

FISHES OF NORTH AMERICA ENDANGERED, THREATENED, OR OF SPECIAL CONCERN: 1979

James E. Deacon, Gail Kobetich, James D. Williams, Salvador Contreras
and Other Members of the Endangered Species Committee of the American Fisheries Society



The snail darter, *Percina tanasi*. Photo by David Etnier of the University of Tennessee.

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This list of freshwater fishes—Endangered, Threatened, Of Special Concern—of North America is the result of three years of effort by the American Fisheries Society (AFS) Endangered Species Committee. During 1976 the primary concern was compiling a list, based on records available in the literature, of fishes for consideration in one of the appropriate categories. During 1977 this list was extensively reviewed by the entire Committee as well as by many colleagues who gave generously of their time. Then in 1978, the AFS Executive Committee requested that the portion of the 1977 Committee report pertaining to the United States and Canada be circulated to each state or provincial fish and game department for review. Comments submitted from the states and provinces were reviewed by the entire Endangered Species Committee with the authors attempting to obtain additional information to resolve differences.

The portion pertaining to northern Mexico was still being developed in September 1977 and therefore could not be sent to appropriate state officials in Mexico. However, Salvador Contreras has maintained extensive contacts with local, state, and federal officials in Mexico while developing this list. At the Segundo Congreso Nacional de Zoología meet-

ing in Monterrey, Nuevo Leon, Mexico, December 6-9, 1978, he presented his conclusions regarding the status of the northern Mexican fishes listed here. The information presented at that Congress will be published as the *Memoria del Segundo Congreso Nacional de Zoología* (Contreras 1978).

The status review of Canadian fishes by McAllister and Gruchy (1976) was utilized in the formulation of the Canadian listings.

In the final analysis, the Endangered Species Committee is responsible for opinions expressed here. Most of the remaining discernible differences of opinion with the status of taxa listed herein revolve around whether or not the AFS or any agency other than the state or province concerned should be involved in determining status of fishes. Since we believe this activity is one for which the American Fisheries Society holds considerable professional responsibility, the Committee presents this list, recognizing that continuing revision is essential if we are to continue to discharge our responsibility in this area. The opinions expressed here are based entirely on biological considerations throughout the range of the taxon and have entirely ignored jurisdictional or political considerations.

THE AUTHORS: **James E. Deacon**, Professor and Chairman of the Department of Biological Sciences at the University of Nevada, Las Vegas, has been active in the conservation of desert fishes since arriving in Las Vegas in 1960, after having received a B.S. from Midwestern University and a Ph.D. from the University of Kansas. His numerous scientific and popular publications have emphasized information useful in the conservation of native fishes and aquatic habitats in desert areas. He has been chairman of the American Fisheries Society's Endangered Species Committee since 1976.

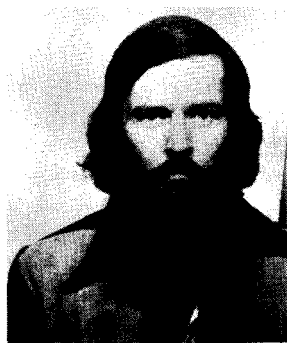
Gail C. Kobetich received both B.S. and M.S. degrees from the University of New Mexico, where he worked on native fish research. He is presently Field Supervisor of the Sacramento Endangered Species Office, U.S. Fish and Wildlife Service, Sacramento, California.

James D. Williams is the staff ichthyologist in the U.S. Fish and Wildlife Service's Office of Endangered Species in Washington, D.C. He received his Ph.D. at the University of Alabama in 1969. Before joining the Service in 1974 he taught at universities in Tennessee, Mississippi, and Alabama. One of his primary interests is the conservation of native fishes and their habitats. In addition to serving on the AFS Endangered Species Committee, he also serves on the Environmental Quality Committee of the American Society of Ichthyologists and Herpetologists.

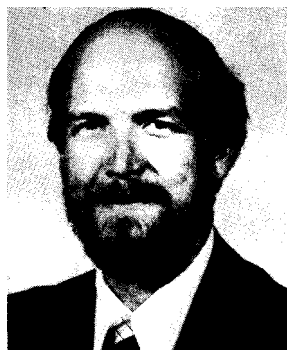
Salvador Contreras completed his graduate work at Tulane University, receiving a Ph.D. in 1966. He was instrumental in organizing the Endangered Species Symposium in Monterrey, Mexico, in December 1978. He has published several papers on the fishes of desert streams in Mexico.



James E. Deacon



Gail C. Kobetich



James D. Williams



Salvador Contreras

It is obvious that the status of many of our freshwater fishes is changing rapidly under a variety of influences. Because of this, we strongly recommend that the Endangered Species Committee be charged with a biennial revision of this list. We would be extremely grateful to receive additional documentation of the status of any taxon listed here, especially if that documentation permits a change in status or deletion or addition of taxa. Please send information or reprints to James E. Deacon, Chairman, AFS Endangered Species Committee, Department of Biological Sciences, University of Nevada, Las Vegas, Nevada 89154. Copies should also be sent to James D. Williams, Office of Endangered Species, U.S. Fish and Wildlife Service, Washington, D.C. 20240, and to the state fish and game agencies directly concerned. Bear in mind that the status given here is for the taxon throughout its range, without regard to political boundaries.

As expected, the review by state and provincial fish and game departments raised and/or answered many questions that had been troublesome. Some problems clearly arose because the best information available to fish and game departments is generally from within their particular political boundaries, while our goal was to consider the status over the entire range of the taxon. Nevertheless, the agency review was extremely helpful in identifying and clarifying many otherwise unanswerable questions. The extent of the interest in the list and the significance of the agency review is obvious from the fact that responses were received from all states and provinces except New Hampshire.

The list submitted for agency review contained 182 taxa. Their review resulted in recommendations for the addition of 117 new taxa. Of these 117, 46 were recommended for endangered status, 36 for threatened status, 26 for special concern and, for 9 taxa, opinions regarding the proper status differed between states or provinces commenting but the recommendation was to add them under some category. Of the 41 taxa for which there was a recommendation for deletion, 10 were listed endangered, 28 threatened, and 3 special concern. In addition, 14 taxa were recommended for deletion by some and for retention by other states or provinces. A change in status within the list was recommended for 16 taxa. These changes were to a less critical listing for 11 taxa, and a more critical listing for 5 taxa.

Of the 41 taxa recommended for deletion, 6 originate from comments made by two or more states or provinces. The remaining 35 taxa were recommended for deletion by only one state or province. Thirteen of those recommendations came from a single state. Thus, one state accounted for 32.5% of the total recommended deletions from the list. Eleven other states or provinces recommended that from 1 to 4 taxa be deleted from the list.

Eighteen states recommended addition of a total of 117 taxa to the list. Interestingly, one state accounted for about 30% of the total recommended additions. Many of these recommendations, however, reflected the status of that taxon within state boundaries only and were not applicable to the taxon throughout its range.

Responses from states and provinces were obviously extremely varied. Some felt that no designations beyond the present list of Endangered Wildlife of the United States should be made. Others provided detailed information regarding status of fish taxa within their state or province and strongly encouraged inclusion of pertinent taxa on this list. Some objected to inclusion of any subspecific taxa. In those

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cases, however, specific management programs existed for distinct subspecies of game fishes occurring within their boundaries. Because we consider subspecific designations for non-game fishes to be as valid and important as they are for game fishes, subspecific designations are used where possible.

In some instances, surprising and unsuspected information resulted from the agency review. Probably most notable was the revelation that a population of Sunapee trout, *Salvelinus alpinus aureolus*, has been established in Idaho, far from its native habitat

In addition to the extensive review by state fish and game personnel summarized above, we developed or were made cognizant of new information during 1978 that resulted in addition, deletion, or change in status of several taxa. In particular, we would like to acknowledge the very fine reports by the Upper Missouri River Chapter of AFS, the Bonneville Chapter of AFS, and the work on cutthroat trout by Terry Hickman of Colorado State University and Don Duff of the Bureau of Land Management. Particularly disappointing was the removal by extinction of the Tecopa pupfish, *Cyprinodon nevadensis calidae*; the Whiteline topminnow, *Fundulus albolineatus*; and the Banff Longnose dace, *Rhinichthys cataractae smithi*.

On the other hand, one of the most significant endangered species events in recent years was the discovery, by Cal Allen, Nevada Department of Fish and Game, of a population of the Big Spring spinedace, *Lepidomeda mollispinis pratensis*, in Condor Canyon, Lincoln County, Nevada. This taxon had been considered extinct since 1959 (Miller and Hubbs 1960).

The review by states and provinces, plus additional information developed during 1978, resulted in an increase from 182 to 203 in the number of taxa listed from the United States and Canada. With the Mexican taxa added, the final list contains 251 taxa.

Seven years ago, the AFS Endangered Species Committee compiled a list of threatened fishes for each state in the United States (Miller 1972). The intervening period has seen a considerable increase in interest and, therefore, knowledge of the status of our native fishes. Enactment of the Endangered Species Act of 1973, which directed the Secretary of Interior to list all animals and plants that are endangered and threatened, has provided much of the stimulus for the compilation of new information. In addition, more professionals have become aware of the problems facing native fishes, and of the value of these fishes. Awareness by the public of the status and value of native fishes has also increased, and the values have been recognized by state and federal legislatures and upheld in the courts (*U.S. vs. Cappaert; Hill vs. TVA*). To encourage use of this new knowledge for the protection and restoration of our native fish populations, the Endangered Species Committee of the American Fisheries Society presents this list of native fishes which are "endangered," "threatened," or "of special concern."

The list includes those species that the Endangered Species Committee feels should be classified as endangered, threatened, or of special concern, whether they appear on an official list or not. The definitions of "endangered" and "threatened" are those found in the Endangered Species Act of 1973. An "endangered species" means any species or subspecies that is in danger of extinction throughout all or a significant portion of its range. A "threatened species" is any species or subspecies that is likely to become an endangered species within the

forseeable future throughout all or a significant portion of its range. In addition, the Committee has erected a new "special concern" category for those species that could become threatened or endangered by relatively minor disturbances to their habitat, or that require additional information to determine their status.

While the earlier report (Miller 1972) presented information regarding the status in each state, this listing provides our opinion of the status of the included taxon throughout its range in North America. We, therefore, have eliminated a "peripheral" category. Our goal is to provide designations based entirely on biological grounds.

For each fish the list presents the common and scientific names, our opinion of the status, the nature of the threat, and the historical distribution by state or province. Documentation of the historical distribution can be found in the bibliography. States of the United States and provinces of Canada are abbreviated according to the 2-letter system; states in Mexico are designated by a 3-letter abbreviation. Common names follow Bailey et al. (1970). For fishes described since 1970, we use common names that seem reasonable and provide references if available. In many cases common names were not available for subspecies. In those cases we use a geographic modifier with the approved common name of the species or follow common usage.

The nature of the threat is indicated by a number referring to the following conditions:

1. The present or threatened destruction, modification, or curtailment of its habitat or range
2. Overutilization for commercial, sporting, scientific, or educational purposes
3. Disease
4. Other natural or manmade factors affecting its continued existence (hybridization, introduction of exotic or translocated species, predation, competition)
5. Restricted range

An examination of the general threats to the species listed provides useful insight into the kinds of management problems that will most frequently be involved in removing species from the endangered category. Of the 251 taxa listed here, habitat modification is an important threat for 98% (246), other natural or manmade factors are involved in threats for 37% (93), a restricted range is involved in 16% (41), overexploitation is involved in 3% (8), and disease is involved in 2% (5) of the cases.

The above generalization is a dramatic illustration of the causes of extinction or depletion of freshwater fishes in North America. It is not surprising to find that destruction or modification of **habitat** is the primary threat to our native fishes. We have **long** known that increasingly complete utilization of environmental resources by one taxon (*Homo sapiens*) results in reduced resource availability for other taxa. The Endangered Species Act will not repeal that principle. The Act may, however, force us into a system of resource allocation that involves purposeful decisions regarding extinction of species.

This tabulation of endangered and threatened fishes of North America is clearly strong documentation of the fact that our most pressing problem is preservation of habitat. It is clear that well over 90% of our endangered and threatened fishes have the potential of being removed from their respective categories by nationwide programs of habitat restoration and protection.

It is also instructive to examine the minor causes for threats to various species. In particular, 3% of the taxa included here have some element of overexploitation involved with their placement on this list. Six of these species are ciscoes and two are catfishes. All have, in general, declined because of a combination of habitat alteration, overfishing by commercial and sport fishermen, and competition from introduced species. Except for these eight species, the problem of overexploitation seems to have been virtually nonexistent. This is probably because our societies have somehow always recognized the importance of protecting species. This recognition has been extremely effective in developing legislation and enforcement designed to prevent irreversible direct damage to species. Paradoxically, the present infinitely more crucial problem of protecting the environment upon which those species depend has not been so well understood. Even today we have state and federal Fish and Game agencies developing elaborate, time-consuming regulations designed to prevent removal of a few individuals from populations in which natural reproduction is adequate to effect very rapid replacement while at the same time programs of habitat restoration fail to get the attention required to effect real, long-term improvement. This, of course, is partly a result of traditional inertia but also partly a result of failure to recognize the comparative importance of the issues being addressed. To be specific, regulation of commercial and sport fishing has been almost totally effective in preventing extinction of freshwater fish stocks as a result of overexploitation. The only cases where this has not been true involve six species of ciscoes and two species of catfishes. Other factors were also involved in the decline of those species. There is no evidence available to us that collecting for scientific or educational purposes has been involved in the decline of any taxon in North America. It appears, therefore, that the elaborate permit systems being developed for scientific and educational collections are addressing largely a phantom problem. In addition, the stringent and time-consuming permit requirements are inhibiting the development of information essential to habitat and species management. This situation is not merely irrational, it is also paradoxical because it restricts flow of information to the very agencies most in need of it and in the best position to use the information regarding endangered species to best advantage. With respect to endangered species management, it appears that we are learning the same lessons—that became obvious decades ago in fisheries management—i.e., definition of, followed by development of, optimal habitat is infinitely more effective than imposition of restrictive regulation in the enhancement of fish populations.

The following list is divided into described and undescribed taxa. This is solely for purposes of minimizing any confusion that might arise regarding definition of undescribed taxa. The undescribed species or subspecies are recognized by authorities in the field as distinct taxa. They are being actively investigated and in most cases publication of the formal description is expected in the near future. The common name used serves to further identify the taxon referred to. These taxa are grouped here separately from the main list solely because formal descriptions have not been published. We believe that calling attention to their status by publication in this list is one important means of helping to insure that these taxa do not become extinct before they are formally recognized as distinct. We also hope that calling attention to them in this way will help hasten publication of the taxonomic descriptions.

FISHES OF NORTH AMERICA

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This listing of species is organized under families, with scientific names following each entry. The status of each species is included: E, Endangered; T, Threatened, SC, Of Special Concern. The present threat is signified by numbers 1–5; 1) Present or threatened destruction of habitat; 2) Overutilization; 3) Disease; 4) Hybridization, competition; 5) Restricted natural range. The entry concludes with the known historical distribution, listed by states of the United States, provinces of Canada, and states of Mexico. After the complete listing a code has been included for the abbreviations.

DESCRIBED TAXA

STURGEONS, family Acipenseridae

Shortnose sturgeon, *Acipenser brevirostrum* Lesueur; E, 1; Atlantic Coast (USA); NB

Lake sturgeon, *A. fulvescens* Rafinesque; T, 1; AL, AR, GA, IA, IL, IN, KS, KY, LA, MI, MN, MO, MS, NE, NY, OH, PA, SD, TN, VT, WI, WV.

Gulf Atlantic sturgeon (Gulf Coast), *A. oxyrinchus desotoi* Vladykov; T, 1; AL, FL, LA, MS, TX.

Atlantic sturgeon (East Coast), *A. o. oxyrinchus* Mitchill; SC, 1; Atlantic Coast (USA and Canada).

Pallid sturgeon, *Scaphirhynchus albus* (Forbes and Richardson); T, 1; AR, IA, IL, KS, KY, LA, MO, MS, MT, ND, NE, SD, TN.

PADDLEFISHES, family Polyodontidae

Paddlefish, *Polyodon spathula* (Walbaum); SC, 1; AL, AR, GA, IA, IL, KS, KY, LA, MD, MI, MN, MO, MS, MT, NC, ND, NE, NY, OH, OK, PA, SD, TN, TX, VA, WI, WV.

TROUTS, family Salmonidae

Longjaw cisco, *Coregonus alpenae* (Koelz); E, 1, 2, 4; Lakes Michigan, Huron, Erie, Ontario.

Atlantic whitefish, *C. canadensis* Scott; E, 1, 2; NS.

Deepwater cisco, *C. johanna* (Wagner); E, 1, 2, 4; Lakes Huron, Michigan.

Kiyi, *C. kiyi* (Koelz); T, 1, 5; Lakes Ontario, Huron, Michigan, Superior.

Shortnose cisco, *C. reighardi reighardi* (Koelz); E, 1, 2, 4; Lakes Ontario, Huron, Michigan.

Blackfin cisco, *C. nigripinnis* (Gill); E, 1, 2, 4; Lakes Ontario, Huron, Michigan, Superior.

Shortjaw cisco, *C. zenithicus* (Jordan and Evermann); E, 1, 2, 4; Lakes Huron, Michigan, Superior; ON.

Little Kern golden trout, *Salmo aquabonita whitei* Jordan; T, 1, 4; CA.

Arizona trout, *S. apache* Miller 1972; T, 1, 4; AZ.



Arizona trout, *Salmo apache* (35 cm). Christmas Tree Lake, Fort Apache Indian Reservation, Arizona. September 1976. Gail Kobetich.

Lahontan cutthroat trout, *S. clarki henshawi* Gill and Jordan; T, 1, 4; CA, NV, UT, WA.

Colorado River cutthroat trout, *S. c. pleuriticus* Cope; SC, 1, 4; CO, UT, WY.



Colorado River cutthroat trout, *Salmo clarki pleuriticus* (30 cm). Upper Northwater Creek, Garfield, Co., Colorado. October 1975. Jim Johnson.

Paiute cutthroat trout, *S. c. seliniris* Snyder; T, 1; CA.

Greenback cutthroat trout, *S. c. stomias* Cope; T, 1, 4; CO.

Utah cutthroat trout, *S. c. utah* Suckley; T, 1, 4; NV, UT, WY.

Rio Grande cutthroat trout, *S. c. virginalis* (Girard); SC, 1, 4; CO, NM.



Rio Grande cutthroat trout, *Salmo clarki virginalis* (20 cm). Trinchera Creek, Costilla Co., Colorado. Date unknown. Lloyd Hazzard.

Gila trout, *S. gilae* Miller; T, 1; AZ, NM.



Gila trout, *Salmo gilae* (30 cm). Gila National Forest, New Mexico. 1976. Paul Turner.

Sunapee trout, *Salvelinus alpinus aureolus* Bean; T, 4; ID, ME, NH.

Montana Arctic grayling (stream form), *Thymallus arcticus montanus* (Pallas); SC, 1; MT.

MUDMINNOWS, family Umbridae

Olympic mudminnow, *Novumbra hubbsi* Schultz; SC, 1; WA.

TETRAS, family Characidae

Cuatro Ciénegas, Sardina, *Astyanax mexicanus* ssp.; SC, 1, 4; COA.

MINNOWS, family Cyprinidae

Mexican stoneroller, *Campostoma omatum* Girard; SC, 1, 3; AZ, TX; COA.

Devils River minnow, *Dionda diaboli* Hubbs and Brown; T, 1; TX; COA.

Saltillo roundnose minnow, *D. episcopa punctifer* (Garman); E, 1, 5; COA.

Flatjaw minnow, *D. mandibularis* Contreras and Verdusco; E, 1, 4; SLP.

Desert dace, *Eremichthys acros* Hubbs and Miller; T, 1, 5; NV.

Alvord chub, *Gila alvordensis* Hubbs and Miller 1972; SC, 1; NV, OR.



Alvord chub, *Gila alvordensis* (8 cm). Serrano Spring north of Alvord Lake, Harney Co., Oregon. 11 November 1977. Jim Williams.

Fish Creek Springs tui chub, *G. bicolor euchila* Hubbs and Miller 1972; E, 1, 4, 5; NV.

Independence Valley tui chub, *G. b. isolata* Hubbs and Miller 1972; T, 1, 4, 5; NV.

Mohave tui chub, *G. b. mohavensis* (Snyder); E, 1, 4; CA.



Mohave chub, *Gila bicolor mohavensis* (7 cm). Zzyzyx Springs, San Bernardino Co., California. Date unknown. L. Fisk.

Newark Valley tui chub, *G. b. newarkensis* Hubbs and Miller 1972; SC, 1, 5; NV.

Oregon Lakes tui chub, *G. b. oregonensis* (Snyder); SC, 1; OR.



Oregon Lakes tui chub, *Gila bicolor oregonensis* (7 cm). XL Spring north end of Lake Abert, Lake Co., Oregon, 9 November 1977. Jim Williams.

Lahontan tui chub, *G. b. obesa* (Girard); SC, 1; NV.

Owens tui chub, *G. b. snyderi* Miller 1973; E, 1, 4, 5; CA.

Thicktail chub, *G. crassicauda* (Baird and Girard); E, 1; CA.

Humpback chub, *G. cypha* Miller; E, 1; AZ, CO, UT, WY.



Humpback chub, *Gila cypha* (33 cm). Little Colorado River at its junction with Colorado River, Coconino Co., Arizona. 2 June 1976. Jim Williams.

Bonytail, *G. elegans* Baird and Girard; E, 1, 4; AZ, CA, CO, NV, UT, WY; SON.

Gila chub, *G. intermedia* (Girard); SC, 1, 4; AZ, NM.

Saltillo chub, *G. modesta* (Garman); SC, 1, 4; COA.

Chihuahua chub, *G. nigrescens* (Girard); E, 1, 4; NM; CHI.

Yaqui chub, *G. purpurea* (Girard); E, 1, 4; AZ.

Gila roundtail chub, *G. robusta grahama* Baird and Girard; T, 1, 4; AZ, NM.



Gila roundtail chub, *Gila robusta grahama* (16 cm). Aravaipa Creek, Pinal Co., Arizona. 6 June 1978. Jim Williams.

Pahrnagat roundtail chub, *G. r. jordani* Tanner; E, 1, 4; NV.

Virgin River roundtail chub, *G. r. seminuda* Cope; E, 1; AZ, NV, UT.



Virgin River roundtail chub, *Gila robusta seminuda* (27 cm). Virgin River at Littlefield, Mohave Co., Arizona. 3 August 1977. Glenn Clemmer.

Flame chub, *Hemitremia flammea* (Jordan and Gilbert); SC, 1; AL, TN, KY



Flame chub, *Hemitremia flammea* (3, 6 cm; 7 cm). Mountain Fork of Flint River at New Market, Madison Co., Alabama. 8 April 1967. Jim Williams.

Slender chub, *Hybopsis cahnii* Hubbs and Crowe; T, 1; TN, VA.



Slender chub, *Hybopsis cahnii* (8 cm). Clinch River at Frost Ford, Hancock Co., Tennessee. 15 April 1978. John Harris.

Oregon chub, *H. crameri* Snyder; SC, 1, 4; OR.
Thicklip chub, *H. labrosa* (Cope); SC, 1; NC, SC.



Thicklip chub, *Hybopsis labrosa* (5, 7 cm). Little Tyger River, Santee River drainage, Greenville Co., South Carolina. 22 April 1967. Jim Williams.

Spotfin chub, *H. monacha* (Cope); T, 1; AL, GA, NC, TN, VA.



Spotfin chub, *Hybopsis monacha* (5, 8 cm). North Fork Holston River, Scott Co., Virginia. 4 June 1972. Bob Jenkins.

Least chub, *lotichthys phlegethontis* (Cope); T, 1, 4; UT.

White River spinedace, *Lepidomeda alb* Wall is Miller and Hubbs; T, 1, 4; NV.

Virgin spinedace, *L. mollispinis mollispinis* Miller and Hubbs; T, 1, 4; AZ, UT.



Virgin spinedace, *Lepidomeda mollispinis mollispinis* (8 cm). Virgin River, Mohave Co., Arizona. Spring 1978. Jim Johnson.

Big Spring spinedace, *L. m. pratensis* Miller and Hubbs; E, 1, 4, 5; NV.

Little Colorado spinedace, *L. vittata* Cope; SC, 1; AZ.



Little Colorado spinedace, *Lepidomeda vittata* (15 cm). East Clear Creek tributary of Little Colorado River, Coconino Co., Arizona. Fall 1969. Jim Johnson.

Spikedace, *Meda fulgida* Girard; T, 1, 4; AZ, NM.



Spikedace, *Meda fulgida* (6 cm). Aravaipa Creek, Graham Co., Arizona. 18 March 1977. Jim Johnson.

Moapa dace, *Moapa coriacea* Hubbs and Miller; E, 1, 3, 4, 5; NV.

Pilón shiner, *Notropis aguirrepequenoi* Contreras and Rivera; SC, 1; TAM, NLE.

Bluestripe shiner, *N. callitaenia* Bailey and Gibbs; T, 1; AL, FL, GA.

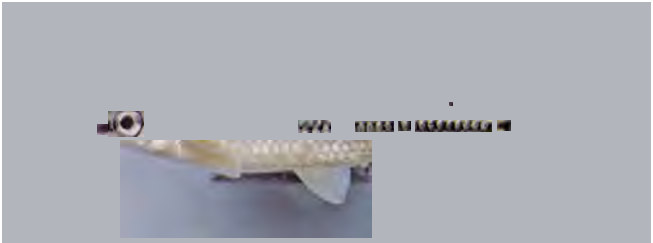
Yaqui beautiful shiner, *N. formosus meamsi* Snyder; SC, 1; AZ.

Rio Grande shiner, *N. jemezianus* (Cope); SC, 1, 4; NM.

Santa Clara red shiner, *N. lutrensis formosus* (Girard); part SC, 1, 4; CHI.

Sardina dorada red shiner, *N. 1. santamariae* Evermann and Goldsborough; SC, 1, 4; CHI.

Cape Fear shiner, *N. mekistocholas* Snelson 1971; SC, 1; NC.



Cape Fear shiner, *Notropis mekistocholas* (5, 6 cm). Rocky River Highway 902, southwest of Pittsboro, Chatham Co., North Carolina. 2 June 1968. Buck Snelson.

Colorless shiner, *N. perpallidus* Hubbs and Black; T, 1; AR, OK.
Conchos shiner, *N. panarcys* Hubbs and Miller 1978; E, 1, 5; CHI.

Proserpine shiner, *N. proserpinus* (Girard); T, 1; TX.

Roughhead shiner, *N. semperasper* Gilbert; T, 1; VA.

Bluntnose shiner, *N. simus* (Cope); E, 1, 4; NM, TX; CHI, COA, NLE, TAM.

Cuatro Ciénegas shiner, *N. xanthicara* Minckley and Lytle; E, 1; COA.

Kanawha minnow, *Phenacobius teretulus* Cope; T, 1; NC, VA, WV.



Kanawha minnow, *Phenacobius teretulus* (9 cm). Big Fox Creek, Grayson Co., Virginia. 10 June 1976. Bob Jenkins.

Mountain blackside dace, *Phoxinus cumberlandensis* Starnes and Starnes 1978; T, 1; KY, TN.

Woundfin, *Plagopterus argentissimus* Cope; E, 1; AZ, NV, UT.

Splittail, *Pogonichthys macrolepidotus* (Ayres); SC, 1; CA.

Colorado squawfish, *Ptychocheilus lucius* Girard; E, 1, 3, 4; AZ, CA, CO, NM, NV, UT, WY.



Colorado squawfish, *Ptychocheilus lucius* (80 cm). Ashley Creek near junction with Green River, Uintah Co., Utah. 11 May 1976. Jim Williams.

Relict dace, *Relictus solitarius* Hubbs and Miller 1972; SC, 1; NV.



Relict dace, *Relictus solitarius* (11 cm). Grass Spring on Lusetti Ranch, north of Ely, White Pine Co., Nevada. 15 November 1977. Jim Williams.

Independence Valley speckled dace, *Rhinichthys osculus lethoporus* Hubbs and Miller 1972; E, 1, 4, 5; NV.

Ash Meadows speckled dace, *R. o. nevadensis* Gilbert; E, 1, 4; NV.

Clover Valley speckled dace, *R. o. oligoporus* Hubbs and Miller 1972; E, 1, 4, 5; NV.

Kendall Warm Springs dace, *R. o. thermalis* Hubbs and Kuehne; SC, 5; WY.

Moapa speckled dace, *R. o. moapae* Williams 1978; T, 1, 3, 4; NV.



Moapa speckled dace, *Rhinichthys osculus moapae* (6 cm). Moapa River, Clark Co., Nevada. March 1977. Jack Williams.

Sandhills chub, *Semotilus lumbee* Snelson and Suttkus 1978; SC, 1; NC, SC.

Loach minnow, *Tiaroga cobitis* Girard; SC, 1, 4; AZ, NM; SON.

SUCKERS, family Catostomidae

Yaqui sucker, *Catostomus bernaldini* Girard; SC, 1, 4; AZ; CHI, SON.

White River desert sucker, *C. clarki intermedius* (Tanner); T, 1; NV.

Webug sucker, *C. fecundus* Cope and Yarrow; SC, 1, 4; UT.

Zuñi bluehead sucker, *C. dicobolus yanowi* Cope; T, 1; NM.

Lost River sucker, *C. luxatus* (Cope); SC, 1, 4; CA, OR.

Modoc sucker, *C. microps* Rutter; E, 1, 4; CA.



Modoc sucker, *Catostomus microps* (20 cm). Rush Creek, Modoc Co., California. April 1973. Peter Moyle.

Warner sucker, *C. warnerensis* Snyder; E, 1, 4; OR



Warner sucker, *Catostomus warnerensis* (30 cm). Honey Creek, Lake Co., Oregon. June 1978. Gail Kobetich.

Sonora sucker, *C. wigginsi* Herre and Brock; SC, 1, 4; SON.

Shortnose sucker, *Chasmistes brevirostris* Cope; T, 1, 4; CA, OR.

Cui-ui, *C. cujus* Cope; E, 1; NV.

June sucker, *C. liorus* Jordan; SC, 1, 4; UT.

Blackfin sucker, *Moxostoma atripinne* Bailey; SC, 1; KY, TN.



Blackfin sucker, *Moxostoma atripinne* (♂, 15 cm). N. Br. Peter Creek, Barren Co., Kentucky. May 1966. Bruce Thompson.

Rustyside sucker, *M. hamiltoni* (Raney and Lachner); SC, 1; VA.



Rustyside sucker, *Moxostoma hamiltoni* (d, 11 cm). North Fork of South Mayo River, Patrick Co., Virginia. 13 May 1977. Bob Jenkins.

Copper redhorse, *M. hubbsi* Legendre; T, 1; PQ.

Razorback sucker, *Xyrauchen texanus* (Abbott); T, 1, 4; AZ, CA, CO, NV, UT, WY.



Razorback sucker, *Xyrauchen texanus* (60 cm). Colorado River system. Date unknown. Nevada Department of Fish and Game.

FRESHWATER CATFISHES, family Ictaluridae

Pánuco catfish, *Ictalurus australis* (Meek); SC, 1, 2; SLP, TAM.

Río Verde catfish, *I. mexicanus* (Meek); SC, 1, 2, 4; SLP.

Yaqui catfish, *I. pricei* (Rutter); SC, 1; AZ; SON.

Yellowfin madtom, *Noturus flavipinnis* Taylor; T, 1; GA, TN, VA.

Carolina madtom, *N. furiosus* Jordan and Meek; SC, 1; NC.

Orangefin madtom, *N. gilberti* Jordan and Evermann; T, 1; NC, VA.

Ouachita madtom, *N. lachneri* Taylor; T, 1; AR.

Frecklebelly madtom, *N. munitus* Suttikus and Taylor; T, 1; AL, GA, LA, MS, TN.



Frecklebelly madtom, *Noturus munitus* (7 cm). Etowah River, Cherokee Co., Georgia. 7 September 1978. Bruce Baker.

Neosho madtom, *N. placidus* Taylor; T, 1; KS, MO, OK.

Caddo madtom, *N. taylori* Douglas 1972; T, 1; AR.

Scioto madtom, *N. trautmani* Taylor; E, 1, 5; OH.

Múzquiz catfish, *Prietella phreatophila* Carranza; E, 1, 5; COA.

Widemouth blindcat, *Satan eurystomus* Hubbs and Bailey; T, 1; TX.

Toothless blindcat, *Trogloglanis pattersoni* Eigenmann; T, 1; TX.

CAVEFISHES, family Amblyopsidae

Ozark cavefish, *Amblyopsis rosae* (Eigenmann); T, 1, 4; AR, MO, OK.

Northern cavefish, *A. spelaea* DeKay; T, 1; IN, KY.

Spring cavefish, *Chologaster agassizi* Putnam; SC, 1; IL, KY, MO, TN.

Alabama cavefish, *Speoplatyrhinus poulsoni* Cooper and Kuehne 1974; T, 1; AL.

KILLIFISHES, family Cyprinodontidae

Railroad Valley springfish, *Crenichthys nevadae* Hubbs; SC, 1; NV.

Media Luna killie, *Cualac tessellatus* Miller; E, 1, 4; SLP.

Perrito de Potosí, *Cyprinodon alvarezii* Miller; E, 1, 4, 5; NLE.

Leon Springs pupfish, *C. bovinus* Baird and Girard; T, 1, 4, 5; TX.

Devils Hole pupfish, *C. diabolis* Wales; E, 1, 5; NV.



Devils Hole pupfish, *Cyprinodon diabolis* (3 cm). Devils Hole Pupfish Refugium below Hoover Dam, Clark Co., Nevada. April 1977. Jack Williams.

Comanche Springs pupfish, *C. elegans* Baird and Girard; E, 1; TX.

Gila desert pupfish, *C. macularius macularius* Baird and Girard; T, 1, 4; AZ; SON, BCA.

Valley Amargosa pupfish, *C. nevadensis amargosae*; SC, 1, 4; CA.

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Ash Meadows Amargosa pupfish, *C. n. mionectes* Miller; T, 1, 4; NV.

Warm Springs Amargosa pupfish, *C. n. pectoralis* Miller; E, 1, 4, 5; NV.

Owens pupfish, *C. radiosus* Miller; E, 1, 4; CA.

White Sands pupfish, *C. tularosa* Miller and Echelle 1975; SC, 1, 4, 5; NM.

Pahrump killifish, *Empetrichthys latos latos* Miller; E, 1, 4, 5; NV.



Pahrump killifish, **Empetrichthys latos latos** (5 cm). Corn Creek Springs, Desert National Wildlife Range, Nye Co., Nevada. November 1976. Doug Selby.

Waccamaw killifish, *Fundulus waccamensis* Hubbs and Raney; T, 1; NC.

Sardinilla Cuatro Ciénegas, *Lucania interioris* Hubbs and Miller; E, 1; COA.

Perrito enano de Potosí, *Megupsilon aporus* Miller and Walters; E, 1, 5; NLE.

MEXICAN LIVEBEARERS, family Goodeidae

Striped goodeid, *Ataeniobius toweri* (Meek); T, 1, 4; SLP.

Rainbow goodeid, *Characodon lateralis* Gunther; T, 1; DGO.

Potosi goodeid, *Xenophorus captivus captivus* (Hubbs); T, 1; SLP.

LIVEBEARERS, family Poeciliidae

Guayacon de San Gregorio, *Gambusia alvarezii* Hubbs and Springer; E, 1; CHI.

Amistad gambusia, *G. amistadensis* Peden 1973; E, 1, 5; TX.

Big Bend gambusia, *G. gageii* Hubbs; E, 1, 5; TX.



Big Bend gambusia, *Gambusia gageii* (4 cm). Captive population at Dexter National Fish Hatchery, Dexter, New Mexico. September 1976. Jim Johnson.

San Marcos gambusia, *G. georgei* Hubbs and Peden; E, 1, 4, 5; TX.

Clear Creek gambusia, *G. heterochir* Hubbs; T, 4; TX.

Guayacon de Cuatro Ciénegas, *G. longispinis* Minckley; T, 1; COA.

Pecos gambusia, *G. nobilis* (Baird and Girard); SC, 1, 4; NM, TX.



Pecos gambusia, **Gambusia nobilis** (3 cm). Blue Spring, Eddy Co., New Mexico. November 1976. Jim Williams.

Gila topminnow, *Poeciliopsis occidentalis* (Baird and Girard); T, 1, 4; AZ NM; SON.



Gila topminnow, *Poeciliopsis occidentalis* (♂, 3 cm; ♀, 5 cm). Bylas Springs, Graham Co., Arizona. 18 March 1977. Jim Johnson.

Monterrey platyfish, *Xiphophorus couchianus* (Girard); E, 1, 5; NLE.

Cuatro Ciénegas platyfish, *X. gordonii* Miller and Minckley; E, 1, 5; COA.

SILVERSIDES, family Atherinidae

Key silverside, *Menidia conchorum* Hildebrand and Ginsburg; T, 1; FL.

Waccamaw silverside, *M. extensa* Hubbs and Raney; T, 1; NC.

STICKLEBACKS, family Gasterosteidae

Unarmored threespine stickleback, *Gasterosteus aculeatus williamsoni* Girard; E, 1, 4; CA.

SUNFISHES, family Centrarchidae

Roanoke bass, *Ambloplites cavifrons* Cope; SC, 1, 4; NC, VA.



Roanoke bass, *Ambloplites cavifrons* (20 cm). Town Creek., Henry Co., Virginia. 28 May 1977. Bob Jenkins.

Guadalupe bass, *Micropterus treculi* (Vaillant and Bocourt); SC, 1; TX.

PERCHES, family Percidae

Crystal darter, *Ammocrypta asprella* (Jordan); SC, 1; AL, AR, FL, IA, IL, IN, KY, LA, MO, MS, OH, OK, TN, WI.



Crystal darter, *Ammocrypta asprella* (13 cm). Tombigbee River, north of Vienna Landing, Pickens Co., Alabama. 29 September 1967. Jim Williams.

Eastern sand darter, *A. pellucida* (Putnam); T, 1; IL, IN, KY, MI, NY, OH, PA, WV.

Sharphead darter, *Etheostoma acuticeps* Bailey; T, 1; NC, TN, VA.



Sharphead darter, *Etheostoma acuticeps* (♂, 5 cm). Nolichucky River at Steele Island, Green Co., Tennessee. 17 May 1977. Dick Bryant.

Coppercheek darter, *E. aquali* Williams and Etnier 1978; T, 1; TN.



Copper cheek darter, *Etheostoma aquali* (♂, 6 cm; ♀, 4 cm). Flat Creek near its junction with Duck River southwest of Shelbyville on Tennessee Highway 64, Bedford Co., Tennessee. 13 April 1967. Jim Williams.

Conchos darter, *E. australe* Jordan; E, 1, 4; CHI.

Slackwater darter, *E. boschungii* Wall and Williams 1974; T, 1; AL, TN.



Slackwater darter, *Etheostoma boschungii* (♂, 5 cm). North Fork Cypress Creek, Lauderdale Co., Alabama. 19 February 1976. Patrick O'Neil.

Ashy darter, *E. cinereum* Storer; SC, 1; AL, KY, TN, VA.



Ashy darter, *Etheostoma cinereum* (♂, 7 cm). Little River at U.S. 411 Bridge, Blount Co., Tennessee. 11 February 1978. Bruce Bauer.

Coldwater darter, *E. ditrema* Ramsey and Suttikus; T, 1; AL, GA, TN.

Fountain darter, *E. fonticola* (Jordan and Gilbert); E, 1, 5; TX.

Kanawha darter, *E. kanawhae* (Raney); T, 1; NC, VA.



Kanawha darter, *Etheostoma kanawhae* (d, 7 cm). Big Fox Creek, Grayson Co., Virginia. 10 June 1976. Bob Jenkins.

Redband darter, *E. luteovinctum* Gilbert and Swain; SC, 1; TN.



Redband darter, *Etheostoma luteovinctum* (♂ and ♀). Unnamed spring tributary of Hickory Creek, Coffee Co., Tennessee. 13 April 1967. Jim Williams.

Yellowcheek darter, *E. moorei* Raney and Suttkus; T, 1; AR.



Yellowcheek darter, *Etheostoma moorei* (♂, 6 cm; ♀, 5 cm). South Fork Little Red River southwest of Clinton, Van Buren Co., Arkansas. 9 June 1967. Buck Snelson.

Niangua darter, *E. nianguae* Gilbert and Meek; T, 1; MO.

Watercress darter, *E. nuchale* Howell and Caldwell; E, 1, 5; AL.

Okaloosa darter, *E. okaloosae* (Fowler); T, 1, 4; FL.



Okaloosa darter, *Etheostoma okaloosae* (♂, 4 cm). Open branch, Walton Co., Florida. March 1976. Scott Mettee.

Finescale saddled darter, *E. osburni* (Hubbs and Trautman); T, 1; VA, WV.

Paleback darter, *E. pallidorsum* Distler and Metcalf; T, 1; AR.



Paleback darter, *Etheostoma pallidorsum* (♂, 5 cm; ♀, 6 cm). Caddo River, Montgomery Co., Arkansas. 17 April 1969. Jim Williams.

Waccamaw darter, *E. perlongum* (Hubbs and Raney); T, 1; NC.

Chihuahua darter, *E. pottsii* (Girard); T, 1, 4; CHI.

Bayou darter, *E. rubrum* Raney and Suttkus; T, 1; MS.



Bayou darter, *Etheostoma rubrum* (♂ and ♀, 5 cm). Bayou Pierre west of Carpenter Copiah Co., Mississippi. 19 November 1978. Glenn Clemmer.

Saluda darter, *E. saludae* (Hubbs and Cannon); SC, 1; SC.

Maryland darter, *E. sellare* (Radcliffe and Welsh); E, 1, 5; MD.



Maryland darter, *Etheostoma sellare* (♂, 6 cm). Deer Creek, Harford Co., Maryland. 1 November 1974. Jim Williams.

Trispot darter, *E. trisella* Bailey and Richards; T, 1; AL, GA, TN.

Tuscumbia darter, *E. tuscumbia* Gilbert and Swain; T, 1; AL, TN.



Tuscumbia darter, *Etheostoma tuscumbia* (♂, 5 cm). Tuscumbia Spring, Colbert Co., Alabama. 2 April 1965. Jim Williams.

Amber darter, *Percina antesella* (Williams and Etnier 1977); T, 1 GA, TN.



Amber darter, *Percina antesella* (d, 7 cm). Conasauga River, Highway 74 Bridge, Bradley Co., Tennessee. 20 September 1977. John Harris.

Goldline darter, *P. aurolineata* Suttkus and Ramsey; T, 1; AL, GA.



Goldline darter, *Percina aurolineata* (d, 8 cm; 9, 7 cm). Little Cahaba River near Bulldog Bend, Bibb Co., Alabama. 15 April 1978. Bruce Bauer.

Blotchside logperch, *P. burtoni* Fowler; SC, 1; AL, TN.



Blotchside logperch, *Percina burtoni* (♂, 13 cm; 9, 10 cm). Copper Creek, Scott Co., Virginia. 25 April 1971. Bob Jenkins.

Bluestripe darter, *P. cymatotaenia* (Gilbert and Meek); T, 1; MO.

Freckled darter, *P. lenticula* Richards and Knapp; T, 1; AL, GA, LA, MS.



Freckled darter, *Percina lenticula* (d, 13 cm). Etowah River, Cherokee Co., Georgia. 7 September 1978. Bruce Bauer.

Longhead darter, *P. macrocephala* (Cope); T, 1; KY, NC, NY, OH, PA, TN, VA, WV.

Leopard darter, *P. pantherina* (Moore and Reeves); T, 1; AR, OK.

Roanoke logperch, *P. rex* (Jordan and Evermann); T, 1; VA.



Roanoke logperch, *Percina rex* (d, 11 cm; 9, 10 cm). South Fork Roanoke River, Montgomery Co., Virginia. 19 April 1969. Bob Jenkins.

Snail darter, *P. tanasi* Etnier 1976; E, 1; TN.

Blue pike, *Stizostedion uitreum glaucum* Hubbs; E, 1; Lakes Erie and Ontario.

CICHLIDS, family Cichlidae

Mojarra caracolora (A), *Cichlasoma bartoni* (Bean); E, 1, 4; SLP.

Mojarra, *C. labridens* (Pellegrin); E, 1, 4; SLP.

GOBIES, family Gobiidae

O'opu nakea, *Awaous stamineus* (Eydoux and Souleyet); SC, 1, 4; HL.

Tidewater goby, *Eucyclogobius newberryi* (Girard); SC, 1; CA.

O'opu alamo'o, *Lentipes concolor* (Gill); T, 1; HI.

O'opu nopili, *Sicydium stimpsoni* Gill; SC, 1, 4; HI.

SCULPINS, family Cottidae

Rough sculpin, *Cottus asperimus* Rutter; SC, 1; CA.

Utah Lake sculpin, *C. echinatus* Bailey and Bond; E, 1, 4; UT.

Shoshone sculpin, *C. greenei* (Gilbert and Culver); SC, 1; ID.

Pygmy sculpin, *C. pygmaeus* Williams; E, 1, 5; AL.

UNDESCRIBED TAXA

STURGEONS, family Acipenseridae

Alabama shovelnose sturgeon, *Scaphirynchus* sp.; E, 1, AL, MS.



Alabama shovelnose sturgeon, *Scaphirynchus* sp. (d, 55 cm). Tensaw River, Baldwin Co., Alabama. 18 March 1977. Glenn Clemmer.

TROUTS, family Salmonidae

Alvord cutthroat trout, *Salmo clarki* ssp.; SC, 1; OR.

Humboldt cutthroat trout, *S. clarki* ssp.; SC, 1; NV.

Redband trout, *S. sp.*; SC, 1, 4; CA, ID, NV, OR.

MINNOWS, family Cyprinidae

Cuatro Ciénegas roundnose minnow, *Dionda episcopa* ssp.; E, 1; COA.

Mezquital roundnose minnow, *D. e. ssp.*; E, 1; DGO.

Nazas roundnose minnow, *D. e. ssp.*; T, 1, 4; DGO.

Catlow tui chub, *Gila bicolor* ssp.; SC, 1; OR.

Sheldon tui chub, *G. b. ssp.*; SC, 5; NV.

Cowhead Lake tui chub, *G. b. ssp.*; SC, 1; CA.

Hutton Spring tui chub, *G. b. ssp.*; T, 1; OR.



Hutton Spring tui chub, *Gila bicolor* (8 cm). Hutton Spring north end Alkali Lake west of U.S. Highway 395, Lake Co., Oregon. 9 November 1977. Jim Williams.

Borax Lake chub, *G. sp.*; T, 1, 5; OR.



Borax Lake Club, *Gila* sp. (4 cm). Borax Lake, Humboldt Co., Oregon. September 1978. Jim Williams.

Parras fatty chub, *G. sp.*; E, 1, 4; COA.

Parras slender chub, *G. sp.*; E, 1, 4; COA.

Cahaba shiner, *N. sp.*; E, 1; AL.

Blackmouth shiner, *N. sp.*; SC, 1; FL.

Foskett Spring speckled dace, *Rhinichthys osculus* ssp.; T, 1, 5; OR.

SUCKERS, family Catostomidae

Papigochoic sucker, *Catostomus* sp.; T, 1; CHI.

FRESHWATER CATFISHES, family Ictaluridae

Cuatro Ciénegas catfish, *Ictalurus* sp.; SC, 1; COA.

Pygmy madtom, *Noturus* sp.; T, 1; TN.



Pygmy madtom, *Noturus* sp. (3 cm). Duck River near mouth of Hurricane Creek, Humphreys Co., Tennessee. 21 October 1978. Bruce Bauer.

Broadtail madtom, *N. sp.*; SC, 1; NC, SC.

KILLIFISHES, family Cyprinodontidae

Preston springfish, *Crenichthys baileyi* ssp.; T, 4, 5; NV.

White River springfish, *C. b. ssp.*; T, 1, 3, 4; NV.

Mormon springfish, *C. b. ssp.*; SC, 1, 4, 5; NV.



Mormon springfish, *Crenichthys baileyi* (4 cm). Forest Moon Ranch, Nye, Nevada. 24 March 1978. C.O. "Butch" Padilla, Nevada Fish and Game.

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Devils River Conchos pupfish, *Cyprinodon eximius* ssp.; T, 1; TX.

LeConte desert pupfish, *C. macularius* ssp.; E, 1, 4; CA.

Quitobaquito desert pupfish, *C. m. ssp.*; SC, 1, 5; AZ.

Santa Rosa pupfish, *C. sp.*; E, 1; CHI.

Bigheaded pupfish, [unnamed genus and species]; E, 1, 5; CHI.

Barrens topminnow, *Fundulus* sp.; E, 1; TN.



Barrens topminnow, *Fundulus* sp. (d, 6 cm). West Fork Hickory Creek, Coffee Co., Tennessee. 1 April 1973. Dave Etnier.

LIVEBEARERS, family Poeciliidae

Múzquiz platyfish, *Xiphophorus* sp.; T, 1; COA.

STICKLEBACKS, family Gasterosteidae

Giant stickleback, *Gasterosteus* sp.; T, 1, 5; BC.

SUNFISHES, family Centrarchidae

Spring pygmy sunfish, *Elassoma* sp.; E, 1, 5; AL.



Spring pygmy sunfish, *Elassoma* sp. (2 cm). Moss Spring, Limestone Co., Alabama. 17 September 1977. Bruce Bauer.

Cuatro Ciénegas longear sunfish, *Lepomis megalotis* ssp.; SC, 1, 4, 5; COA.

Cuatro Ciénegas largemouth bass, *Micropterus salmoides* ssp.; SC, 1, 4, 5; COA.

Shoal bass, *M. sp.*; SC, 1; AL, FL, GA.

PERCHES, family Percidae

Duskytail darter, *Etheostoma (Catonotus)* sp.; T, 1; TN, VA.



Duskytail darter, *Etheostoma (Catonotus)* sp. (d, 5 cm). Big South Fork Cumberland River near mouth of Station Camp Creek, Scott Co., Tennessee. 1 November 1977. Bruce Bauer.

Jewel darter, *E. (Doration)* sp.; SC, 1; TN.

Emerald darter, *E. (Ulocentra)* sp.; SC, 1; TN.

Red snubnose darter, *E. (Ulocentra)* sp.; SC, 1; TN.

Yazoo River darter, *E. (Ulocentra)* sp.; T, 1; MS.



Yazbo darter, *Etheostoma (Ulocentra)* sp. (♂ and ♀, 5 cm). Puskus Creek east of Oxford, Lafayette Co., Mississippi. 5 May 1976. Glenn Clemmer.

Information on the distribution and conservation status was obtained from a variety of sources including published and unpublished data. Books and reports on the fishes of individual states and regions plus lists of endangered and threatened fishes published by museums, universities, and state conservation agencies were extremely valuable in this compilation. Articles published in scientific journals were also utilized in determining distribution and status. Additional input from numerous biologists was obtained through the review process. Sources of published information can be found in the bibliographies and references presented below, with addresses for use in ordering:

Cutright, Noel J., and Douglas P. Kibbe. 1977. A partial bibliography on rare and endangered species. Vermont Inst. Nat. Sci., Woodstock, Vt. Publ. No. 5. 15 pp. (Available from Vermont Institute of Natural Science, Woodstock, Vermont 04091; \$3.00 prepaid.)

McGaugh, Houston M., and Hugh H. Genoways. 1976. State laws as they pertain to scientific collecting permits. Texas Tech University, Lubbock, Tex. Museology No. 2. 81 pp. (Available from The Museum Shop, Texas Tech University, Lubbock, Texas 79409; \$2.00 prepaid.)

Wood, Don. A. 1977. Endangered species: A bibliography. Environmental Inst. Okla. State Univ., Stillwater, Okla. Environ. Ser. No. 3. 85 pp. (Available from Environmental Institute, Oklahoma State University, Stillwater, Oklahoma 74074; \$5.00 prepaid.)



CANADA

Canada

Scott, W. B., and E. J. Crossman. 1973. Freshwater fishes of Canada. Fish. Res. Bd. Canada Bull. 184. 966 pp.

McPhail, J. D., and C. C. Lindsey. 1970. Freshwater fishes of northwestern Canada and Alaska. Fish. Res. Bd. Canada Bull. 173. 381 pp.

Eastern Canada

Scott, W. B. 1967. Freshwater fishes of eastern Canada. 2nd Ed. Univ. Toronto Press. 137 pp.

Alberta (No reference)

British Columbia

Carl, G. C., W. A. Clemens, and C. C. Lindsey. 1959. The fresh-water fishes of British Columbia. 3rd Ed. Prov. Mus. Handbook 5. 192 pp.

Labrador

Backus, R. H. 1957. The fishes of Labrador. Bull. Amer. Mus. Nat. Hist. 113:273-338.

Cuatro Ciénegas darter, *E. sp.*; E, 1; COA.

Nazas darter, *E. sp.*; SC, 1; DGO.

Aguanaval darter, *E. sp.*; SC, 1; ZAC.

Mesquital darter, *E. sp.*; E, 1, 4; DGO.

Warrior bridled darter, *Percina (Aluordius) sp. ssp.*; T, 1; AL.

Pearl Channel darter, *P. (Cottogaster) sp.*; T, 1; LA, MS.

CICHLIDS, family Cichlidae

Mojarra caracolera (B), *Cichlasoma sp.*; E, 1, 4; SLP.

Mojarra caracolera, *C. sp.*; E, 1, 4; COA.

Mojarra de Lugo, *C. sp.*; E, 1, 4; COA.

Mojarra cabezona, *C. sp.*; E, 1; COA.

Mojarra inesperada, *C. sp.*; E, 1; COA.

SCULPINS, family Cottidae

Malheur mottled sculpin, *Cottus bairdi* ssp.; SC, 1; OR.

Manitoba

Hinks, D. 1957. The fishes of Manitoba. (Reprinted with supplement by J. J. Keleher and B. Kooyman.) Manitoba Dept. Mines Nat. Resour., Winnipeg. 117 pp.

New Brunswick (No reference)

Newfoundland

Scott, W. B., and E. J. Crossman. 1964. Fishes occurring in the freshwaters of insular Newfoundland. Dept. Fish. Canada, Ottawa. 124 pp.

Nova Scotia (No reference)

Ontario

Mackay, H. H. 1963. Fishes of Ontario. Ontario Dept. Lands and Forests. 300 pp.

Quebec

Legendre, V. 1954. Key to the game and commercial fishes of the Province of Quebec. Vol. 1. The Freshwater Fishes. 1st English Ed. Soc. Can. d'Écol. Montreal. 80 pp.

Saskatchewan

Rawson, D. S. 1947c. A checklist of the fishes of Saskatchewan. Pages 2-8 in Rep. Roy. Comm. Fish. Saskatchewan, Saskatchewan Dept. Nat. Resour. Indust. Develop.

Symington, D. F. 1959. The fish of Saskatchewan. Saskatchewan Dept. Nat. Resour. Conserv. Bull. 7. 25 pp.

UNITED STATES

Alabama

Smith-Vaniz, W. F. 1968. Freshwater fishes of Alabama. Auburn Univ. Agr. Exp. Sta. 211 pp.

Alaska

Wilimousky, N. J. 1958. Provisional keys to the fishes of Alaska. Fish. Res. Lab., U.S. Fish & Wildlife Serv., Juneau. 113 pp.

Morrow, J. E. 1974. Illustrated keys to the fresh-water fishes of Alaska. Alaska Northwest Pub Co., Anchorage. 78 pp.

Arizona

Minckley, W. L. 1973. Fishes of Arizona. Arizona Game and Fish Dept., Phoenix. 293 pp.

Arkansas

Buchanan, T. M. 1973. Key to the fishes of Arkansas. Arkansas Game and Fish Comm., Little Rock. 68 pp. 198 maps.

California

Moyle, P. B. 1976. Inland fishes of California. Univ. Calif. Press, Berkeley. 405 pp.

Colorado

Beckman, W. C. 1953. Guide to the fishes of Colorado. Univ. of Colo. Mus. Leaflet No. 11. 110 pp.

- Everhart, W. H., and W. R. Seaman. 1971. Fishes of Colorado. Colorado Game, Fish and Parks Div., Denver. 75 pp.
- Connecticut*
Whitworth, W. R., P. L. Berrien, and W. T. Keller. 1968. Freshwater fishes of Connecticut. *St. Geol. and Nat. Hist. Surv. of Conn. Bull.* 101. 134 pp.
- Delaware*
Lee, D. S., A. Norden, C. R. Gilbert, and R. Frank. 1976. A list of the freshwater fishes of Maryland and Delaware. *Chesapeake Sci.* 17(3):205-211.
- Florida*
Carr, A., and C. J. Goin. 1955. Guide to the reptiles, amphibians, and freshwater fishes of Florida. Univ. Florida Press, Gainesville. 341 pp.
Briggs, J. C. 1958. A list of Florida fishes and their distribution. *Bull. Florida St. Mus.* 2(8):223-318.
- Georgia*
Dahlberg, M. D., and D. C. Scott. 1971. The freshwater fishes of Georgia. *Bull. Ga. Acad. Sci.* 29. 64 pp.
- Hawaii*
Morita, C. M. 1963. Freshwater fishing in Hawaii. Dept Land and Nat. Resour., Honolulu. 22 pp.
Gosline, W. A., and V. E. Brock. 1960. Handbook of Hawaiian fishes. Univ. Press of Hawaii, Honolulu. 372 pp.
- Idaho* (No reference)
- Illinois*
Smith, P. W. 1979. The fishes of Illinois. Univ. of Ill. Press, Urbana. 314 pp.
- Indiana*
Gerking, S. D. 1945. The distribution of the fishes of Indiana. *Invest. Indiana Lakes, Streams* 3:1-137.
_____. 1955. Key to the fishes of Indiana. *Invest. Indiana Lakes, Streams* 4:49-86.
- Iowa*
Harlan, J. R., and E. B. Speaker. 1969. Iowa fish and fishing. 4th Ed. Iowa Conserv. Comm., Des Moines. 365 pp.
- Kansas*
Cross, F. B. 1967. Handbook of fishes of Kansas. Univ. of Kan. Mus. Nat Hist. Misc. Publ. 45. 357 pp.
Cross, F. B., and J. T. Collins. 1975. Fishes in Kansas. Univ. of Kan. Mus. Nat Hist., Public Ed. Ser. No. 3. 189 pp.
- Kentucky*
Clay, W. M. 1975. The fishes of Kentucky. Kentucky Dept. Fish and Wildl. Resour., Frankfort. 416 pp.
- Louisiana*
Douglas, N. H. 1974. Freshwater fishes of Louisiana. Claitor's Publ. Div., Baton Rouge. 443 pp.
- Maine*
Everhart, W. H. 1966. Fishes of Maine. 3rd Ed. Maine Dept of Inland Fish. and Game, Augusta. 96 pp.
- Maryland*
Lee, D. S., A. Norden, C. R. Gilbert, and R. Franz. 1976. A list of the freshwater fishes of Maryland and Delaware. *Chesapeake Sci.* 17(3):205-211.
- Massachusetts*
Mugford, P. S. 1969. Illustrated manual of Massachusetts freshwater fish. Massachusetts Div. of Fish and Game, Boston. 127 pp.
- Michigan*
Hubbs, C. L., and K. F. Lagler. 1964. Fishes of the Great Lakes Region. Univ. Mich. Press, Ann Arbor. 213 pp.
- Mississippi*
Cook, F. A. 1959. Freshwater fishes in Mississippi. Mississippi Game and Fish Comm., Jackson. 239 pp.
- Missouri*
Pflieger, W. L. 1975. The fishes of Missouri. Missouri Dept. Conserv., Columbia. 343 pp.
- Minnesota*
Eddy, S., and J. C. Underhill. 1974. Northern fishes, with special reference to the Upper Mississippi Valley. Univ. Minn. Press, Minneapolis. 414 pp.
- Montana*
Brown, C. J. D. 1971. Fishes of Montana. Montana St Univ., Bozeman. 207 pp.
- Nebraska*
Morris, J., L. Morris, and L. Witt. 1972. The fishes of Nebraska. Nebraska Game and Parks Comm., Lincoln. 98 pp.
- Nevada*
LaRivers, I. 1962. Fish and fisheries of Nevada. Nevada St Fish and Game Comm., Carson City. 782 pp.
- New Hampshire*
Scarola, J. F. 1973. Freshwater fishes of New Hampshire. New Hampshire Fish and Game Dept., Concord. 131 pp.
- New Jersey*
Stiles, E. W. 1978. Vertebrates of New Jersey. Edmund W. Stiles, Publishers, Somerset, N.J. 148 pp.
- New Mexico*
Koster, W. J. 1957. Guide to the fishes of New Mexico. Univ. New Mexico Press, Albuquerque. 116 pp.
- New York*
Greeley, J. R. 1927 to 1940. Watershed survey reports on fishes of New York rivers published as supplements to the 16th through 29th Ann. Reports of the New York State Conservation Dept, Albany, New York.
- North Carolina*
Fish, F. F. 1967. Some North Carolina fresh-water fishes. *St. Mus. Div., North Carolina Dept of Agr. and North Carolina Wildlife Resour. Comm., Raleigh.* 49 pp.
Menhinick, E. F., T. M. Burton, and J. R. Bailey. 1974. An annotated checklist of the freshwater fishes of North Carolina. *J. Elisha Mitchell Sci. Soc.* 90(1):24-50.
- North Dakota*
Hankinson, T. L. 1929. Fishes of North Dakota. *Pap. Mich. Acad. Sci., Arts, Lett.* 10:439-460.
- Ohio*
Trautman, M. B. 1957. The fishes of Ohio. Ohio St. Univ. Press, Columbus. 683 pp.
- Oklahoma*
Miller, R. J., and H. W. Robison. 1973. The fishes of Oklahoma. *Okl. St. Univ. Press, Stillwater.* 246 pp.
- Oregon*
Bond, C. E. 1973. Keys to Oregon freshwater fishes. Oregon St. Univ. Agr. Exp. Sta., Corvallis. 42 pp.
- Pennsylvania* (No reference)
- Rhode Island* (No reference)
- South Carolina* (No reference)
- South Dakota*
Bailey, R. M., and M. O. Allum. 1962. Fishes of South Dakota. Univ. Mich. Misc. Publ. Mus. Zool. 119. 131 pp.

Tennessee

Kuhne, E. R. 1939. A guide to the fishes of Tennessee and the mid-South. Tennessee Dept. Conserv., Nashville. 124 pp.

Texas

Hubbs, C. 1972. A checklist of Texas freshwater fishes. Texas Parks and Wildlife Dept. Tech. Serv. No. 11. 11 pp.
 Knapp, F. T. 1953. Fishes found in the fresh waters of Texas. Ragland Studio and Litho. Printing Co., Brunswick, Ga. 166 pp.

Utah

Sigler, W. F., and R. R. Miller. 1963. Fish of Utah. Utah Game and Fish Dept. Salt Lake City. 203 pp.

Vermont (No reference)

Virginia

Martin, R. G. 1960. A list of the fishes of Virginia. Virginia Wildlife. Va. Comm. Game and Inland Fish., Richmond. 4 pp.

Washington

Schultz, L. P. 1948. Keys to the fishes of Washington, Oregon and closely adjoining regions. Univ. Washington Publ. Biol. 2: 103-228.

West Virginia

Denoncourt, R. F., E. C. Rancey, C. H. Hocutt, and J. R. Stauffer. 1975. A checklist of the fishes of West Virginia. Va. J. Sci. 26(3): 117-120.

Wisconsin

Johnson, M., and G. C. Becker. 1970. Annotated list of the fishes of Wisconsin. Wis. Acad. Sci., Arts and Lett 58:265-300.

Wyoming

Baxter, G. T., and J. R. Simon. 1970. Wyoming fishes. Wyoming Game and Fish Dept. Bull. No. 4. Cheyenne. 168 pp.

UNITED STATES-REGIONAL

Christman, S. P., and W. S. Lippincott, Jr. 1978. Rare and endangered vertebrates of the southeastern United States coastal plain—a summary of public concern for sensitive wildlife. Office of Biological Service, Fish and Wildlife Service, U.S. Dept. of the Interior. FWS/OBS-71/31. 46 pp.

Eddy, S., and J. C. Underhill. 1974. Northern fishes, with special reference to the Upper Mississippi Valley. Univ. Minn. Press, Minneapolis. 414 pp.

Eddy, S., and J. C. Underhill. 1978. How to know the freshwater fishes. 3rd Ed. W. C. Brown Co., Dubuque, Iowa. 215 pp.

Hubbs, C. L., and F. Lagler. 1964. Fishes of the Great Lakes Region. Univ. Mich. Press, Ann Arbor. 213 pp.

Hubbs, C. L., R. R. Miller, and L. C. Hubbs. 1974. Hydrographic history and relict fishes of the North Central Great Basin. Mem. Calif. Acad. Sci. 7. 259 pp.

Jenkins, R. E., E. A. Lachner, and F. J. Schwartz. 1972. Fishes of the central Appalachian drainages: Their distribution and dispersal. Pages 43-117 in The distributional history of the biota of the southern Appalachians. Part III. Res. Div. Monogr. 4. Va. Polytech. Inst. St. Univ., Blacksburg, Va.

Moore, G. A. 1968. Fishes. Pages 21-165 in Vertebrates of the United States. 2nd Ed. McGraw-Hill Book Co., New York.

Soltz, D. L., and R. J. Naiman. 1978. The natural history of native fishes in the Death Valley system. Nat. Hist. Mus. of Los Angeles Co., Sci. Ser. 30. 76 pp.

Williams, J. D., and D. K. Fimley. 1977. Our vanishing fishes. Can they be saved? Acad. Nat. Sci., Phil. Frontiers 41(4):21-32.

LITERATURE CITED

Bailey, R. M., J. E. Fitch. E. S. Herald, E. A. Lachner, C. C. Lindsey, C. R. Robins, and W. B. Scott. 1970. A list of common and scientific names of fishes from the United States and Canada. 3rd Ed. Am. Fish. Soc. Spec. Publ. 6. 150 pp.

Contreras, Salvador. 1978. Lista de Peces Mexicanos En Peligro y Amenazados de Extinction en las Provincias Sonorense, Chihuahuense y Tamaulipense. Mem. II Cong. Nal Zool. Mex. (Monterrey).

Cooper, J. E., and R. A. Kuhne. 1974. A new genus and species of subterranean fish from Alabama. Copeia 1974:486-493.

Etnier, D. A. 1976. *Percina (Imostoma) tanasi*, a new percid fish from the Little Tennessee River, Tennessee. Proc. Biol. Soc. Wash. 88(4):469-488.

Hubbs, C. L., and R. R. Miller. 1972. Diagnoses of new cyprinid fishes of isolated water in the Great Basin of Western North America. Trans. San Diego Soc. Nat. Hist. 17(8): 101-106.

Hubbs, C. L., and R. R. Miller. 1978. *Notropis panarcys*, n. sp., and *N. proserpinus*, cyprinid fishes of the subgenus *Cyprinella*, each inhabiting a discreet section of the Rio Grande complex. Copeia 1978(4):582-592.

McAllister, D. E., and C. G. Gruchy. 1976. Status and habitat of Canadian fishes in 1976. In Canada's threatened species and habitats. Canadian Nature Federation, Ottawa, Canada.

Miller, R. R. 1972. Classification of native trouts of Arizona with the description of a new species, *Salmo apache*. Copeia 1972:401-422.

Miller, R. R. 1972. Threatened freshwater fishes of the United States. Trans. Am. Fish. Soc. 101(21):239-252.

Miller, R. R. 1973. Two new fishes, *Gila bicolor snyderi* and *Catostomus fumeiventris*, from the Owens River basin, California. Occ. Pap. Mus. Zool. Univ. Mich. No. 667. 19 pp.

Miller, R. R., and A. A. Echelle. 1975. *Cyprinodon tularosa*, A new cyprinodontid fish from the Tularosa Basin, New Mexico. Southwest Nat 19:365-377.

Miller, R. R., and C. L. Hubbs. 1960. The spiny-rayed cyprinid fishes (Plagopterini) of the Colorado River system. Misc. Publ. Mus. Zool. Univ. Mich. No. 115. 39 pp.

Peden, A. E. 1973. Virtual extinction of *Gambusia amistadensis* n. sp., a poeciliid fish from Texas. Copeia 1973:210-221.

Perales-Echarte, Guadalupe. 1978. Transecto Ictiofaunístico del Rio Pilón y Nuevo Registro para Nuevo León. Mexico. Mem. II Cong. Nal. Zool. Mex. (Monterrey).

Rodriguez-Gamez, Adress. 1978. Los Peces del Valle de Saltillo, Coahuila, Mexico. Mem. U Cong. Nal Zool. Mex. (Monterrey).

Snelson, F. F. 1971. *Notropis mekistocholas*, a new herbivorous cyprinid fish endemic to the Cape Fear River basin, North Carolina. Copeia 1971: 449-462.

Snelson, F. F., and R. D. Suttkus. 1978. A new species of *Semotilus* (Pisces: Cyprinidae) from the Carolinas. Bull. Ala. Mus Nat Hist. No. 3. 11 pp.

Starnes, W. C., and L. B. Starnes. 1978. A new cyprinid of the Genus *Phoxinus* endemic to the upper Cumberland River drainage. Copeia 1978:508-516.

Wall, B. R., and J. D. Williams. 1974. *Etheostoma boschungii*, a new percid fish from the Tennessee River drainage in northern Alabama and western Tennessee. Tulane Stud. Zool. Bot. 18(4):172-182.

Williams, Jack. 1978. Taxonomic status of *Rhinichthys osculus* (Cyprinidae) in the Moapa River, Nevada. Southwest. Nat 23(31):511-518.

Williams, J. D., and D. A. Etnier. 1977. *Percina (Imostoma) antesella*, a new percid fish from the Coosa River system in Tennessee and Georgia. Proc. Bio. Soc. Wash. 90(1): 6-18.

Williams, J. D., and D. A. Etnier. 1978. *Etheostoma aquali*, a new percid fish (subgenus *Nothonotus*) from the Duck and Buffalo Rivers, Tennessee. Proc. Bio. Soc. Wash. 92(1):463-471.

CODE FOR ABBREVIATIONS

PROVINCES OF CANADA

AB Alberta	NT Northwest Territories
BC British Columbia	ON Ontario
LB Labrador	PE Prince Edward Island
MB Manitoba,	PQ Quebec
NB New Brunswick	SK Saskatchewan
NF Newfoundland	YT Yukon Territory
NS Nova Scotia	

STATES OF MEXICO

BCA Baja California	SLP San Luis Potosi
CHI Chihuahua	SON Sonora
COA Coahuila	TAM Tamaulipas
DGO Durango	ZAC Zacatecas
NLE Nuevo León	