523

College of Biological Sciences / Museum of Zoology / 1813 North High Street / Columbus, Ohio 43210

NEWS RELEASE

FOR RELEASE ON RECEIPT

GEORGE D. NOKES, REGIONAL MANAGER

(209) 222-3761

THE RESOURCES AGENCY
DEPARTMENT OF FISH AND GAME
1234 EAST SHAW AVENUE
FRESNO, CA 93710

AUGUST 2, 1988

NOTICE TO CONCERNED AGENCIES, ORGANIZATIONS AND INDIVIDUALS REGARDING THE LITTLE KERN GOLDEN TROUT

The lower half of Soda Spring Creek is tentatively scheduled to be chemically treated August 6 - 11, 1988. This chemical treatment is being conducted to remove hybrid trout (rainbow x golden) and brook trout as part of the recovery program aimed at restoring Little Kern golden trout to their native range. Once DFG biologists have determined that this treatment is successful, Little Kern golden trout will be restocked.

Signs will be posted at appropriate trail heads and points where trails cross affected stream reaches to advise backcountry users of the treatment.

This is a cooperative project between Sequoia - Kings Canyon National Park, Sequoia National Forest, U.S. Fish and Wildlife Service, and the California Department of Fish and Game. Anyone wishing additional information about the recovery of this threatened trout species or additional details concerning the chemical treatment can contact the California Department of Fish and Game, 1234 E. Shaw Avenue, Fresno, CA 93710, or by calling (209) 222-3761.

STATE OF CALIFORNIA DEPT OF FISH & GAME 1234 E. SHAW AVENUE FRESNO, CA. 93710



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Robert Stand Robert Stands and Stands Stands



November 30, 1988

Dr. Robert J. Behnke
Department of Fisheries and
Wildlife Biology
Colorado State University
Fort Collins, Colorado 80523

Dear Professor Behnke:

In collaboration with a Geologist on our faculty, I am working of fish fossils that are over 600,000 years old. The deposit is from ancient Lake Lahontan and has been exposed by the Humboldt River, just below Rye Patch Reservoir, Nevada. I tentatively have at least three species - probably the tui chub, Tahoe sucker and/or cui-ui, and cutthroat trout. My immediate problem is in obtaining comparative materials from large individual fish. My specific problem is to locate skeletons of cutthroat trout at least 900 mm S.L. The vertebrae I have recovered are from individuals that large. Lake Lahontan had some wonderfully large fish. For comparative purposes I would also like to locate skeletons of large rainbow trout and lake trout.

I have already been through the collection at the University of Michigan, Ann Arbor and have borrowed materials from California Academy of Sciences and the natural History Museum of Los Angeles County. Additionally I have contacted representatives of the U.S. Fish and Wildlife Service in Reno in attempts to obtain, specimens from Pyramid Lake, Nevada.

With that as background, I am writing you to solicit your suggestions as to where I might try next. Do you know where I might locate skeletons of large <u>Salmo</u> and lake trout? I would also appreciate any input relating to museums containing fossil materials of any of the fish indicated.

Your help is much appreciated.

Kenneth W. Gobalet

Ken W. Dlan

Assistant Professor of Biology California State University

9001 Stockdale Highway

Bakersfield, CA 93311-1099

Phone: (805) 664-3038



Department of Biology California State University, Bakersfield 9001 Stockdale Highway Bakersfield, California 93311-1099 Kenneth W. Gobalet



600,000 pr B.P, -900 mm

Dr. Robert J. Behnke
Department of Fisheries and
 Wildlife Biology
Colorado State University
Fort Collins, Colorado 80523



22 May 1988

Dr. Robert J. Behnke Department of Fishery and Wildlife Biology Colorado State University Fort Collins, Colorado 80523

Dear Bob:

I hope you made it home safe and sound from the land of roasted pig and Dolly Parton. I spent a few days following the Brown Trout Workshop in the Smokies over on the Tennessee side. The spring scenery was enjoyable and I fished one day in the Little River for browns; no brook trout that far down.

How are you coming with your next column about landlocked salmon?

My plans are to leave here on June 8 for another trout management conference in Wisconsin, so I'm hoping to have your writing in another week. That will give me time to go over your manuscript and send it to typesetting.

Incidentally, I'll be in Michigan following the Wisconsin conference, and will keep my ears open for the latest on the Au Sable situation. With luck, it will be mostly old news.

Sincerely,

Pero Thomas R.

Editor

Editor Thomas R. Pero Post Office Box 6225 Bend, Oregon 97708 503-382-2327



23 May 1988

Dr. Robert J. Behnke
Department of Fishery and Wildlife Biology
Colorado State University
Fort Collins, Colorado 80523

Dear Bob:

Our letters must, indeed, have crossed in the mails! This morning I received your column about landlocked salmon for the autumn 1988 issue of <u>Trout</u>. It's a particularly incisive treatment.

You went way beyond the \$500 limit in effort, which amount is nevertheless enclosed in the form of Trout Unlimited check number 3030. Your extra work is appreciated.

Begin thinking, if you would, about your feature story on special regulations. It will be published in our retrospective anniversary issue covering 1959-1989.

I'd like the piece to be as comprehensive as any fishing magazine has ever done on the subject -- history, philosophy, biological dynamics, politics of implementation during the last 30 years. In other words, the definitive statement. It's all yours...

P. S. Perhaps you could work over the summer with a fall deadline of your choosing.

Sincerely,

Thomas R. Pero Editor

- Seeding
- optimal foraging may
- have weaten
- reaminal ope

Editor
Thomas R. Pero
Post Office Box 6225
Bend, Oregon 97708
503-382-2327



Post Office Box 6225 Bend, Oregon 97708

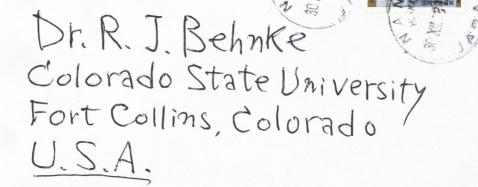


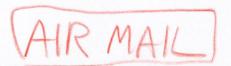


Dr. Robert J. Behnke
Department of Fishery and Wildlife Biology
Colorado State University
Fort Collins, Colorado 80523

Spec. Rogs
Most comprehesive ever done
Wistory
philosophy
biology
politics

Tatsuro KUBO, "HAKUSUIEN"
511 Hon-cho, NANAE-CHO,
HOKKAIDO, 041-11, JAPAN







Season's Greetings

"For unto you is born this day...a Saviour, which is Christ the Lord... Glory to God in the highest, and on earth peace, good will toward men." Luke 2:11, 14



stream upper the in observed 'Kirikuchi" Kumano

Denver Public Library



1357 Broadway Denver, Colorado 80203-2165 303/571-2000

Mr. Robert Behnke Colorado State University Department of Fishery and Wildlife Biology Fort Collings, CO 80523

> Rick J. Ashton City Librarian

December 22, 1988

Dear Mr. Behnke:

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Please let us know if we can be of further assistance.

Prepared by Kathey Swan.

Sincerely,

Eleanor M. Gehres

Manager

Western History Department

KS/EMG:rt

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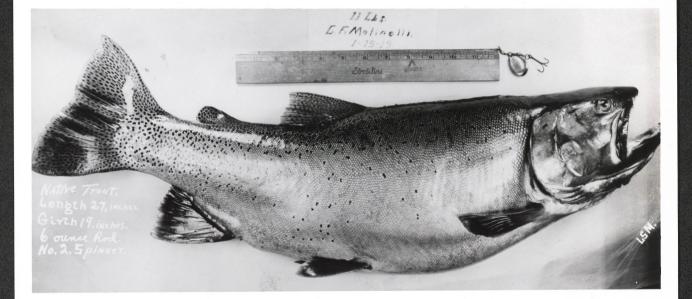
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Fich Culture

Mr. Behnke:

Sorry, but we don't know where this fish was caught, or who donated it to D.P.L. The only info we have is that which is printed on the front of the photo.

Sorry we couldn't be of more help.
Please let us know if we can be of future assistance.

OFFICE MEMO

TO: Rosenlund

Date

FROM: Sec. Econ. Dept. Avg. 1988

SUBJECT: Lily L., he solveter Huetono R., cost rape M. Blance

REMARKS: 14, 347 fr., co, 1 ske st 12,600 fl. fed by mow on sheltoutlet over waterfall - 4 who drive - scross private land to Rio Grande N. 7. - Then bike up steep trail - many trout color photo co as Hurchinson L. 12 rge upits, rel. sparse, over body - old gold mine in ever - could be from early transplant of Ant. R. greenbock.

Dear Mr. Beecher:

The trouts of the genus Salmo mative to washington have never been intensively studied in relation to how many unique groups or taxa are involved. In a broad sense, Two major species groups -- the rainbow broul and the cutthroat trout are native to washington, but in two each of these two species groups are made up of distinct subgroups in different

geographical regions of the state.

The cutthroat species can be divided into two well differentiated groups -- The coastal cutthroat Trout, Salmo clarkir clarki, naturally distributed along the Pacific Coast es west of the Cascade Range, and an interior cutthroat trout which is comprised of several, less distinct subspecies. The subspecies Salmo clarki tenisi is native to the Spokane and Vend Oreille drainages and perhaps, sporadically westward to the Cascades. There is some evidence that the cutthroat trout notice to have Chelan is of this subspecies, but the evidence is not clear. Washington propagates and stocks this subspecies from Kings Lake, The original stock was derived from Priest Lake, Idaho, and it has been widely stocked around the interior regions of the state. The original distribution and occurrence of the S. c. lewise would be defficult to determine in washington. Unother 2

interior subspecies of culthroat Trout, characterized by larger, rounder spots is native to the Snake River drainage. I have seen museum specimens collected in the 1890's from the Walla Walla River which I identify with this subspecies. The correct name of this subspecies is in doubt, but, provisionally I use the name Salmo clarki Couviere (described from Waka hake mear washington -Idaho border, and now extinct there). Probably a there subspecies of interior cutthroat trout is or was native to washington. The mountain culthroat trout, Salmo clarki alpestris was described from a few relect populations in the upper Columbia River in British Columbia. It is characterized by very small scales (typically more than 200 scales along the body). I have examined a museum specimen with 217 scales from the John Day River drawage in Oregon which & believe to be of this subspecies. Undoubtably, the fine-scaled cutthroat once had access to much of the middle Columbia River basin in Washington, Son but there are no records from the state tio mentioned above, however, a native trout study has never been attempted in Washington and the possible existence of a third subspecies of interior cutthroat trout must remain

3

open to question. If they do exist, they would most likely be found in somall, isolated tributaries. A species of trout was described from Crob Creek (eastern scabland country) as Salmo exemogenous. This trout is believed long extinct, but I have examined some of the original specimens and consider it to be the same trout, I call Salmo clarki bovrieri.

There have been published reports that two distinct forms of cutthroat trout occur in the Tuget Sound region: a coarse-scaled form a fine-scaled form. I have never seen specemens of the course-scaled form. The question of los distinct forms of coastal culthroat trout is another invesolved problem concerning the Taxonomy of the native trouts of washington. Other cutthroat trout described from Washington include "Salmo crescentis and Salmo bathocoeter "Salmoyo of Crescent Lake and "Salmo jordani" and Salmo decliviprons of Lake Sutherland. I consider these to be Salmo clarki clarki. It should be recognized, however, that "Salmo crescentis" did represent a unique, lacustrine specialized form of coastal cutthroat trout which attained a large size and had considerable value. The blockage of spawning streams and untroductions of massive numbers of non-native trout

into Crescent Lake over the years makes it doubtful that this trout still exists in its original form. The rainbow trout in Washington consests of two divergent evolutionary lines that could well be recognized as two species. The Coastal rambow trout, Salmo gavrdneri, is nalive as both resident and anadromous steelhead pipulations, mainly from the Cascade Range the to the coast. East of the Cascade Range, the native rainbow thout is derived from a group of the trout I have called the recland trout. Enclosed is a short report mentioning the cutthroat, rainbow and redband trout of the Columbia River. The trout known as the Tamloops trout in the upper Columbia basin of British Columbia, in my opinion, is a redband "trout. They are is distinguished from the rainbow trout by more numerous scales and vertebrae, and fewer pyloric caeca and differences in coloration and pave marks. Frainbow trout named Salmo beardolei" from trescent hake, I consider as Salmo gavidneri; but, as with "Salmo crescentis" The beardslee nambour was a unique race of great size and certainly worthy of protection. I expect it was also destroyed by a great infusion of hatchery rainbour

there is a real problem faced by any program designed to perotect and enhance survival of rare populations of native trouts—how do you recognize them if you do find them? The differences are not clear—cut and it stakes considerable experience working with all of these different forms before one can make confident identifications. I do not believe there is anyone in the state of washington who has the experience with these fish to make correct identification except, perhaps between rainbow and cutthroat and coastal and the interior cutthroat trouts. The identification of the interior subspecies and the redband trout and recognition of hybridized populations will be an overwhelming problem.

Mational Park Service, which has lands in those areas precisely unvolved in located when the diverse taxa sho parobably exist— Olympic Pentinsula, North Cascades and Mt. Ranier. I have performed taxonomic studies of trout for Yellowstone and Rocky Mountain parks and will start in this year for Glacier Park. The U.S. Forest Service knowy also be interested in determining the star precise identification of mative trouts on their lands. They have funded similar studies in New Mexico and Colorado. Under separate cover I am sending a report on

some rare forms of native western trouts. This report was funded and published by the Forest Service.

The Bureau of Land Management is another possibility. They are coverently funding one of my graduate students to study the native broads cutthroat thout of the Bonneville basin, Utah.

6

It is apparant that without a well-organized and well-planned study, all of the puestions in need of answers pertaining to the taxonomy of the native trouts of washington can not be answered. I should mention that Mr. James Mullan, a fisheries brologist with the US Fish and Wildlife Service, now stationed in Olympia, has had several years experience in rare trout protection and enhancement programs. We served together on the greenback trout recovery team and unitested projects to restore the endangered greenback cuthroat trout. Jim is quite familiar with the problems and frustrations of the type of forgram envisioned by the Washington Natural Heritage Program in relation to notive trouts. I don't know if he would be willing or able to participate, but his address in Olympia is 2508 Wedgewood Court, Sin cerely,

OFFICE MEMO

TO:

Date

FROM:

S. salar restored & penmark - Gudena R.

REMARKS:

SUBJECT:

(Sutland, Vibing) - Jensen, 7, 1982. Natur og Mus. 21(3):1-23. (Gus Swawen har capy). I see no urgent comments to be made on sections 1.1,1.5,2.1, 2.3, only that you are concerned that the limitations for predict flow + habitat - import on target species. are not considered in the study plan. That is, a long history of failure
to accurately associate flow changes with
changes in population of tanget species -a lack of clear-cut cause-effect
relationships (except for unambiguous
cause-effect conditions such as no water
no fish), raises the questions can the
proposed study provide the biological basis
to resolve the issue? All part history
on habitat modeling vaises senious doubts on habitat modeling raises serious doubts
that the present study can provide a
scientifically sound basis for flow recommendations. I see nothing in study plan to indicate that it will provide such a basis.

Enclosed is copy of paper I

wrote several years ago on This subject,

I will send along assorted selections from my consulting reports so that you can become familiar with problems of flow-habitat-fish models and ramifications Problems to be swore of and try to avoid in Comal Springs flow issue,

I note that Thomas B. Hardy is in professor Dept. of Civil & Environment) Engineering, Utsh St. Univ. It you can obtain a copy of proposal from Hardy to USTWS (evidently the basis for / study plan), it would be useful.

CALIFORNIA TROUT



March 13, 1989

Dr. Bob Behnke Dept. of Fisheries Colorado State University Ft. Collins, CO 80523

Dear Bob:

Well, I see where the Michigan courts did the right thing -- for the wrong reason. Or, was it the wrong thing for the right
reason? Whatever. Sportsmen must be careful not to ask for the
wrong thing. They might get it.

I haven't read your paper yet on catchables, but thought you might enjoy the enclosed in the meanwhile. Your name is in it. You might be amused: During the session, a private hatchery entrepreneur went through the timeworn song and dance that it was catchable trout production, planting and recreation which supported the bulk of DFG's angling license sales and therefor supported all the other programs.

When he concluded, I meekly raised my hand and said, "For more than twenty years I've heard that old song... that catchable trout were the primary support of DFG like some sort of institutional brassiere." It brought down the house. I then continued, "Despite the refrain, and despite repeated requests, no one ever has been able to document that for me... in fact there is evidence to the contrary. Can you document what you just said?" He could not. At that silent moment, I unhooked him and sent him back to the depths.

Thanks for the TU tweak. Steve Lundy is coming to see me the end of this month. It's not clear what we will talk about. Our conversation five years ago was unproductive, even though I gave him a good idea: "If TU would confine its California activities to raising money here for specified wild trout projects in trout-rich people-poor places like Wyoming, Idaho, and Montana, we will help you" This is where Cutter stole that idea, but he impled TU is doing that in other areas now. They are not, to any meaningful extent.

I'll probably write again later after I've read your piece.

Ruhard

Colorado State University

Mar. 8, 89

Department of Fishery and Wildlife Biology Fort Collins, Colorado 80523

Dear Dick:

Enclosed is something I put tagether for 12st weeks meeting of co-wy A.7.5. chapter, It's a first attempt to quantitatively evaluate a states catchable thout pragram and point out when its grown disproportionately to its actual significance in praviding recreation.

several T.U. people were 2T meeting, including P2m McClelland the Revouce Director. I gave them copies and told them I would send one to Cal Trout. I then predicted, much to T.U. people's chagrin, that it an augler organization uses my paper as a gaideline to successfully challenge the unfairness of a catchable program, it would be Cal Trut (perhaps OR Trout), not T.U. - So the challenge was made.

I saw Ralph Cotter's article on troutwars in Hy Fishing and the letters that came in the next issue. You must practice how to come across in a more gentle, warm manner (like me), Mr. Cotter should become informed on hooking montality data. Last issue of Cal. 7, x G. had paper on hooking montality in Heenan L. Using a phoebe spinning lune with banbed trable, barbless trable, and barbless single - 5 of 364 (a. 1.3%) died in spring a fall when water temp. 50-60-7.

in July, when surface temp hit 70°7, - 48% of 169 fish died -- single barbless willed 59%, barbed treble 48%, & barbless treble 35% of fish caught and released in July. I can't explain difference, only that this study agrees with most all only that montality is not reduced by single barbless restrictions (or that spinning larer kill more than flies).

I resd that Colif. bond money will allow

C. 7. x G. to finally build The experimental hardway

(unless funds diverted to estable production).

Regards,

Bob

This will not happen, because CalTrout wrote and paid for the Bond act language.
Trust me.

Fish Technol. Cent. Beroman - greenbourg, Colo Ru Sonotay, wy . Emm's MT. Pyromiat cuts - 7/2m, ism - Egunt. Remarks of Richard H. May, President, California Trout Inc., to the symposium on "The Role of Hatcheries in the Year 2020" al-Neva Chapter, American Fisheries Society Napa, California February 9, 1989 w/ my etr OSITION 70 GOT INTO THE HATCHERY BUSINESS What this state needs is another trout hatchery. That statement will come as a surprise to those of you who know our reputation for criticism of oldtime hatchery dominance of the trout management scene in California. It was us twenty-odd years ago who began disparaging hatchery trout and boosting wild trout. When asked to point out the difference between the critters, we responded: "It's simply the difference between a Poodle and a Timber Wolf...they're both dogs (canines), but what a difference! We're talking Chihuahuas and Wolverines ... Ornamental goldfish and Barracuda. You get the idea, and it doesn't matter a whit whether they come four-to-the-pound or twoto-the-pound." This began to grab people's attention and understanding that fishing for wild trout was a whole different ballgame with a whole different set of ballplayers. From that perception the California Wild Trout Program grew. But truth is, CalTrout always has seen a need for trout hatcheries: Recreational trout fishing; mitigation for steelhead habitat loss; and even a hatchery FOR ASSISTING WILD TROUT MANAGEMENT. -- And where did we get such a crazy wild trout idea? From you. One of the earliest to suggest this was biologist Eric Gerstung -- for propagating threatened trout, circa 1979. And then I think Dick Beland wanted one, to develop a rotenone-resistant trout or whatever. You remember Dick. Ol' Bellyup Beland we fondly called him. But we talked with lots of people about this idea: Cordone Behnke Evans Barnhart Beland Rawstron Gall Nicola Lee Bailey Marshall Jones King Weidlein Deinstadt Stephens the list seems endless Hanson We asked a lot of questions, like:

Fish Technoli Cent. Beroman - greenbooks, Colo R.,
Soro toy, wy . Ennis MT.

Pyramida all - 715m, Em - Egymt.

Remarks of Richard H. May, President, California Trout Inc., to the symposium on "The Role of Hatcheries in the Year 2020" sponsored by the Cal-Neva Chapter, American Fisheries Society Napa, California February 9, 1989

HOW AND WHY PROPOSITION 70 GOT INTO THE HATCHERY BUSINESS

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Cordone Behnke Evans Barnhart Beland Rawstron Nicola Lee Gall Bailey Weidlein Marshall Jones Deinstadt King Stephens the list seems endless Hanson

We asked a lot of questions, like:

WHY MIGHT CALIFORNIA NEED AN EXPERIMENTAL TROUT HATCHERY?

Lots of reasons were offered, and they boil down to this: "To produce special strains, and hybrids, and species of trout to meet specific and perhaps unusual <u>management objectives.</u>" And, "For genetic selection and production of fish for <u>fishery</u> performance rather than hatchery performance."

DO WE NEED A NEW FACILITY... OR CAN WE USE AN EXISTING ONE?
The consensus was strong and clear: a new and different
facility, designed and constructed for the job, was needed.
And then, in 1982, we sponsored (with AFS) a symposium in Reno,
"The Role of Hatcheries in the Management of Wild Salmonids."
Sad to say, nobody showed up except the speakers. Certainly no
hatchery people showed up. Probably it was the bad weather. But
in any case, we published (at great expense!) the symposium
Proceedings and these got wide circulation and had significant
impact.

Well, by the end of 1982, between you pro's and we drum beaters, we had DFG's hierarchy convinced... and we thought committed. Branch chiefs and Directors were behind it, or so we thought. Each year we were promised the requisite budget request to launch the project. Over the years, chiefs McCammon, Fisk and Rawstron submitted for it. Directors Fullerton, what's his name, and Parnell wrote us letters saying they were pursuing it.

But, strange to say, year after year through most of the 1980's, the money never showed up. Each year it disappeared in the maw of the budget process. We never could figure out who, exactly, wielded the knife. Everyone pleaded innocent.

Then, in 1988, an opportunity arose. Conservation groups, frustrated by the legislature's inability or unwillingness to fund parkland acquisitions, decided to "do it themselves" -- qualify a Parkland (and related matters) bond measure for the June 88 ballot. The leader of this was the Planning and Conservation League, CalTrout's Sacto representative. PCL asked us if we had a shopping list. Indeed we did!! And so we, and the Special Hatchery, became part of the historic Prop 70 campaign of 1988.

The way Prop 70 worked, and there was some criticism of this, was that the shopping lists of sponsoring groups were toted up -- they came to \$750 million -- and the number of signatures needed was determined -- 600,000 or so -- and a formula for participation was worked out: for each \$million you wanted, your group had to collect so many thousand signatures. An alternative was to pay professional petition-workers to do it -- and because our pin-striped elitist yuppie CalTrout people are not real good at buttonholing voters in shopping center parking lots, we chose the latter.

So what was to be the price on our shopping list? How much does a well designed, never-before-seen-in-the-history-of-the-world, prototype, experimental wild trout hatchery cost? Damned of we knew. But we figured it might cost maybe \$6 million, and besides, 30,000 signatures at 50 cents ea. = \$15,000, which is all we felt we could afford to gamble on the outcome of a statewide vote. So \$6 million it was, and we wrote the language:

"\$6 million to the Dept. of Fish and Game for restoration and enhancement of wild trout and native steelhead habitat; for capital outlay to design, develop, and construct an experimental

"\$6 million to the Dept. of Fish and Game for restoration and enhancement of wild trout and native steelhead habitat; for capital outlay to design, develop, and construct an experimental wild trout and native steelhead propagation facility; for acquisition of land important for the perpetuation of wild trout and native steelhead; and to provide public access to wild trout and native steelhead waters."

We made it clear to DFG leaders our first priority for use of these bond funds was for the hatchery. The other language was included for general appearances, and to provide mop up in case there were leftovers.

The measure passed by a wide margin. But, in the very next budget, the current 1989-90 governor's budget, we discovered, again, no hatchery funds! Zounds! Foiled again! But Pete Bontadelli assures me he is fixing this aberration foisted upon us by the Dept. of Finance, and we are agreed if he can't, the legislature will. Meanwhile, an effort headed by Ken Hashagen is scouting sites for the facility.

So, what is this oddly-named Wild Trout hatchery going to look like? Damned if I know. Nobody yet knows. But here is my vision of what it will be like:

- o It will look like no hatchery everbefore seen... Wild trout don't <u>like</u> hatcheries, bless their hearts. We must respect that, and provide surroundings <u>natural enough</u> to satisfy them.
- o It will have a myriad of discrete, small-lot, isolated units, not large raceways and ponds.
- o It will have quarantine capability either on site or off, or perhaps both.
- o It will produce wild fish, rare fish, unique fish, highperformance fish, well-suited fish. Trout for warm temperatures, voracious trout that eat undesirable nongame fish, trout that mature late and grow big, trout that spawn in the wild when we want them to, trout that <u>survive</u> and are capable of growing old, beautiful trout... well you get the idea.
- o The hatchery facility will have <u>satellite</u> units in various parts of the state and these will be a mixture of permanent, semi-permanent and temporary locations -- for a variety of

purposes, from rearing ponds, to hatchbox operations, to egg taking stations.

- o It will be a hatchery that will require new techniques, new diets, new policies and procedures, new thinking.
- o It will be a hatchery where the operators take pride in the quality and diversity of product, not the volume of fishflesh cranked out.
- o It will be a hatchery where there is trial and error, disappointments suffered, mistakes made, AND TRIUMPHS SAVORED.
- o It will be a hatchery where genetic integrity and diversity is job #1, and where it will be remembered that electrophoretic comparison is only ONE tool for discerning significant differences between fish.
- o It will be the place where wild trout field managers and experimental hatchery managers have <u>duplicate</u> goals, where they will each be serving the <u>same</u> cause.
- o It will be an educational place... for its employees, for students, and for the curious public which I predict will come to visit in droves.
- o AND, It will be a place where fisheries people from across the country and around the world will visit to learn "how it is done," because this, my friends, will be a new frontier... and you, my friends, will be the pioneers.

I hope to see you there some day.

Thanks for asking me to tell you this story today. Perhaps I should also relate to you how we managed to link the tobacco tax (Prop 99) to fisheries work. But that's another engaging story for another time.

Washington State University

Department of Zoology, Pullman, Washington 99164-4220 / 509-335-3553

4/14/89

Dear Bob:

It was nice to get a chance to see you and hear your talks.

I have enclosed a copy of the section in "The New Henning's Guide to Fishing in Oregon" which state that there are still native Alvord cutthroat in upper \mathbf{t} rout Creek. This was not stated in the earlier edition of this guide (much of the guide was identical to the earlier edition) which makes me think that they have some new information from somewhere.

Let me know if you find anything out about this. That is sure beautiful country down there. I hope to get back there on a fishing trip sometime.

Sincerely,

Gary Thorgaard

THE NEW HENNING'S GUIDE TO

FISHINGINOREGON

Sixth Edition Revised and Edited by

Dan Casali and Madelynne Diness

Copyright © 1984 Flying Pencil Publications

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Perry Corning of hours

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P.O. Box 19062
Portland, Oregon 97219
(503) 245-2314

TROUT CREEK Want to get away from it all? This creek is about as remote a one as you can drive to in Oregon. Located in far southeastern Oregon, the creek heads high in the Trout Creek Mts. near the Nevada border and flows northward into the desert country southeast of the Steens Mts. About 30 miles long, it is so remote it is hardly ever fished. Small, unique Alvord cutthroat inhabit the bracing upper waters of this creek.

Only the upper waters are available for fishing; the lower end is all in private ownership. You'll want a good map before heading in here; the BLM Steens Mt. map covers the area well. Four wheel drive or at least a high center vehicle is strongly recommended, along with a good stock of supplies. Inquire at the State Patrol office in Burns for road conditions prior to attempting this; this angler has had to rebuild a section of road to get out.

A graded road leads east towards Whitehorse Ranch from the Fields to Denio road, about midway between them and a mile north of Tum Tum Lake. This road reaches a gap formed by lower trout creek about six miles to the east and follows the lower waters about eight miles. Unfortunately, the creek flows across private land here.

To reach the upper waters, take the Whitehorse road five miles east of Fields to Denio road, and turn south on a graded road which loops on to Denio. A bit over a mile later turn southeast onto a road which will meet Oreanna Creek in about three miles. Stay on this road and follow it southeast and up for about 13 rough miles to a ford over Trout Creek. The road follows the creek for a mile or so; you'll have to hike for further access. You can continue on this road and loop north and back down to the Whitehorse Ranch road.

Trout Creek offers fair fishing for rainbow trout on bait or flies in the lower waters if you can get permission to fish. There is not a lot of water in the upper creek, and the trout above are generally under 8 inches and darkly speckled. No improved camping areas nearby, but pretty aspen groves and plenty of wide open spaces. Trout season is April 28 to October 31. Limit is five trout per day, six-inch minimum length.

TWENTYMILE CREEK A pretty good desert trout stream, flowing east and north from springs near the California line into Warner Valley, about 7 miles south of Adel. Adel is on state route 140, about 30 miles east of highway 395. The 140 junction is about six miles north of Lakeview. Twentymile is followed by a gravel road that leads south from Adel to California. The upper stream is accessed by graded roads running northwest from this road toward Big Valley and Big Lake, then on to Warner Canyon road 140

Between the Big Lake road and the Adel-to-California road, the stream flows into a canyon. Most of the fishing takes place there, for native rainbow. Angling is good in spring and summer for trout up to 15 inches, but the average is 9 to 10 inches. Bait or wet flies should produce a limit in a few hours. Trout season is April 28 to October 31. Limit is five fish per day, six-inch minimum length. There are no camping areas in the vicinity.

UNITY RESERVOIR A large reservoir on the upper Burnt River south of Baker, three miles north of the town of Unity, with good angling for rainbow trout. Just west of Unity highway 7 runs north to the reservoir.

Over 2000 acres when full, Unity Reservoir is stocked with rainbow trout, and provides good catches of rainbows. The maximum size is about 16 inches, with the typical fish ranging 9 to 12 inches. Trolling and bait fishing are both

popular, but bait anglers fare better early in the season. There is lots of angling pressure here but good success. South of the dam, a state park provides boat ramps and camping facilities. The reservoir is open all year, and ice fishing is good.

UPPER KLAMATH LAKE Formerly the largest lake in Oregon (now in second place, with top honors to Malheur), shallow and extremely productive, featuring big native rainbows. Averaging 64,000 acres, Upper Klamath is connected by a natural strait to 8200 acre Agency Lake (See Agency Lake description). Its primary tributary is the rich Williamson River system, and from it flows the great Klamath River. From its southern tip within the town of Klamath Falls, the lake stretches north almost 25 miles.

Interstate highway 97 provides direct access from Bend and from Redding, California and follows a good portion of the east lakeshore. State route 140, a direct route from the Medford area, follows the more popular west lakeshore from Pelican Bay to Klamath Falls. There are no bridges or opportunities to cross the ten-mile swath of water and wetland between Klamath Falls and the northernmost reach of Agency Lake. Following highway 97 south, motorists can position themselves to cross over to the westside road by taking the state route 232 cut-off about three miles south of the Diamond Lake Junction. Follow signs to Fort Klamath, then take Nicholson Road west to the westside road, forest primary route 33. Secondary roads east from highway 140 access boat launches and popular fishing areas on the west shore, including Eagle Ridge, Shoalwater Bay, Ball Bay, and Odessa Creek.

Of Klamath Lake's 100 square miles, all but two percent is under 25 feet deep. This shallow water, high in nutrients from the lake's productive tributaries, provides a food-rich environment for growing fish quickly. Large rainbow, over 20 inches, are the main attraction in the Upper Klamath, with the average catch coming in at a whopping 18 inches. Studies have shown that rainbow trout in this lake reach 20 inches in only three years, and by five years have reached a length of 26 inches. A few twenty-pound rainbows are taken every year. The lake is no longer stocked with trout; hatchery fish proved too susceptible to a fish disease organism present in the lake. Of over 300,000 marked fingerlings and 30,000 adult rainbows stocked, a total of 8 fish were caught.

By mid-summer the lake becomes too warm for most trout, and the fish move into springfed pockets and the mouths of tributaries. A side effect of the nutrient rich water is heavy algal blooms which occur during the summer months. This algae tends to give fish caught during the summer an off taste.

Bank angling is popular in winter, spring, and fall at Moore Park, Pelican Marina, and the Link River outlet in north Klamath Falls; along Howard (Wocus) Bay, in the southwest; and near springs on the east shore, just north of Hagelstein county park, off highway 97. In early spring, a boat fishery develops near Eagle Ridge and in Howard (Wocus) and Shoalwater bays. In late April the northern lake opens and there are active troll fisheries out of Rocky Point and Harriman resorts, at the Recreation Creek inlet of Pelican Bay, and in the narrows between Upper Klamath and Agency lakes. In late summer fish gather in the Fourmile Creek inlet of Pelican Bay, which is cooled by springs, and in the mouths of cooler tributaries.

Klamath Lake has a large chub population, and bait fishing with chub chunks is popular. (Note that fish bait is NOT legal in most of Oregon's waters; Klamath Lake is an exception.)

Bait is available at local shops. Trollers use large flasher-type lures or catfish and the standard spinner-bait set-up. The Andy Reeker No. 4 has been a standard lure here for years. Trolling with dead minnows behind a flasher is very successful and legal here.

Other fish available in Upper Klamath include mullet (Lost River suckers), brown bullheads, yellow perch, sculpins, and sturgeon. Largemouth bass have been introduced, but have not thrived.

Boat anglers are generally cautious and keep close to shore. Klamath Lake is mighty big and can kick up Great Lakes style in even moderate wind. There is a public boat launch at Moore Park in Klamath Falls. Westshore ramps are located at Howard Bay campground just off state route 140, at Odessa Creek campground just south of Pelican Bay, at Rocky Point campground near the Pelican Bay inlet off county route 531, and at Shoalwater Bay. The only public ramp on the east shore is at Hagelstein park and campground. There is a 10 mph speed limit in the channels and resort areas.

Supplies, lodging, boat rentals, and private launches and marinas are available near the prime fisheries around the lake. Williamson, Wood, Sprague, and Klamath Rivers offer outstanding angling alternatives in the immediate area. Lake of the Woods, Fourmile Lake, and Mountain Lakes Wilderness (See Lake Harriet) offer additional angling, camping, and hiking opportunities nearby.

The dividing line for regulations applying to northern and southern lake sections is a line from Modoc Point to the north end of Eagle Ridge and then to Ball Point. Shoalwater Bay is included in the southern section. The southern section is open year around for all fisheries. The northern section is open April 28 to October 31. Trout limit is 10 per day, six-inch minimum with no more than five over 12 inches and no more than two of these over 20 inches. There are no limits on yellow perch and brown bullheads. The mullet limit is 10 per day. Sturgeon limit is 3 per day, 36 inch minimum, 72 inch maximum.

VAN PATTEN LAKE A hike-in rainbow trout lake in the Anthony Lake area west of the community of Haines on state route 411. From Haines, go west on 411, which becomes forest primary route 73. Trail 1634 to Van Patten Lake takes off south from route 73 two miles east of Anthony Lake guard station.

The lake has about 23 surface acres and generally offers excellent angling for rainbow up to 14 inches from late spring through fall. All methods will take fish. The lake is stocked with fingerlings bi-annually. Supplies, guide service and accommodations are available at Anthony Lake Resort, 3 miles to the west. There are campgrounds at Anthony Lake and at Grande Ronde Lake.

VEE LAKE A 13 acre lake in the Fremont National Forest that was created by a small dam to provide fish and goose habitat. The lake is in the North Warner Mts. northeast of Lakeview. Drive east from Lakeview on highway 140 about 15 miles to the North Warner Road (forest road 3615), and follow this north about 25 miles to the lake.

Its a shallow, weedy lake with lots of natural food to grow trout quickly. Most of the rainbow in the lake are in the 12 to 16 inch range. Bait, lures and flies all produce well here. Bout without motors are allowed on the lake but must be carried over a fence to the lake. Several forest service campgrounds are nearby.

WARM SPRING RESERVOIR A large reservoir in southeastern Oregon, southwest of Jun-

FORSCHUNGSINSTITUT UND NATURMUSEUM SENCKENBERG



der Senckenbergischen Naturforschenden Gesellschaft in Frankfurt am Main

Senckenberg · Senckenberganlage 25, 6000 Frankfurt 1

Mr. Mohammad Ali Saadati
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Mashad 91735
Iran

5 May 1989

Forschungsgebiete:

Botanik / Paläobotanik Geologie / Paläozoologie Meeresbiologie Meeresgeologie Paläoanthropologie Zoologie

Telefon (069) 75 42-1 Durchwahl 75 42 Durchwahl 79 40 04 Telex 4 13 129 Telefax (069) 74 62 38

Dear Mr. Saadati,

Many thanks for your letter of 4 April.

Dr. Robert Behnke, with whom I have been in contact for many years was kind enough to send me a copy of your MSc thesis which, I think, is a good basis for a PhD dissertation. I discussed your PhD project with Professor Kinzelbach and we suggest that you will enrole at the University of Darmstadt, but conduct your research work in my department. We have large comparative collections of freshwater fishes from the Middle East which are not available in Darmstadt. Additionally, there is limited laboratory space and no ichthyologist in Darmstadt. Professor Kinzelbach and I could jointly supervise the thesis.

In order to get aquainted with the facilities here, to discuss your PhD work and to do some initial joint research, I suggest that you visit us in September or October this year (I will be away as of 29 October) for a period of about 3 weeks. We could provide a room in our guest house and funds which will cover living expenses. If you have funds for the airticket, please consider this invitation and let me know your date of arrival and period of stay at your earliest convenience. We have only single or double rooms in our guest house and while funds will easily cover the living expenses of a single person they might not be sufficient for a whole family. Your family is certainly welcome, but you should reconsider bringing them along under this aspect.

If you come for a PhD dissertation, we should apply to DAAD for a scholarship for the period of two years. These scholarships provide for

additional funds, if you bring along your family. You should get the application forms as soon as possible from the Cultural Attaché of the German Embassy in Teheran. As far as I know the deadline for submission of applications for 1991 is in October 1990. We will then have to work out a detailed research programme and schedule, which we could do together. I think if you submit these documents together with letters of recommendation from Prof. Kinzelbach and myself you will have a very good chance to get the scholarship.

We should discuss the drainage basins which will have to be sampled and the methods of collecting (perhaps we can provide electric fishing gear which is very efficient) at a later stage.

Looking forward to hearing again from you, I am

Yours sincerely

Friedhelm Krupp

Dear Dr. Behnike.

I have got your letter on May 15, and a coppy of recomendation—
that you have written to br. Moon. I appre evaled a lot of
all of your kindoness and helps, your letter of
recomendation— is an honour for me, your attentions
to my problem is an assurance nowadays barme.

Still gamtrying to bind out some way to get out,
at least bor bow years, and to bind a chance to binish
my study. I have missed lost tempers,

I have requested kro- University of Ottoma Gar graduate study bor PH.D. Dr. Hoon has replied, that the only proble— is the binance support. which I don't have it.

Recently I have a fot a letter from Dr Krupp. of

Frankburt Natural History purseum. They have work

on Freshwater Fishes of Hidel East. Oo he mentioned he

Nowwyou. I was invited box September. to we cermany

for an interaccio. They promised me to yet an scholarship

form—DAAD. He proble— is my age, on H3 now

gears old. First 9 amintrested to know about your openion— about all of these second 9 would be most grate full if you write another recommendation to Dr. Krupp and Dr. Kinzelback. I send you a coppy of Dr. Hrupp's letter.

9 lope to see you again with best regards.

elle Sacrelate

90 - July-15

Jap. J. I olethyol.

M. Saadati
Dopt. of Env. of Ichorasa
P.O.Box 589
Mashad 91735
IRAN









Dr. R.J. Behnlee Dept of Fish and Wild Biolog CSU Fort Collins, Colorado 80523 U.S. A الاصتعراريط



Gary Thorgaard

Washington State University

Department of Zoology Pullman, Washington 99164-4220 Horizons 1890-1990

APRIT'89

≅0213

Dr. Robert Behnke Dept. of Fishery and Wildlife Biology Colorado State University Fort Collins, Colorado 80523

Dear Dr. Behnke

On a recent trip to Sawtooth L., I cought what appears to be brook & sunaper. I also cought a male sunaper of about 15" and several good brookies, all a foot or better, with the hest brook trout going about 16" and 13/4 lbs. In 1987, I had assumed that any fish over about a foot long that I saw were sunapers, but it is now apparent that some of those fill may dark been prook front. The sunapers may not be quite so plantiful as I first thought. We certainly had fromble contching them this trip. All of the fish that we caught in the vicinity of the shoal I mentioned in 1987 were brook troud, this trip.

Spend a couple of days with him. Very interesting gent! I had hoped to witness Bob catching to 40, but it wasn't to be. He later wrote that he got his Sunaper just after

I let.

Angways, 80b seemed to think that you would want to see this lybrid, so I've sent it along. Also exclused are a couple of pylori from two Chester lake Pollies. I've finished with thom and thought you might like a look. The on with the longer piece of attatched intestine is from an 18" spawned out male, and the other one was taken from a 16" temale which did not spawn this year, although next years eggs were visible. I counted 31 and 33 caecae respectively, which seems to be more in tune than the trouble some 35 count.

Scince about 1985, fisheries has been stocking Chester L. annually with cutthroat fry, at twice the normal rate, ostensibly to provide some feed for the "Arctic Char" while the size of the dollies soems actually to have dropped, Cfrom all the competition, I suppose) the number of dollies may be up, at least I saw more this fall than in several years. They travel around the laberanith similarly sized cutthroat, but the white find are an obvious queaway. May be all those cutts have taken the angling pressure of the char.

give also enclosed a copy of an item which appeared in Trout Canada magazine, and must admil that I'm somewhat confused. While I can appreciate the desire to emphasize the different phylogeny of Atlantic and Pacific drainage Salmo - Parasalmo groups, it seems that lumping Oncorynchus and Salmo together only muddies the picture further. Or do you even agree with this "revision"? Or was "Oncorynchus" perhaps first applied to a western "Parasalmo" group tish? If so, will the genus of 7 Pacific Salmon he revised to something else? your comments on the enclosed item would be greatly appreciated.

Rejards
16/2/2 Midrilly.

R. KYLE McNEILLY 159 Caudebrook Rise N.E. T3J 1Y3

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d'office

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Dr. RJ Behnke DEPT OF FISHERY + WILDLIFE BIOLOGY FORT COLLINS. COLDRADO 80523

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Chester Lake
There are 2 men on shore on

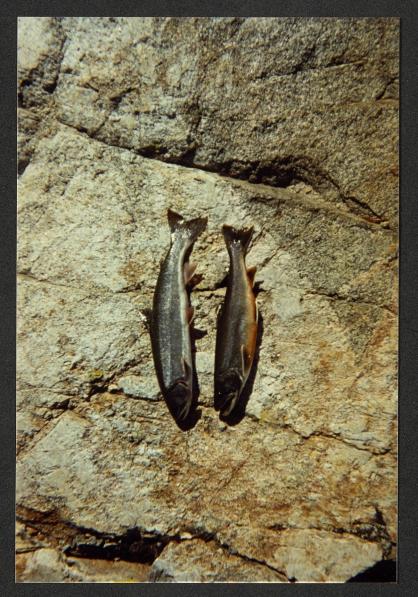
right side of lake - Dolly spawning

site suist in front of farthest man in

bay formed by sog in in shoreline.



There are some better brookies in Sawtooth L than I first assumed - this one is about 15 or 16" and 11/2-13/4 lbs.



Sunapee + Lybrid



TAXONOMIC NAME CHANGES FOR NORTH AMERICAN TROUT SPECIES by Garry Szabo

ish taxonomy is usually not a topic of casual angler conversation, but

here is some recent information that is bound to get your interest.

After lengthy debate, fish taxonomists are in agreement that native Salmo trouts of northern Pacific Ocean drainages are more closely related with the genus Oncorhynchus, the Pacific salmon, than with Atlantic or Eurasian Salmo species (i.e. the Atlantic salmon, S. salar and brown trout, S. trutta).

New data was presented at the June, 1988, meeting of the American Society of Ichthyologists and Herpetologists that persuaded the American Fisheries Society's Committee on Names of Fishes to adopt Oncorhynchus as the appropriate generic name for all native Pacific drainage trouts that are presently called Salmo.

Confounding the generic changes that I've just described, taxonomists now also consider that rainbow trout, Salmo gairdneri, and the Kamchatkan trout of Asia, Salmo mykiss, form a single species, for which mykiss has nomenclatural priority. The Names of Fishes Committee now recognizes Oncorhynchus mykiss as the correct scientific name for rainbow trout.

The North American Salmo species affected are as follows:

- cutthroat trout becomes Oncorhynchus clarki
- rainbow trout becomes O. mykiss
- golden trout becomes O. aguabonita
- Mexican golden trout becomes O. chrysogaster
- Gila trout becomes O. gilae
- Apache trout becomes O. apache

These changes were presented in editorial form in the fall, 1988 issue of the North American Journal of Fisheries Management, at which time the new name changes were implemented. The common names for these species remain the same. In future articles, I will attempt to provide information regarding the taxonomic rationale for the name changes presented above.

SOUTHWEST ONTARIO CHAPTER

n this, our first year of activity, we have scheduled three work days on the lower reaches of Whiteman's Creek. Because of the overwhelming angling pressure during the trout season, we have been forced to conduct all of our work before and after the season, to avoid interferring with anglers.

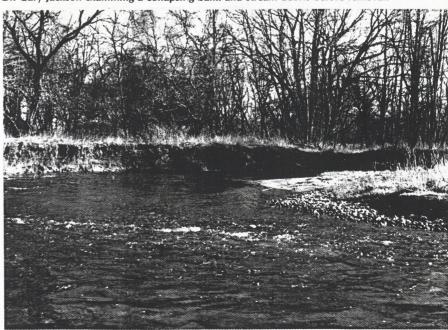
Under the careful guidance of Jon Bisset, the April work crew concentrated their efforts on clearing in-

stream debris and cutting down overhanging trees. The downed trees were then stripped of most of their branches and used in the bank stabilization process. Because of the severe flooding that occurs in this creek, the bank stabilization works consisted of porous walls that would not be adversely affected by the fluctuation in water level. After diverting the flow from the undercut banks, the water began to cut new channels which quickly wash-

Continued on Page 33



Dr. Gary Jackson examining a collapsing bank and stream debris before removal



The same bend after removal of debris. Note the reappearance of the riffle.

Joseph J. Branney Neil Hillyard John A. Criswell P.C. M. Susan Kudla Larry D. Lee Branney

Law Offices of Branney, Hillyard and Criswell

April 4, 1986

Professor Bob Behnke Department of Fish and Wildlife Biologists Colorado State University Fort Collins, Colorado 80523

Dear Professor Behnke:

I certainly enjoyed talking with you yesterday about the Eagle Lake and Tasmanian rainbows in our lake in southern Colorado called Maria Lake. As I indicated to you, we have been looking for someone who would be qualified to be our consultant on the lake. We probably would not necessitate more than approximately one day per year and then as much graduate student time or leg work which would be necessitated under your direction.

As I indicated to you, I have developed quite an interest in the various species of fish and would really appreciate knowing more about the Eagle Lake and Tasmanian rainbows. It really was interesting to me to know that the Tasmanian originated from the Sonoma Creek in northern Colorado.

I would appreciate it if you would review the two enclosed fish studies that I have. These are separated in time by eleven years and after you have had the opportunity to look at them, I would like to hear from you. Also, if you have a graduate student who would like to do some bibliographic assemblage of material for me on the Eagle Lake and Tasmanian rainbows, I would be more than pleased to pay for the same.

I thank you for taking the time to talk to me, and I can't wait to get you to Maria Lake.

Sincerely,

BRANNEY, HILLYARD & CRISWELL

JJB/vdeb Enclosures

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Joseph J. Branney Neil Hillyard P.C. M. Susan Kudla Larry D. Lee David A. Klibaner

August 24, 1987

Dr. Robert Behnke Department of Fishery & Wildlife Biology Colorado State University Fort Collins, Colorado 80523

Dear Dr. Behnke:

I have enclosed an article from the Wyoming Wildlife, August issue regarding the Eagle Lake rainbow trout. I found it interesting and thought you might, too.

I hope all is going well.

Sincerely,

BRANNEY, HILLYARD, KUDLA AND LEE

Joseph J. Branney

JJB:jcr enclosure Freshwater Fisheries Centre P O Box 8324 Christchurch, N.Z.

20 September, 1988

Dr R J Behnke
Department of Fishery and Wildlife Biology
Colorado State University
Fort Collins
Colorado 80523
U.S.A.

Dear Bob

Thanks for your note and the memo from AFS about salmon and trout nomenclature. It is good to know that some decisions have been made. I was actually in the process of writing some letters to seek clarification of what formal action was being taken, this morning, when your letter came dealing with most of the issues.

There is, however, one question that I cannot clarify. Why do North American biologists use <u>gairdneri</u>, when the original usage was <u>gairdnerii</u>, and the International Code is quite clear. I actually bungled that in a recent article, because I thought that the new edition of the ICNZ had made the single i mandatory, but it hasn't. Richardson used <u>gairdnerii</u>, and it seems quite clear to me that the code allows for that (Latinisation of the name - hence gairdnerius, followed by taking of genitive = <u>gairdnerii</u>, and I suspect also <u>clarkii</u>).

You sent the copy of the AFS memo in good time as I have just read galley proofs of a new edition of my New Zealand Freshwater Fishes. I had gone to Salmo mykiss, following our earlier correspondence, but frankly was beginning to feel a bit nervous, and was scared that I might be the only person using the name combination for rainbows. Producing a major book, that I would expect to be the standard for many years with such an obvious error (if that's what it turned out to be) would not have made me very glad. Now, I have to get the galleys back and re-do the salmonid chapter, and since the rainbow is the first species I deal with, and the Pacific salmons numbers six and seven, of seven, there is some work to do.

I look for and enjoy your ramblings in <u>Trout</u>, and believe that the sort of thing you do, and which we do in <u>Freshwater Catch</u> for as long as <u>user-pays</u> allows us to continue to produce the magazine, is of great importance. I also think it is a lot of fun, and that is why I have recently started a regular contribution to the NZ <u>Flyfisher</u>.

There is no way our anglers are any more genteel than yours, and certainly we get into some scraps at times - here especially over trout farming, and we do have some highly opinionated and equally uninformed anglers here who like to take a spike at us. I see

that as part of the game, and often not really counterproductive as the real and important issues eventually emerge. I'm enclosing for your interest a little book I wrote for anglers a few years ago, and you might get a laugh from my comments on catch and release - which I describe as an American fad!!

There are always some nutters - give the world a bit of character, and keep people on their toes.

Rudd have not created any problems here that we know about, but then we don't know much! Now some aquaculture people are talking about introducing channel catfish. They could have a scrap on their hands once the anglers are environmentalists get a hold of it, but that isn't my problem - though I'm bound to be caught up in the middle somewhere, with my job.

Have a good time at your meetings.

od wishes

R Medowall

Pemolo Ton usa Tramonie 1864

Dr. Bob Behnke	
Colo. St. Uniu	
Fort Collins, Colo 80523	
SUBJECT	DATE March 19/84
☐ For Your Information ☐ Please O.K. and Return ☐ Please Discuss With Me ☐ Please Process ☐ Return With More Details ☐ Investigate and Report	☐ Per Your Request ☐ For Your Signature ☐ Please Answer ☐ For Your File
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WRITE YOUR REPLY AND RETURN THIS SHEET.	

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(207)941-4449

John R. McKernan, Jr. Governor

William J. Vail Commissioner

DEPARTMENT OF INLAND FISHERIES AND WILDLIFE

Telephone (207) 289-3371

P.O. Box 1298 Bangor, Maine 04401

November 6, 1989

Dr. Johan Hammar Arctic Fish Biologist Sötvattenslaboratoriet 170 11 Drottningholm Sweden

Dear Johan:

30 ind/pop 50% 99 desp freque one gene pool/pip. plef. a lange gede prol

Since our meeting in Japan I have pushed very hard for protecting the Floods Pond population of charr. I interested a legislator in submitting a bill which would protect the charr spawning area during periods of low water. The outcome of this legislation attempt is still not final, but I do have the attention and interest of many influential people and I feel that s workable solution can be reached.

As a part of our current research I am assisting with a mitochondrial DNA study of several North American landlocked charr populations. This is the reason for my letter. I would like to obtain some tissue samples from landlocked charr populations outside of North America, and I was hoping that you could help. We would like to have the liver and some ovarian tissue from as many fish (up to 30) as we can get from each charr population. One set of samples from 2 or 3 widely-distributed populations would be ideal, if it is possible. The samples should be sent air express, on dry ice. Each sample should be identified with location and fish length, weight and sex. We would, of course, cover all shipping expenses incurred by anyone assisting with this effort.

I am hoping to attend the September meeting in Murmansk and hope to see you there.

Sincerely yours,

Frederick W. Kircheis

Fishery Research Biologist

FWK: jpn

cc: Dr. Irv Kornfield

State House Station 41, Augusta, Maine 04333 — Offices Located at 284 State Street

FORSCHUNGSINSTITUT UND NATURMUSEUM SENCKENBERG



der Senckenbergischen Naturforschenden Gesellschaft in Frankfurt am Main

Senckenberg · Senckenberganlage 25, 6000 Frankfurt 1

Dr. Robert Behnke
Colorado State University
Dept. of Fishery and Wildlife Biology
Fort Collins, Colorado 80523
U. S. A.

Forschungsgebiete:

Botanik / Paläobotanik Geologie / Paläozoologie Meeresbiologie Meeresgeologie Paläoanthropologie Zoologie

9 September 1990

Dear Dr. Behnke,

Thank you for your letter of recommendation for Mohammad Saadati. We will forward a copy to the German Academic Exchange Service together with his application for a PhD scholarship. I expect Mr. Saadati here next month and will then have an opportunity to discuss his research proposal in more detail.

I am still in contact with Hmoud Alkahem and we exchange reprints on a regular basis. I visited him in Riyadh this April and we agreed to lumb the long series of fishes from Saudi Arabia which have accumulated since our 1983 publications and to write a joint paper with more ecological and biological data. I was also able to take some nice photographs of life specimens during recent fieldwork in Saudi Arabia which we will include in the publication.

With best wishes

Yours sincerely

Friedhelm Krupp

Senckenberg



Werden Sie Mitalied

Naturmuseum und Forschungsinstitut



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Friedhelm Krupp



Forschungsinstitut · Naturmuseum SENCKENBERG

Senckenberganlage 25 6000 FRANKFURT a. M. 1

Dr. Robert Behnke Colorado State University Dept. of Fishery and Wildlife Biology Fort Collins, Colorado 80523 U. S. A.





WILDLIFE DEVELOPMENT FUND FOR NORTH AMERICA

801 P Street, Lincoln, Nebraska 68508

April 10, 1986

Dr. Robert Behnke Department of Fishery & Wildlife Biology Colorado State University Fort Collins, CO 80523

SUBJECT: FLATHEAD NATIONAL FOREST
"UNMANAGEMENT" - FISH KILL PLAN

Dear Dr. Behnke:

I'm sorry that you were not able to meet me for dinner at Boulder Sunday night. I realize this was short notice. I had wanted the opportunity to get better acquainted with you.

About a year ago I had sent you a copy of our "Comments on the Draft Flathead Wild & Scenic River Plan". I'm enclosing another copy of this just in case you may have misplaced yours.

Especially important, Dr. Behnke, are the comments in the first 11 pages. I hope we quoted you accurately on page 5.

Please note Appendix C (the excerpts from letters section). These are views from others (that I did not solicit) as to the rapidly declining condition of the rare Westslope Cutthroat Trout fisheries on the South Fork of the Flathead River.

Because of the U.S. Forest Service "unmanagement" policy, the fishery is being so rapidly depleted that the State Fish & Game has had to recently declare a large portion of the river "Catch & Release only" and they have lowered the creel limit on the rest of the river. The fishery is continuing to sharply decline as the number of floater grows.

I have attached some extracts from their "Decision" on March 1986 that may be of interest to you.

- 1) From the "Decision Notice" issue #2, page 7 and 8.
- 2) From the "Summary of & Response to Public Comments:
 - A. Concern #13, "Impacts on Fisheries are not adequately discussed in the draft".
 - B. Concern #27, "Fish Population is Declining".
 - C. Concern #46, "The Forest Service should manage fisheries through visitor limitations.

D. Concern #55, "Westslope Cutthroat Trout is the most valuable resource on the South Fork". 3) From the "Environmental Assessment", pages 10, 11, 12, 13 & 14. Would you please look at this material. I will call you next week and see if you have any comments on how we can save this fine "natural resource" the wild pure Westslope Cutthroat Trout of the South Fork of the Flathead River. Thank you very much. Sincerely Jack R. Cole JRC/ty Enc1. P.S. I'm also enclosing a copy of the agreement between Montana Fish & Game and U.S. Forest Service Region I concerning management of use. The Forest Service has the authority to protect fish and wildlife by restricting traffic.



WILDLIFE DEVELOPMENT FUND FOR NORTH AMERICA

801 P Street, Lincoln, Nebraska 68508

April 12, 1986

Dr. Robert Behnke Department of Fishery & Wildlife Biology Colorado State University Fort Collins, CO 80523

Dear Dr. Behnke:

Attached is an enclosure I've left out of our letter of April 10th.

Sincerely,

Jack R. Cole

JRC/ty

Encl.

Department of Fishery and Wildlife Biology



Colorado State University Fort Collins, Colorado 80523

13 July 1982

Miss Mary Bacon Shasta-Trinity National Forest 2400 Washington Avenue Redding, CA 96001

Dear Mary:

Many thanks for a copy of the Progress Report on California native trout. Sorry it took so long to send my comments, but I've been busy and some of the things said in the report required two or three readings to try to figure out how conclusions were made. There is not enough data presented to critically analyze all of the input into the computer that was used to come up with such a classification. Overall, I could agree with the general trends of differentiation that might be called subspecies—coastal rainbow trout, upper Columbia—Fraser river redband, upper Sacramento (headwaters McCloud), Kern drainage (two basic forms—gilberti and aguabonita), but the recognition of two subspecies—Salmo gairdneri aguabonita and S. g. "STK" (also called two subpopulations), both groups reputedly occurring in both Golden Trout Creek and in the South Fork drainage, is simply dumb. Any agency that would waste time and money developing a management program for these two "subspecies" would be even dumber.

I suspect what happened here was too much data, most of it without useful information content, went into the program. The computer forces allignment of all samples by degrees of similarities, but with so much "noise" or "mushy" data, these similarities bear no resemblance to evolutionary reality.

Data on allelic frequency are given in pie diagrams for four loci. The assumption that a sample from Golden Trout Creek and a sample from Mulky Creek share a most recent common ancestor while another sample from Golden Trout Creek shares a most recent common ancestor with all other South Fork samples can not be realistically supported by the data given. I can only assume that the authors let the computer do the analysis and thinking for them and since computers can't think you see what you get.

The authors also make phylogenetic interpretations which are not valid. I have tried to get this point across for several years that unless the characters being analyzed (alleles at gene loci in this case) can be known to be a primitive or a derived condition, there is no way to make valid phylogenetic interpretations (based on recentcy of common ancestry) or to recognize true branching points. The data presented in this report are simply comparisons of overall phenotypic similarity of protein banding patterns, which may or may not approximate phylogenetic relationships. There is no simple "technological fix" for resolving all problems of trout evolution and classification.

I suspect that Dr. Gall is a busy person and essentially turns the work over to the students to do and write up. But I wonder if he critically reads the manuscripts on which he is listed as coauthor?

Miss Mary Bacon 13 July 1982 Page Two Just recalling some of the "conclusions" made in reports and manuscripts I've read over the years based on electrophoretic studies, first the Sheepheaven trout and golden trout were found to be virtually undifferentiated from hatchery rainbow trout. Now with data from additional loci, they become very distinctive, more in accordance with my conclusions of 1968. Two or three years ago, it was concluded that the trout in Mountaineer Creek and neighboring tributaries (Little Kern drainage) were the "true gilberti." Now they are only introduced rainbow hybrids (which was obvious to me when I saw them in 1968). But now gilberti is back in the main Kern drainage--actually these "gilberti" populations bear little resemblance to the type specimen of gilberti collected from the Kern in 1893. The recent publication in California Fish and Game by Gold and Gall on golden trout and a manuscript by Smith and Gall on these same fish submitted to Canadian Jour. contain basic contradictions (I reviewed both papers). The nomenclature used is erroneous. The upper Columbia River basin subspecies would be S. g. gairdneri in accordance with Jordan and Evermann acting as the first revisers of the name gairdneri in 1896. The coastal rainbow is S. g. irideus. The name newberryi is associated with the original lacustrine trout of Klamath Lake. The "gilberti" in the report is not the same gilberti described in 1893 (they are S. g. gilberti x S. g. irideus hybrids). I'd suggest forgetting about "S. g. SFK." The useful aspect of the sum of all of electrophoretic studies is that they do provide verification and quantification of what I have been saying and writing for 15 years or more that the trout we call rainbow, redband, or golden trout consist of populations exhibiting great genetic variability, often between geographically close localities. A great amount of evolutionary experimentation has been going on and considerable gene flow has occurred among and between the ancestral groups which all results in patterns of differentiation that cannot be arbitrarily grouped into subspecies in such a manner that the classification accurately represents evolutionary reality. An example of this is the trout of East Fork Nelson Creek (Pit drainage). On a quantifiable basis the electrophoretic data would suggest recognizing this trout as a new species. The E. Fk. Nelson Creek trout is indeed unique. When I first collected specimens in 1968 I thought they were an introduced population of Lahontan cutthroat trout from their spotting pattern, but they do belong to the native Pit River group (which is so diverse I assume at least 3 ancestral groups are involved in their origins). -What do you do with this situation -- how do you classify the complexity contained in all of these unique native populations, how do you manage them? You are a level-headed person and I trust you will come up with a workable plan for the Forest Service. It should be apparent by now, however, that there is no technological resolution for solving the classification problem of the native trouts of California as so many biologists had naively assumed. I should mention that the analysis and interpretation of the eletrophoretic data into quantified genetic similarity (or distance) scores assumes a constant, uniform rate of differentiation through time (not punctuated equilibrium evolution) and that there is no selective advantage of one allele over another (or else evolutionary change would not be uniform through

Miss Mary Bacon 13 July 1982 Page Two time). Overwhelming evidence indicates this is not true. Therefore there is no logical basis for the authenticity of the relationship scores developed from such a study. A recent publication, Fish gene pools, N. Ryman (ed.) 1981, Ecological Bull. 34, published by Forskningradsnamnden (FRN), Stockholm, provides many useful arguments on why genetic diversity, as found in native trout populations, should be preserved. Much of the work presented is based on salmonid electrophoretic studies -- which I fully agree with. That is, it is an extremely useful tool for population genetic work and documentation of genetic differentiation but without primitive and derived character states to work with and when dealing with populations with genetic distance scores of .90 or more, phylogenetic and taxonomic conclusions should not be made or made very cautiously and provisionally. Sincerely, Robert J. Behnke Associate Professor Fishery Biology RJB:pt

Miss Mary Bacon Shasta-Trinity National Forest 2400 Washington Ave. Redding, Calif. 96001

Dear Mary:

Many thanks for a copy of the Progress Report on California native trout, Sorry it took so long to send my comments, but I've been busy and some of the things said in the report required two or three readings to Try to figure out how conclusions were were also made. There is not enough data presented to critically analyze all of the input into the computer that was used to come up with such a classification. Overall, I could agree with the general trends of differentiation — a that might be called subspecies — a coastal rambow to the coastal rambow. trout, upper Columbia - Fraser river redband, upper Sacramento (# headwaters Mc Cloud), Itern drainage (two bases forms - gilberti and aquabonita), but the recognition of two subspecies - Salmo gavidneri guabonila and 5. q. '5 7K" (also called two subpopulations); both groups reputedly occurring in both Golden Trout Creek and in the South Fork drainage, is simply dumb. any agency that would waste time and money developing a management program for these two "subspecies" would be even dumber. I suspect what happoned here was Information content, went into the program. The computer forces allegment of all samples into des by degrees of similarities, but with so much "moise" or "mershy" data, these similarities dear no resemblance to evolutionary reality. Data on allelic frequency are given in

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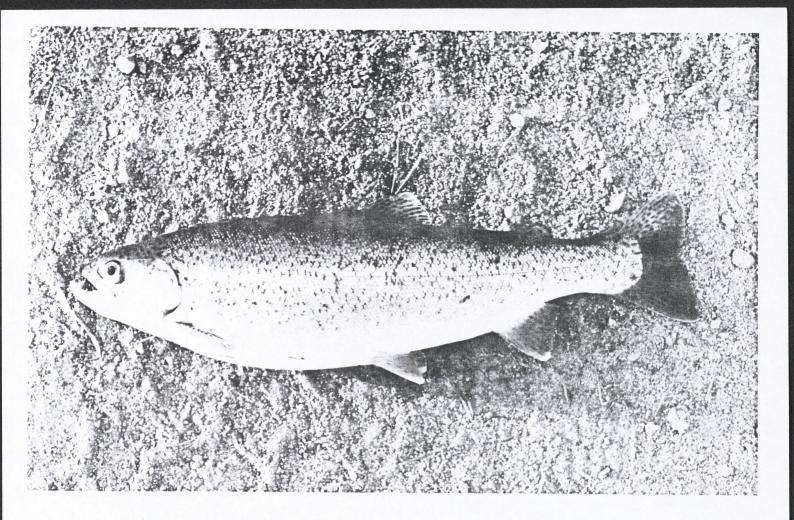
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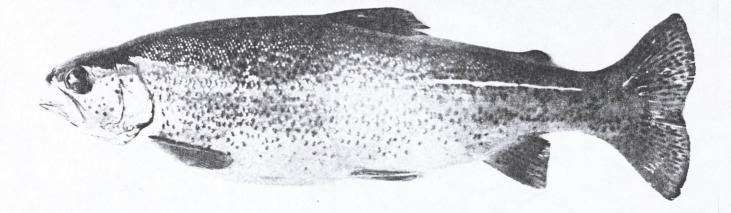
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work and documentation of genetic differentiation but without primitive and derived character states, and when dealing with populations with genetic distance scores of 30 or more, phylogenetic and taxonic taxonomic conclusions should not be documentated by made very contiously and provisionally. Sin circly



Both hybrids? Please reply



Dec.15, 1989

Dear Mr. Behnke:

Thanks for your letter of nov.21, 89.

Very interesting about the fishery regulations in state of Idaho.

Can you send a copy of the regulations?

Do the anglers use barbless hooks?

Also thanks for the information on the size of dorsal fin, less $1\frac{1}{2}$ inches =hatchery - higher $1\frac{1}{2}$ in.=wild, rainbow trout.I did not know this.

The seven fishes in the photowere coming from a provincial hatchery, mostly for anglers och shops. For anglers/turism in "put & take waters", mostly in Westsweden.

Today, what I know, nobody here in Sweden is stocking rainbow trout in Swedish coastwater or in the Baltic sea. Perhaps the fishskin was from Poland or another land, who knows? But I shall keep an eye om all rainbow trouts here as often I can and keep you informed. Also new bulletins/books.

"Trout and salmon handbook" by R.Ade. No, he do not cite his sources of information for fishes. I sent a few copies/sides of his book to you and I hope have you have got them.

Encl. is \$3 for the TROUT-magazine you sent to me before.

Encl. are 2 photos of "new" rainbow trouts. You can keep all photos.

I would like to wish you and your family a very happy Christmas and asuccessful New Year.

Regards,

Kent Andersson Norumshöjd 11 bv 417 45 Göteborg Sweden



"Rainbow trout", Gothenburg.
11 december 1989

Photo: Kent Andersson Norumshöjd 11 bv 417 45 Göteborg Sweden



"Rainbow trout", Gothenburg
11 december 1989

Photo: Kent Andersson Norumshöjd 11 bv 417 45 Göteborg Sweden