CUTTHROAT TROUT

General Ecology

Distribution. Cutthroat trout, Salmo clarki, are a polytypic species consisting of several geographically distinct forms with a broad distribution and a great amount of genetic diversity (Hickman 1978; Behnke in press). Behnke (in press) recognizes 13 extant subspecies: Coastal cutthroat (S. c. clarki) in coastal streams from Prince William Sound, Alaska to the Eel River in California; mountain cutthroat (S. c. alpestris), upper Columbia and Frazer River drainages of British Columbia; west slope cutthroat (S. c. lewisi) in the upper Columbia, Salmon, Clearwater, south Saskatchewan and upper Missouri drainages of Montana and Idaho; an undescribed subspecies in the Alvord basin, Oregon; Lahonton cutthroat (S. c. henshawi), Pauite cutthroat (S. c. seleniris), and an undescribed subspecies in the Humboldt River drainage of the Lahontan basin of Nevada and California; Yellowstone cutthroat (S. c. bouvieri) of the Yellowstone drainage of Montana and the Snake River drainage of Wyoming, Idaho and Nevada; an undescribed subspecies (fine spotted) from the upper Snake River, Wyoming; Bonneville cutthroat (S. c. utah) of the Bonneville basin in Utah, Nevada, Idaho and Wyoming; Colorado River cutthroat (S. c. pleuriticus) of the Colorado River drainage in Wyoming, Utah and Colorado; greenback cutthroat (S. c. stomias) of the South Platte and Arkansas River systems; and Rio Grande cutthroat (S. c. virginalis) of the Rio Grande River drainage of

Colorado and New Mexico. Many of these 13 subspecies are included on Federal or State endangered or threatened species lists.

Variation in temperature and chemical preferences, migration, and other ecological and life history attributes exists among cutthroat subspecies (Behnke in press). Differences in growth rate (Carlander 1969; Scott and Crossman 1973; Behnke in press) and food preferences (Trojnar and Behnke 1974) between some subspecies have also been reported. To a large extent stream trout are territorial, they need a certain territory for their shelter and foraging, and the more aggressive individuals will defend these territories. Stream salmonids are able to reduce agression and tolerate crowded conditions if food is abundant (Chapman 1966).

Habitat. Cutthroat trout prefer clear, cold, rocky bottom streams and clear, deep lakes that may vary in size and chemical quality. These trout tend to occupy headwater stream areas, especially when other trout species are present in the same river system.

Several studies have demonstrated the importance of cover to salmonid densities but few have involved research during the winter (Bustard and Narver 1975b). In some streams the major factor limiting salmonid densities may be the amount of adequate overwintering habitat rather than summer rearing habitat (Bustard and Narver 1975a). Everest (1969) suggested that some salmonid population levels were regulated by the availability of suitable hibernating areas. The major advantages in seeking winter cover are: prevention of physical damage from ice scouring (Chapman and Bjornn 1969; Hartman 1965) and conservation of energy (Chapman and Bjornn 1969; Everest 1969). The main advantage of summer cover is probably predator avoidance. During high water velocity periods cover may also provide resting areas and help prevent downstream displacement. Very few salmonids are found in areas lacking cover (Bustard and Narver 1975a). Winter hiding behavior in salmonids is triggered by low temperatures (Chapman and Bjornn 1969; Everest 1969; Bustard and Narver 1975a,b). Bustard and Narver (1975a) indicated that as water temperatures dropped to 4 to 8^{o} C feeding was reduced in young salmonids and most were found within or near cover, few were found more than 1 m from potential cover. Cutthroat trout were found under boulders, log jams, upturned roots and debris when temperatures neared 4 to 8^{o} C, depending on velocity (Bustard and Narver 1975a). Salmonids use instream structures, substrate, deep water and undercut banks for cover. Bjornn (1971) observed that nearly all the rainbow trout in his study lived in or near rock piles during the winter. Lewis (1967) reported that rainbow trout tended to move into deeper water during winter. Bustard and Narver (1975a) reported that the streambank environment was very important to overwintering steelhead trout.

Headwater trout streams tend to be relatively unproductive. Most energy inputs to the stream are in the form of allochthonous materials; leaves and other terrestrial vegetation and terrestrial insects. About 40 to 50% or more of the food trout in headwater streams eat during the summer is comprised of terrestrial insects. Aquatic invertebrates are most abundant and diverse in stream riffle areas with cobble or greater size substrate and on submerged aquatic vegetation. In headwater streams the invertebrate fauna is much more abundant and diverse in riffles than pools (Hynes 1970). Canopy cover is important in maintaining shade for stream temperature control and to provide allochthonous materials to the stream. Too much shade can, however, restrict primary productivity in a stream. Shading becomes increasingly important as stream gradients decrease.

Cutthroat trout fry exhibit three distinctly different genetically controlled patterns when moving from natal gravels to rearing areas: 1) Downstream to a larger river or lake; 2) upstream from an outlet river to a lake; or 3) local dispersion within a common spawning and rearing area to areas of low velocity and cover (Raleigh and Chapman 1971). The latter type of movement pattern is the most common. Fry of lake resident fish may either move into the lake from natal streams during the first growing season or overwinter in the spawning stream and move into the lake during the second growing season (Raleigh 1971; Raleigh and Chapman 1971). Some Salmo clarki lewisi spend one to four years in the stream (average two) before migrating back to the lake (Roscoe 1974).

Coastal cutthroat trout, Salmo clarki clarki, appear to be less prone to saltwater rearing than steelhead trout or salmon. Some cutthroat live their entire lives without entering saltwater (Behnke in press), and those that enter the sea return to overwinter in freshwater streams and lakes each year (Armstrong 1971; Johnston and Mercer 1976). The majority of coastal cutthroat that smolt and migrate to the sea for the first time do so at III or IV years old. Some smolt at age I while others may not migrate to saltwater until age VI. In Washington the smallest cutthroat smolt entering saltwater weigh about 40 to 45 gms and are 160 to 170 mm in length. Physiological adaptation to saltwater appears to be more related to size than to age (Johnston and Mercer 1976).

In Washington and Oregon smolt movement to saltwater occurs as early as March, peaks in mid-May and is completed by mid-June (Johnston and Mercer 1976). In Alaska migration begins in April (Armstrong 1971; Johnston and Mercer 1976), peaks at the end of May (Johnston and Mercer 1976) and continues into August (Armstrong 1971). Armstrong (1971) indicated that most seasonal migrations occurred during the dark. Once in saltwater coastal cutthroat usually remain near shore in bays, estuaries and along the coastal area with little or no offshore movement (Behnke in press). Re-entry into freshwater in Washington and Oregon begins in July, peaks in September and October and lasts until the end of October. In smaller streams draining directly into saltwater re-entry begins in October, peaks in December and January and lasts until March. Migrations into small stream-lake systems in Alaska begins as early as mid-May, peaks in September and lasts until October (Johnston and Mercer 1976).

Age and Growth. Most male cutthroat trout mature at ages two to three while females usually mature a year later (Irving 1954; Drummond and McKinney 1965). Size of cutthroat trout at maturity is variable and depends on environmental conditions. Maximum life expectancy for coastal cutthroat is about 10 years of age (Johnston and Mercer 1976). Cutthroat tend to mature at a smaller size in small headwater streams (Behnke and Zarn 1976).

Trout are opportunistic feeders (Behnke and Zarn 1976). Aquatic insects, generally the most available food in streams, are the dominant item of most cutthroat trout diets (Allen 1969; Carlander 1969; Baxter and Simon 1970; Scott and Crossman 1973; Griffith 1974). Other foods, such as zooplankton (McAfee 1966; Carlander 1969; Trojnar and Behnke 1974), terrestrial insects (Carlander 1969; Trojnar and Behnke 1974; Hickman 1977), and fish (Carlander 1969) are important locally or seasonally. Cutthroat trout usually become more piscivorous as they increase in size (McAfee 1966; Carlander 1969; Baxter and Simon 1970).

Reproductive Behavior. Cutthroat trout are stream spawners. The fertilized ova are deposited in redds constructed primarily by the female in the stream gravels (Smith 1941, 1947). Resident populations of cutthroat in lakes spawn in both outlet and inlet streams (Raleigh 1971; Raleigh and Chapman 1971).

Spawning begins as early as March (Behnke and Zarn 1976; Fleener 1951) and as late as August (Juday 1907; Fleener 1951). The time of spawning depends on water temperature, runoff (Lea 1968), ice melt (Calhoun 1944), elevation and latitude (Behnke and Zarn 1976). Specific information on optimal velocity for cutthroat trout spawning was not found in the literature. Post-spawning mortality of adults is high in most populations (Irving 1954; Carlander 1969; Scott and Crossman 1973).

Specific Habitat Requirements

Habitat Parameters. In general sand is the poorest habitat for invertebrate production. The fact that rubble supports more organisms than sand is correlated with the amount of available stable living space. Larger and more irregular stones support a more diverse invertebrate fauna. Optimum substrate for invertebrate production consists of a mosaic of sand, gravel, rubble and boulder with rubble being dominant. On stony substrate the presence of silt reduces and changes the invertebrate fauna. The presence of vegetation increases the diversity and abundance of invertebrate fauna. In several studies vegetated areas were more heavily colonized than the non-vegetated areas of substrate (Hynes 1970). A ratio of 50% pool area to 50% riffle area is the best overall habitat for stream resident trout (Needham 1940).

Hartman and Gill (1968) studied 66 streams in British Columbia and those streams containing cutthroat trout had a pH range of 6.0 to 8.8. Thirteen streams in Wyoming containing populations of Colorado River cutthroat trout had pH levels ranging from 7.1 to 8.3 (Binns 1977). Sekulich (1974) reported that the pH in three reservoirs containing cutthroat trout ranged from 7.8 to 8.5. Platts (1974) analyzed three streams in Idaho containing cutthroat trout where the pH ranged from 7.3 to 7.9. Some isolated populations of cutthroat trout in the Great Basin area have developed a unique tolerance to high alkalinity and temperature conditions. The largest cutthroat trout ever recorded came from

Pyramid Lake, which has a pH of over 9.0 (LaRivers 1962). The pH range for cutthroat trout appears to be about 6.0 to 9.0 with more restricted optimal ranges regionally.

Bachmann (1958) reported that cutthroat trout stopped feeding and moved to cover at turbidities above 35 ppm. Total dissolved solids from 38 to 544 mg/l and turbidities of less than 25 JTU characterized 13 Wyoming streams containing cutthroat trout (Binns 1977). Platts (1974) recorded total dissolved solids ranging from 41 to 63 mg/l in three Idaho streams. The Lahontan basin cutthroat trout persist in waters where total dissolved solids may exceed 7,000 mg/l (Johnson 1974).

Adult. Dissolved oxygen requirements vary with the species, age of fish, prior acclimation temperature, water velocity and concentration of substances in the water (McKee and Wolf 1963). As temperatures increase the dissolved oxygen level in the water decreases while the dissolved oxygen requirement for the fish increases. As a result, an increase in temperature resulting in a decrease in dissolved oxygen can be detrimental to the fish. Doudoroff and Shumway (1970) demonstrated that swimming speed and growth rates for salmonids declined with decreasing dissolved oxygen levels. Cutthroat trout generally avoid water with dissolved oxygen level in the summer of less than 5 mg/l (Trojnar 1972; Sekulich 1974).

Cutthroat trout usually do not persist in waters where maximum temperatures consistently exceed 22^{o} C, although they may be able to withstand brief periods of daytime water temperature as high as 26^{o} C if considerable cooling takes place at night (Behnke and Zarn 1976). The Humboldt River cutthroat trout, however, occupy waters where temperatures may reach a summer maximal level of 25° C (Behnke in press). Needham and Jones (1959) reported cutthroat trout actively feeding at a temperature of 0° C. Bell (1973) reported a preferred temperature of 9 to 12° C for cutthroat trout. As temperatures neared 7° C adult steelhead trout in Idaho moved downstream to larger and deeper rivers (Everest 1969).

Embryo. The length of the incubation time varies indirectly with temperature. Eggs usually hatch within 28 to 40 days (Cope 1957), but may take as long as 49 days (Scott and Crossman 1973). The optimum temperature for incubation is approximately 10° C (Snyder and Tanner 1960). The combined effects of temperature, dissolved oxygen levels, water velocity, and gravel permeability are important for successful incubation. Suitable incubation substrate is gravel 3 to 80 mm in diameter (Duff in press). Suspended sediment levels greater than 130 ppm, combined with dissolved oxygen concentrations less than 6.9 mg/l and velocities in the redd of less than 55 cm/hr, can reduce egg survival to below 10% (Bianchi 1963). Coble (1961), working with steelhead trout embryos, demonstrated that velocities and dissolved oxygen concentrations were closely related in their effect on embryo survival. Doudoroff and Shumway (1970) reported that salmonids that hatched at low dissolved oxygen levels were weak and small; their development was slower and there were more abnormalities.

Fry. Cutthroat trout remain in the gravel for about two weeks after hatching (Scott and Crossman 1973), and emerge from the gravel 45 to 75 days after egg fertilization depending on water temperature (Calhoun 1944; Lea 1968).

Fry residing in stream environments prefer shallower water and slower velocities than other life stages (Miller 1957; Horner and Bjornn 1976). Velocities of less than 30 cm/sec are preferred with less than 8.0 cm/sec optimum (Horner and Bjornn 1976). Fry survival decreases with increased velocities after some optimal velocity has been reached (Bulkley and Benson 1962; Drummond and McKinney 1965). A pool area of 40% to 60% of the total stream area is optimal fry habitat. Cover in the form of aquatic vegetation, debris piles, and the interstitial spaces between rocks is critical.

Chapman and Bjornn (1969) demonstrated that the number of fry steelhead trout hiding in rubble cover was directly related to water temperature, none were observed above the substrate when water temperatures were below 4° C. Trout fry usually overwinter in shallow areas of low velocity near the stream margin, with rubble being the principle cover (Bustard and Narver 1975a). As these young trout mature they move to deeper, faster water. Everest (1969) suggested that one reason for this movement was the need for cover which is fulfilled by increased water depth, turbulence and larger substrate. Optimum size of substrate, used as winter cover for steelhead fry, ranges from 20 to 40 cm in diameter (Everest 1969; Hartman 1965). Bustard and Narver (1975a) reported that the majority of steelhead fry in their study were found in substrate less than 20 cm in diameter, but suggested that this was because few rocks larger than 15 cm were available. Using smaller diameter rocks for cover may result in increased mortalities because of shifting substrate (Bustard and Narver 1975a).

<u>Juvenile</u>. Juvenile cutthroat trout in southwestern British Columbia were generally in streams with drainage areas of less than 13 km^2 (Hartman and Gill 1968). The streams had a range of total dissolved solids between 20 and 190 ppm.

Juvenile cutthroat trout in streams are most often found in water depths of 45 to 75 cm and velocities of 25 to 50 cm/sec (Nickelson unpublished data). Metabolic rates are highest between 11 and 21° C (Dwyer and Kramer 1975). The optimal temperature for growth of juvenile cutthroat trout is 15° C and equilibrium is lost between 28 and 30° C (Heath 1963).

Bustard and Narver (1975b) demonstrated that juvenile cutthroat trout used rubble and overhanging banks as cover. When given a choice between areas containing overhanging bank cover and areas without cover the cutthroat choose the overhanging bank cover areas, they also showed a preference for clean rubble as opposed to areas of silted rubble for cover. Common types of cover for juvenile steelhead are upturned roots, logs, debris piles, overhanging banks and boulders (Bustard and Narver 1975a). They also reported that young salmonids occupy different habitats in the winter than in the summer, log jams and rubble were the most important winter cover. Edmundson and Everest (1968) reported that juvenile steelhead were primarily under or between rubble particles in the winter. Everest (1969) demonstrated that juvenile steelhead actively seek suitable overwintering areas in the fall and they entered the substrate at temperatues below 7^{o} C, none were found above the substrate when temperatures reached 5^{o} C. These fish were found 15 to 30 cm deep in the substrate and were often covered by 5 to 10 cm of anchor ice. Everest (1969) indicated that juvenile steelhead do not feed during this winter hibernation and once in the substrate they do not come out until the temperature is above 7^{o} C.

Table 1. Data Summary

Model	Rating	Analysis Method	Data Source
I_{1A} - Temperature (Adult)	Good	Ocular Estimation	Behnke (in press) (CT) Bell 1973 (CT) McKee & Wolf 1963 (RB) Mottley 1933 (RB) Needham & Jones 1959 (CT) Purkett 1951 (CT)
I_{1E} - Temperature (Embryo)	Good	Ocular Estimation	Ball & Cope 1961 (CT) Brungs & Jones 1977 (RB) Kwain 1975 (RB) Leitritz 1960 (RB)
I_{1F} - Temperature (Fry)	Good	Ocular Estimation	Same as Adult
I_{1J} - Temperature (Juvenile)	Good	Ocular Estimation	Same as Adult
I_{2A} - Dissolved Oxygen (Adult)	Good	Ocular Estimation	Davis 1975 (RB) Doudoroff & Shumway 1970 (RB) McKee & Wolf 1963 (RB)
I_{2E} - Dissolved Oxygen (Embryo)	Good	Ocular Estimation	Coble 1961 (RB) Davis 1975 (RB) Doudoroff & Shumway 1970 (RB) Garside 1966 (RB)

Table 1. (Continued)

Model	Rating	Analysis Method	Data Source
I_{2F} - Dissolved Oxygen (Fry)	Good	Ocular Estimation	Same as Adult
I_{2J} - Dissolved Oxygen (Juvenile)	Good	Ocular Estimation	Same as Adult
I_{3A} - Velocity (Adult)	Good	Ocular Estimation	Griffith 1972 (CT) Hanson 1977 (CT)
I_{3E} - Velocity (Embryo)	Good	Ocular Estimation	Coble 1961 (RB) Cooper 1965 (SAL) Pyper & Vernon 1975 (SAL) Shumway et al. 1964 (RB) Smith 1973 (RB)
I_{3F} - Velocity (Fry)	Good	Ocular Estimation	Everest 1969 (RB) Horner & Bjornn 1976 (CT) Miller 1957 (CT)
I_{3J} - Velocity (Juvenile)	Good	Ocular Estimation	Everest 1969 (RB) Nickelson unpubl. (CT)
I_{4A} - Percent Cover (Adult)	Good	Ocular Estimation	Boussu 1954 (RB) Elser 1968 (RB BN) Gunderson 1968 (BN) Lewis 1969 (RB BN) Marcuson 1977 (BN)

Table 1. (Continued)

Model	Rating	Analysis Method	Data Source
I_{4E} - Substrate (Spawning) (Embryo)	Good	Ocular Estimation	Bjornn 1969 (RB) Cope 1957 (CT) Duff (in press) (CT) Hall & Lanta 1969 (RB) Kiefling 1978 (CT) Koski 1966 (SAL) Lantz 1967 (CT) McCuddin 1977 (CT) Mills 1966 (CT) Phillips 1964 (RB) Phillips et al. 1966 (RB) Phillips et al. 1975 (RB)
I_{4F} - Substrate (Cover) (Fry)	Good	Ocular Estimation	Bustard & Narver 1975a,b (CT RB) Hartman 1965 (RB)
I_{4J} - Percent Cover (Juvenile)	Good	Ocular Estimation	Bustard & Narver 1975a,b (CT RB) Everest 1969 (RB)
I_{1H} - Substrate (Invert. Prod.) (Habitat)	Good	Ocular Estimation	Binns & Eiserman 1976 Hynes 1970 Pennak & Van Gerpen 1947

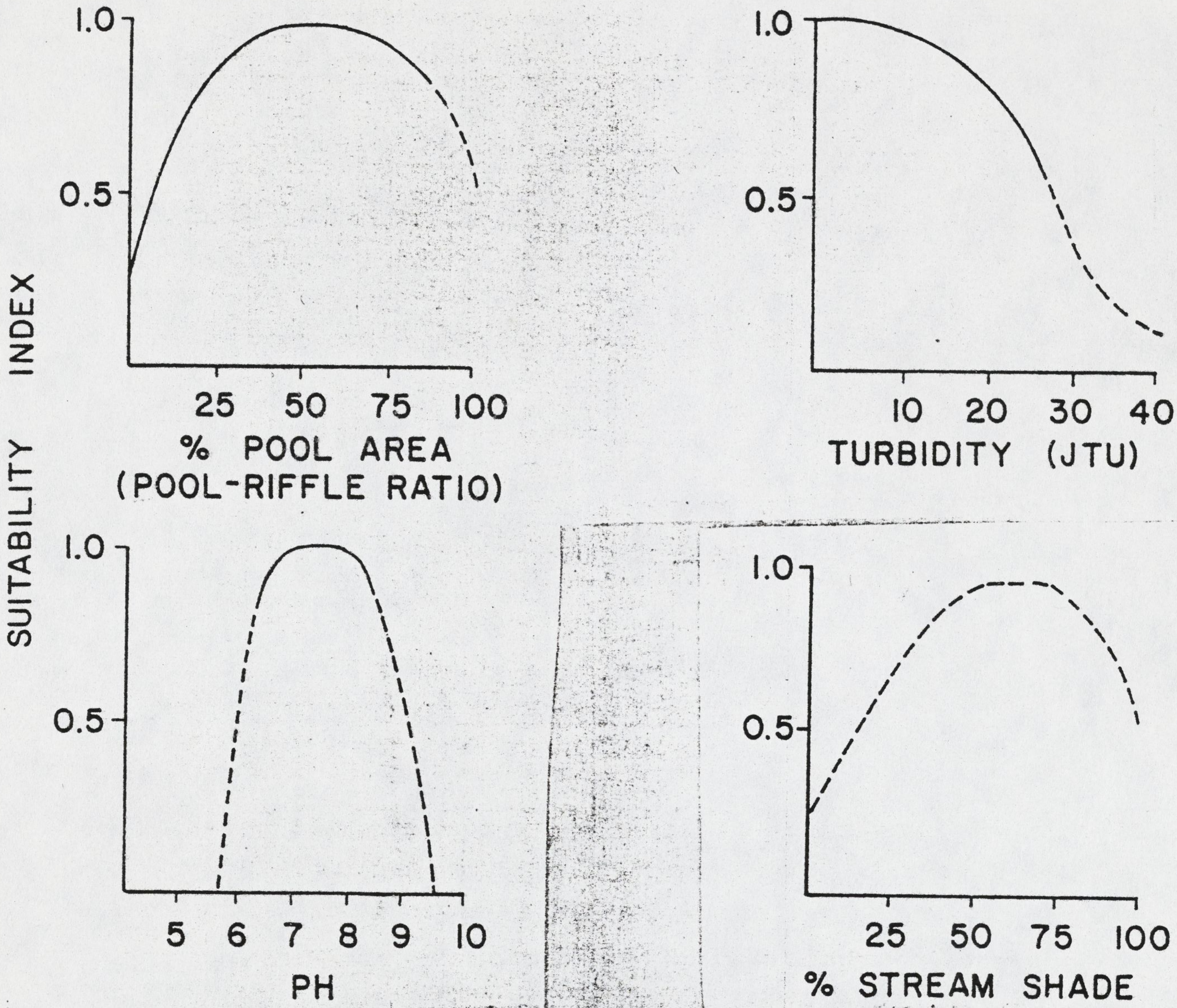
Table 1. (Continued)

Model	Rating	Analysis Method	Data Source
I_{2H} - % Pool Area (Pool/Riffle) (Habitat)	Good	Ocular Estimation	Elser 1968 (RB BN) Horner & Bjornn 1976 (CT) Hunt 1971 (BK) Jester & McKirdy 1966 (CT) Needham 1940 (CT RB BN BK)
I_{3H} - Turbidity (Habitat)	Good	Ocular Estimation	Binns 1977 (CT) Cordone & Kelly 1961 (CT)
I_{4H} - pH (Habitat)	Good	Ocular Estimation	Binns 1977 (CT) Hartman & Gill 1968 (CT) Kiefling 1978 (CT) LaRivers 1962 (CT) Platts 1974 (CT) Sekulich 1974 (CT)

Key: CT Cutthroat; RB Rainbow; BN Brown; BK Brook; SAL Salmon

The suitability curves are a compilation of published and unpublished information on cutthroat trout. Information from another life stage or species or expert opinion was used to formulate curves when the data for a particular habitat parameter or life stage was insufficient. Data are not sufficient at this time to refine the habitat suitability curves that accompany this narrative to reflect subspecific or regional differences. Local knowledge should be used to regionalize the suitability curves if that information will yield a more precise suitability index score. Additional information on this species that can be used to improve and regionalize the suitability curves should be forwarded to the Project Impact Evaluation Group, U.S.D.I. Fish and Wildlife Service, 2625 Redwing Road, Ft. Collins, Colorado 80526.

CUTTHROAT TROUT
(HABITAT)



Wildlife Commission to consider hunting season changes

The Colorado Wildlife Commission will consider several possible changes in the general framework of state hunting seasons for the next three years at its November meeting in Denver.

The meeting is scheduled for November 15 and 16 in Division of Wildlife headquarters at 6060 Broadway, and is open to the public.

According to Jim Lipscomb, game program manager for the Division of Wildlife, seven major issues are under consideration for possible change in the hunting framework adopted in 1976.

All of those issues, he said, have been raised at one time or another by either sportsmen or wildlife managers in the past three years.

Those issues and brief background on them include:

• Whether or not to continue the separate-combined big game season structure. That structure was implemented in 1976 to ease crowded hunting conditions, Lipscomb said. It allows hunters to pursue deer and elk in separate October seasons, or both deer and elk at the same time in a November combined season, but not one species in October and the other in November.

• Whether deer or elk season should come first. For the past three years, the separate deer season has been held before the separate elk season.

• Whether or not to continue restricting the number of muzzle-loader licenses to 2,000 for each species (deer and elk).

• Whether or not to separate archery and muzzle-loader seasons. Currently, the nine-day muzzle-loader season occurs during the longer archery season, Lipscomb said.

• Whether or not to continue the "one and only hunt" and "one and only harvest" restrictions, which limit hunters to one type of season and allow taking no more than one animal per species.

• Whether or not to continue setting single season deer hunts outside of the eastern Colorado plains area. The state's separate-combined season structure is mostly intended for Colorado's Western Slope, where most deer and elk hunters go. In a few areas of the Front Range, single deer seasons were set at the request of landowners in those areas, while other areas stayed within the separate-combined structure, Lipscomb said.

• Whether or not to continue opening quail season two weeks earlier than pheasant season on the Eastern Slope. That policy was begun in 1977 to allow hunters to pursue quail as early in the fall as possible before the bulk of natural mortality occurs, Lipscomb said.

WILDLIFE NEWS
COLORADO DIVISION OF WILDLIFE NOVEMBER 1979
VOLUME IV, NUMBER 11

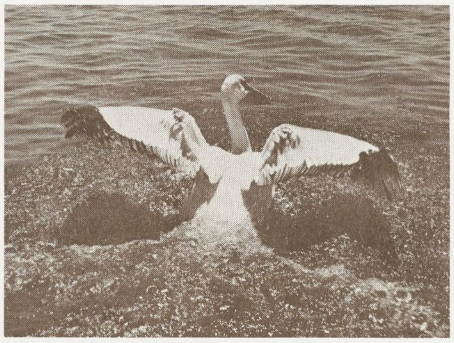
Colorado's nongame program maintains steady growth

By Russ Bromby
Assistant Editor

Colorado's nongame program has come a long way in its climb to being the most aggressive effort of its kind in the nation. Since its inception in 1972 the program has burgeoned from a one man show to its present strength of 31 full and part-time employees handling a variety of nongame research and management projects. Nongame animals are those species not pursued for sport or profit and include not only the much reported peregrine falcon, bald eagle and other threatened and endangered species, but more common animals like songbirds and small mammals like chipmunks and shrews.

The program had its beginning in 1972 with the appointment of John Torres as the state's first nongame biologist. In the seven years since, the nongame program has grown to include a Denver administrative unit, a regional program and a research branch. The phenomenal growth is due largely to increased interest in nongame wildlife that has resulted in a large funding base of federal and state tax money. One of the most significant reasons for the program's growth is the support of Colorado taxpayers through the state's nongame check-off system on income tax forms.

Torres now heads up the nongame program and coordinates the activities of nongame personnel statewide as well as supervising the four full-time employees that make up the Denver planning unit. Steven Bissell is a four-year veteran of the nongame wars and is currently the nonconsumptive public use specialist, responsible for developing a wildlife nonconsumptive use program for all species including activities like photography, nature walks and scientific study. Robin Knox has made the transistion from watershed biologist to aquatic nongame specialist since joining the team last year from the Indiana Division of Fish & Wildlife. He received his master's degree from the University of Missouri and has extensive experience in fisheries biology throughout the United States. His duties include planning programs that relate to all aquatic nongame species in Colorado.



Stabilizing Colorado's only nesting colony of white pelicans is just one of many projects the nongame program is involved in.

Patsy Goodman is the new kid on the block, having started with the Division as the terrestrial nongame specialist on October 1 of this year. She received her master's from the University of Colorado and worked for the Colorado Department of Highways as an environmental analyst for five years prior to coming to the Division of Wildlife. She is also past president and a member of the Board of Directors for the Denver Audubon Society. Clerical duties have been handled for the last two years by Juanita Garcia.

Regional nongamers are Ted Washington in the northeast, Chuck Loeffler, southeast, Dave Langlois from the southwest region and Tom Lytle, northwest. The regional nongame biologists, most of whom were appointed in the past year, handle a variety of management assignments relating to the recovery of threatened and endangered species as well as other nongame wildlife. They work closely with the Denver unit and are under the direction of the regional wildlife managers.

In research, there is the gang of five in Fort Collins. Walt Graul, research leader, guides the group consisting of aquatic researcher Charles Haynes, amid two terrestrial researchers, Jerry Craig, whose specialty is raptors, and Gary Miller. Clerical chores for the research unit are taken on by Rose Calderon.

Throw in sixteen temporary employees working at various times of the year on a number of research and management projects and you have a capable and experienced base from which to tackle the difficult problem of managing the 783 species of nongame wildlife in Colorado.

Past accomplishments of the nongame team include stabilizing the white pelican colony in northeast Colorado, introduction of the river otter in the state's waters, restoration of breeding pairs of the peregrine falcon and reestablishing the Rio Grande cutthroat trout in southwest Colorado.

With the continued support of the public, these and other programs should do much to improve the standing of nongame species in a state whose wildlife habitat shrinks daily.

The cost was high, but well-publicized bear is confirmed as griz

By Geoff Tischbein

"I wouldn't have believed it if I hadn't seen it myself...it's just too bad we had to find out this way," commented Division of Wildlife biologist Jim Olterman as he examined the hide of the first confirmed grizzly in Colorado since 1951. It was the grizzly, as most of the country has now heard, that was killed by Crestone hunting guide Ed Wiseman after it had attacked him.

It has to be the most confirmed grizzly in history...and also one of the most expensive as two helicopters went down trying to get the bear out. Miraculously, no one was hurt.

The first word the Division of Wildlife got was a phone call at 10:30 p.m. on Sunday, September 23, to La Jara district wildlife manager Dick Weldon from the sheriff's office. A MAST (emergency) helicopter had been requested by a man mauled by a bear near Platoro Reservoir. Weldon immediately drove to Platoro where he first heard that the bear may have been a grizzly.

"I was skeptical at first," Weldon said. "I've gotten numerous reports over the years and all the ones I have been able to run down have been black bears. But I've always said that if there were any grizzlies left in Colorado, this is where they'd be."

The MAST helicopter was able to get in Monday to fly Wiseman out, but it was not until Tuesday before a Division helicopter was able to take Weldon, fellow officer Bob Rouse, and Wiseman guide Dick Baumfalk to the bear.

Meanwhile, several Division employees and news media persons waited at La Jara for the helicopter which was supposed to bring the bear out shortly after noon. The chopper still hadn't arrived by 4 p.m., and Division personnel began to fear that something may have happened. They were right.

In attempting to get as close to the bear as possible, pilot Bill Knight accidentally hit the rear rotor on a rock. No serious damage was done, but the chopper began to vibrate and Knight set it down immediately knowing the vibration would eventually shake the ship apart.

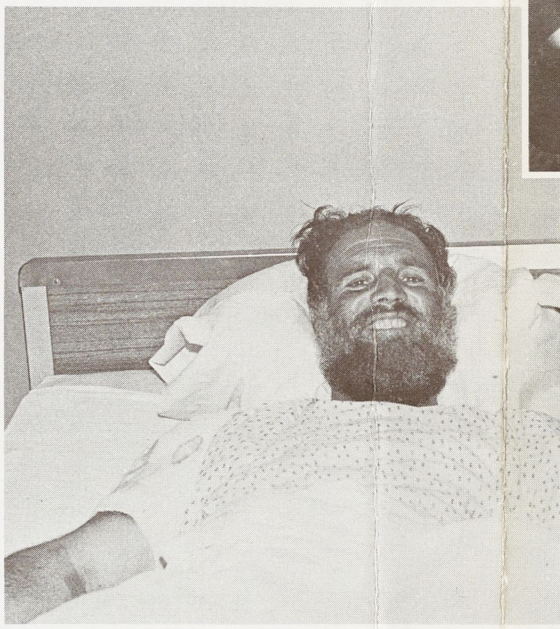
At that point it was obvious someone would have to walk out. Weldon and Knight agreed to go get help. Four and one-half hours later they reached Platoro and phoned an anxious Clayton Wetherill, area wildlife manager for the entire San Luis Valley. The call came just as the Division airplane Wetherill had requested to begin a search was landing at La Jara. After emphasizing no one was hurt, Weldon confirmed that the bear was indeed a grizzly.

The problem now was to get sleeping bags, warm clothing and food to Rouse and Baumfalk who were still in the high country. Supplies were quickly gathered, put in the airplane, and pilot-biologist Jim Olterman took off literally into the dying sunset. "If it had been five minutes later it would have been too dark to see them...we, I guess I mean they, were lucky," Olterman said after arriving back at the airport.

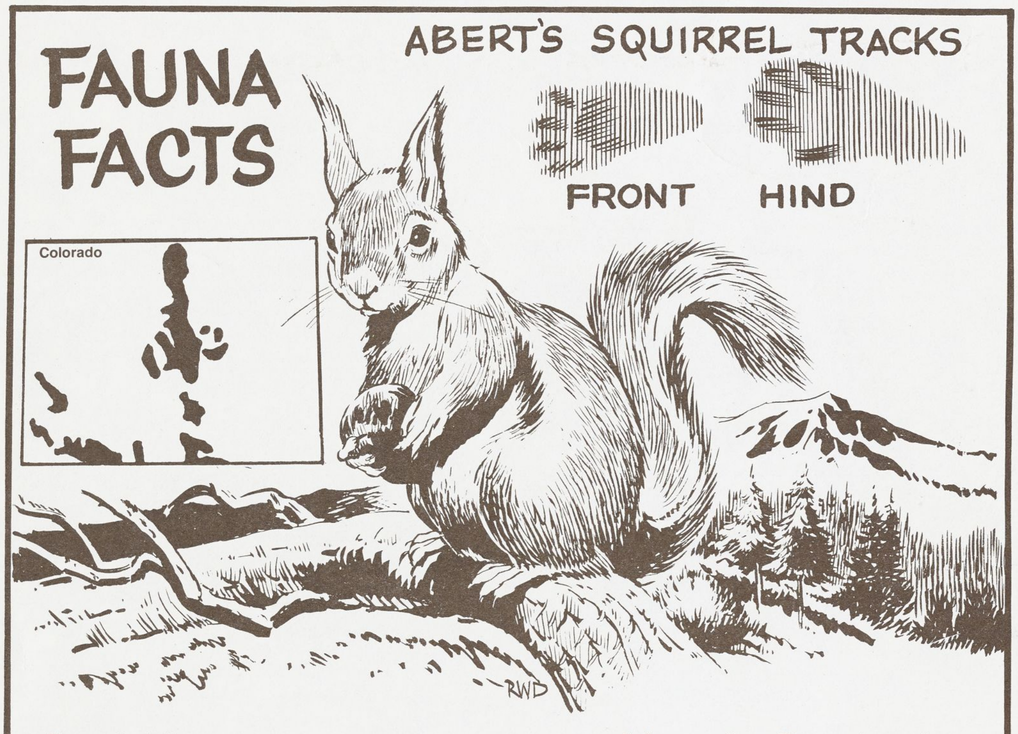
At that point, KOA-TV newsmen Jim West and Jerry Curran offered to split with the Division the cost of getting another helicopter to fly them and Division officials into the site the next morning. The details were worked out and at daybreak Wednesday morning a helicopter picked up the newsmen and Olterman.

By the time they reached the bear, it had already been skinned to save the hide from being ruined. They then flew to Wiseman's base camp where Olterman first saw the hide and immediately backed up Weldon's confirmation that it was a grizzly. The hide and skull were flown out to Monte Vista where Division bear specialist Tom Beck also confirmed that it was a grizzly through tooth measurements.

But the excitement was far from over—at least for Division biologist Steve Bissell who flew to Alamosa then drove to Platoro to re-



Ed Wiseman recuperating in the hospital after his enc



Characteristics

A large squirrel, the Abert's weighs up to 2 lbs. and can reach 22 inches in length including a 8-9 inch bushy tail. The squirrel is found only in ponderosa pine forests between 5,000 and 8,500 feet and builds a bulky nest of leaves and twigs high in the trees. Their range is restricted to the states of Colorado, New Mexico, Arizona and Wyoming. Mating in March-April produces three or four offspring by late May or early June. Areas in which Abert's are commonly observed include Rocky Mountain National Park, Boulder Canyon, and the Black Forest region of El Paso and Elbert counties. A close relative of the Abert's squirrel is the rare Kaibab squirrel found only on the North Rim of the Grand Canyon.

The Abert's Squirrel...

or tassel-eared squirrel, so-called because of its unique ears, is one of three Colorado tree squirrels. The easily recognizable rodent ranges in color from light gray to coal black with many color combinations in between. The black phase is considered rare everywhere but on Colorado's Eastern Slope where perhaps 65 percent of the squirrels are dark. The Abert's squirrel is common in many areas of the state and a limited hunting season was authorized two years ago in a portion of southwest Colorado. Neighboring states of Arizona and New Mexico have held Abert's squirrel seasons for many years.

Colorado River cutthro

Approximately 1700 Colorado River cutthroat trout fry were stocked in Timber Lake, Rocky Mountain National Park, in late September according to Robin Knox, Division of Wildlife nongame aquatic specialist.

The trout stocking is a direct result of a cooperative effort by the Division of Wildlife, U.S. Fish and Wildlife Service, the National Park Service and Amax, Inc., to help protect the threatened trout species from extinction. The uncommon Colorado River cutthroat is found in headwater lakes and streams in the

grizzly

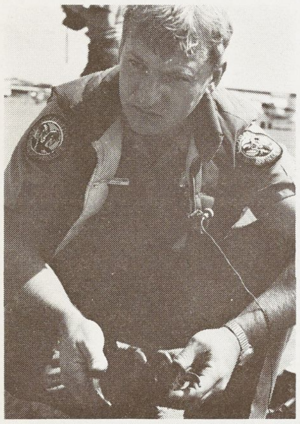
cover the carcass that Saturday.

Another chopper was brought in to take Knight, who had the necessary parts, in to the first helicopter that was still at the site. Weldon also went in to assist getting the carcass into a large net that would be used to haul the bear out.

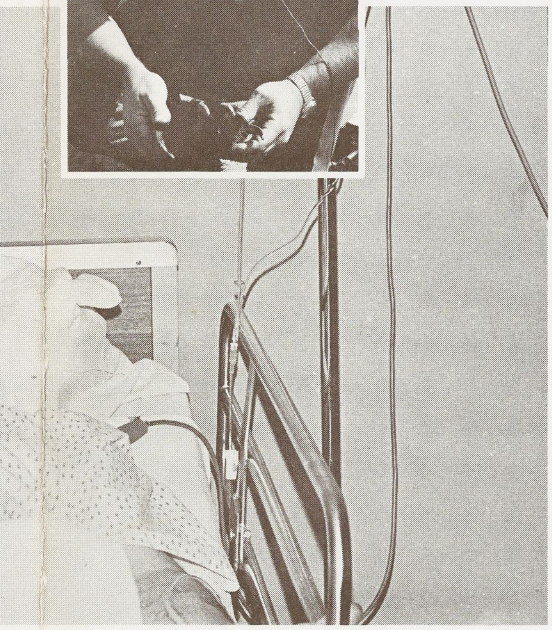
After flying the bear back to Platoro for Bissell, then getting Weldon and his gear out, the pilot offered to fly Bissell back to the Alamosa airport. Within two minutes after lifting off, the chopper's engine failed and it plummeted to the ground, somersaulting on impact. It was totally destroyed. Incredibly, Bissell and the pilot walked away.

Weldon, who in a five-day period had seen two helicopters go down moments after he had stepped out of them philosophized, "I think somebody up there is looking after me!"

And with the same smile, he still refuses to say there are no more grizzlies in Colorado.



Biologist Jim Olterman shows distinctive claws which helped wildlife officials identify bear as a grizzly.



er his encounter with Colorado's now-famous grizzly.

tthroat stocked in Rocky Mountain Park

upper Colorado River basin.

Early in July of this year, Division and U.S. Fish and Wildlife Service biologists collected eggs from spawning fish in a stream owned by Climax Molybdenum Co., a subsidiary of Amax, Inc. The eggs were incubated and hatched at the Division's Glenwood Springs Fish Hatchery. The U.S. Fish and Wildlife Service, in conjunction with Rocky Mountain National Park, renovated Timber Lake, located within the Colorado River drainage, to prepare a suitable site for the restocking.

On September 27, the fry were removed from the hatchery and flown into the Timber Lake area for stocking. Hopefully, the fry will repopulate Timber Lake and become a source of Colorado River cutthroat trout for other future recovery efforts, Knox said.

This and other efforts to recover and restore threatened and endangered fish species to their original ranges are supported in part by state income tax check-off donations to the nongame program of the Division of Wildlife.

Wildlife Notes

Kokanee closure at Turquoise

Catching kokanee salmon by any means in the inlet and outlets of Turquoise Reservoir has been closed through November 30 by the Colorado Wildlife Commission to enhance spawn-taking operations in those waters.

The closure to both kokanee angling and snagging applies to the Lake Fork Creek from County Road 9 Bridge downstream to and including the Turquoise Reservoir inlet. It also prohibits taking kokanee in the outlets of Boustead and Homestake Tunnels to Lake Fork Creek.

The closure does not affect kokanee fishing in the reservoir itself. The closure is also effective from October 15 to November 30 in 1980.

Minnich gets wildlife post

Don W. Minnich, an official of the Colorado Department of Natural Resources, has been nominated to be regional director of the U.S. Fish and Wildlife Service's western regional headquarters in Denver.

Lynn A. Greenwalt, director of the Interior Department agency, said that Minnich was his choice for regional director. He said Minnich's official appointment was awaiting completion of the formalities required for employment with the federal government.

As regional director, Minnich would supervise Fish and Wildlife Service activities and offices in Colorado, Iowa, Kansas, Missouri, Montana, Nebraska, North Dakota, South Dakota, Utah and Wyoming.

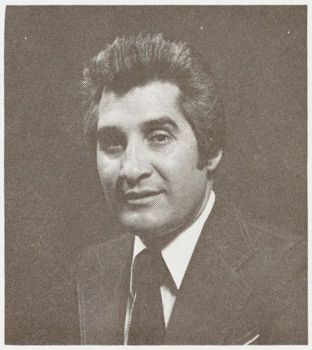
Minnich, 42, has a broad range of experience in fish and wildlife management, having worked at virtually every level from field biologist to executive administrator. He is especially noted for his work in devising and implementing a long-range planning and management system for the Colorado Division of Wildlife. The Colorado system, by which long-range goals for the conservation of wildlife are set and ranked in order of priority, is the basis for all budget requests. The system has become a model for other state wildlife agencies.

A native of Ardmore, Oklahoma, Minnich graduated from Colorado State University, Fort Collins, with a B.S. in biology and wildlife management. He began his career as a conservation officer with the Colorado Division of Wildlife and later served as a game biologist and as a game and fish planning specialist. He then joined the private sector, working for a year as director of fish and wildlife management on one of the largest privately-owned ranches in the nation.

After rejoining the Colorado Division of Wildlife, Minnich was given responsibility for supervising planning and budgeting, including land acquisition and projects under the Federal Aid in fish and wildlife restoration programs.

In July 1978, he was promoted to his present position as assistant director of the Colorado Department of Natural Resources where he is responsible for overseeing the programs and budgets of the renewable resource divisions of the department.

Audubon honors Torres



John Torres, nongame program manager for the Division of Wildlife, is the 1979 recipient of the Environmental Service Award of the Arkansas Valley Audubon Society, the largest Audubon chapter in the state. Torres received a plaque commemorating the award at a banquet in Pueblo on September 29.

Magazine features energy tips

Ideas to help you cut energy consumption in your home this winter highlight the current issue of *Colorado Outdoors*, the bi-monthly magazine published by the Division of Wildlife.

Written by an expert in energy conservation and solar energy, the article includes more than a dozen tips to help you save substantially on your fuel and electric bills this winter.

The November-December issue of the magazine also includes stories on Division of Wildlife efforts to increase Colorado's pheasant population, a forecast for waterfowl hunters, the Jefferson County Outdoor School Lab at Windy Peak and a new land use tool which can help increase the amount of land available to public use or open space.

Other highlights of the issue are a how-to article on building your own pack saddle and an historical feature on Colorado's "man-eater," Alferd Packer.

Subscriptions to the magazine cost $3 for one year and $7 for three years. To subscribe, send your check or money order to *Colorado Outdoors*, 6060 Broadway, Denver, CO 80216.

Wildlife News
Colorado Division of Wildlife
6060 Broadway, Denver, Colorado 80216

Bag limit changes highlight 1980 fishing regulations

New bag limits on whitefish, northern pike and kokanee salmon and a clarification of the method for determining when bag and possession limits are reached highlight the more significant changes made in 1980 Colorado fishing regulations by the Colorado Wildlife Commission.

Other changes made by the Commission in approving the regulations at its September meeting in Lamar include a size limit on bass caught at Chatfield Reservoir and restrictions on archery and underwater spearfishing. Otherwise, 1980 fishing regulations are similar to this year's.

The Commission also approved land and water use regulations for 1980. Those regulations are also similar to the 1979 regulations, but do include several minor changes.

All fishing and land and water use regulations for 1980 will be explained in detail in a booklet published by the Division of Wildlife for free distribution. That booklet should be available from license agencies and Division offices throughout Colorado by mid-December.

Specific changes made by the Commission in 1980 fishing regulations include:

• The number of whitefish allowed in addition to the daily bag limit and possession limit of trout, char, salmon and grayling was increased from eight to 20 except in the White River drainage where the number was set at eight.

• The daily bag and possession limit for northern pike was increased from six to 10.

• The bag and possession limit for kokanee salmon taken by angling was set at 10. For kokanee taken by snagging, the daily bag limit will remain at 20 and the possession limit at 40.

• Largemouth and smallmouth bass taken from Chatfield Reservior must be returned to the water immediately if they are between 12 and 15 inches in length.

• Once the daily bag limit of any game fish is reached, any fish of the same species caught must be returned to the water immediately. The new regulation will prevent anglers from continuing to fish after a bag limit is reached in hopes of catching a larger fish and releasing a smaller one kept on a stringer or alive in a container.

• Archery, underwater spearfishing and the use of gigs will be limited to the taking of carp, shad and suckers (except for the razorback sucker, which is a threatened species) in all waters of the state. In addition, kokanee salmon may be taken by archery during the regular snagging season in open waters.

DWM David Kenvin wins Shikar Safari Club award

David W. Kenvin, Jr., district wildlife manager in the Paonia area, has been honored by the Shikar Safari Club International as Colorado's top wildlife manager for 1979.

Kenvin received the award from former astronaut Wally Schirra at the Division of Wildlife annual field meeting in Denver on October 5.

In the letter recommeding him for the award, Jack Grieb, Division director, cited Kenvin for his work during the past severe winter. The single worst case of game damage in the Division's history occured in Kevin's district, Grieb said, and often forced him to work from morning until night seven days a week.

Grieb commended Kenvin for his environmental work in a district where coal mining is booming. His efforts on mined land reclamation have been "outstanding," Grieb said.

Former astronaut Wally Schirra, right, presents Shikar-Safari International award to David Kenvin.

Grieb added that Kenvin's district includes several state highway studies and one federal highway project under construction. Kenvin's work on those projects has resulted in stream improvements, protection of riparian (river bottom) zones, and preservation of big game wintering range, Grieb said. Kenvin has also vigorously opposed channelization of the North Fork of the Gunnison River by Delta County and others, Grieb said.

"Dave's duties have been as varied as paperwork on environmental impact statements to negotiating wildlife damage claims to actively feeding and caring for wildlife in one of the most severe winters in Colorado's history," Grieb said. "He is a fine officer in a district which requires top-notch professional dedication."

Published by the
DEPARTMENT OF NATURAL RESOURCES
Harris Sherman, Director

COLORADO DIVISION OF WILDLIFE
Jack R. Grieb, Director
6060 Broadway, Denver, Colorado 80216

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