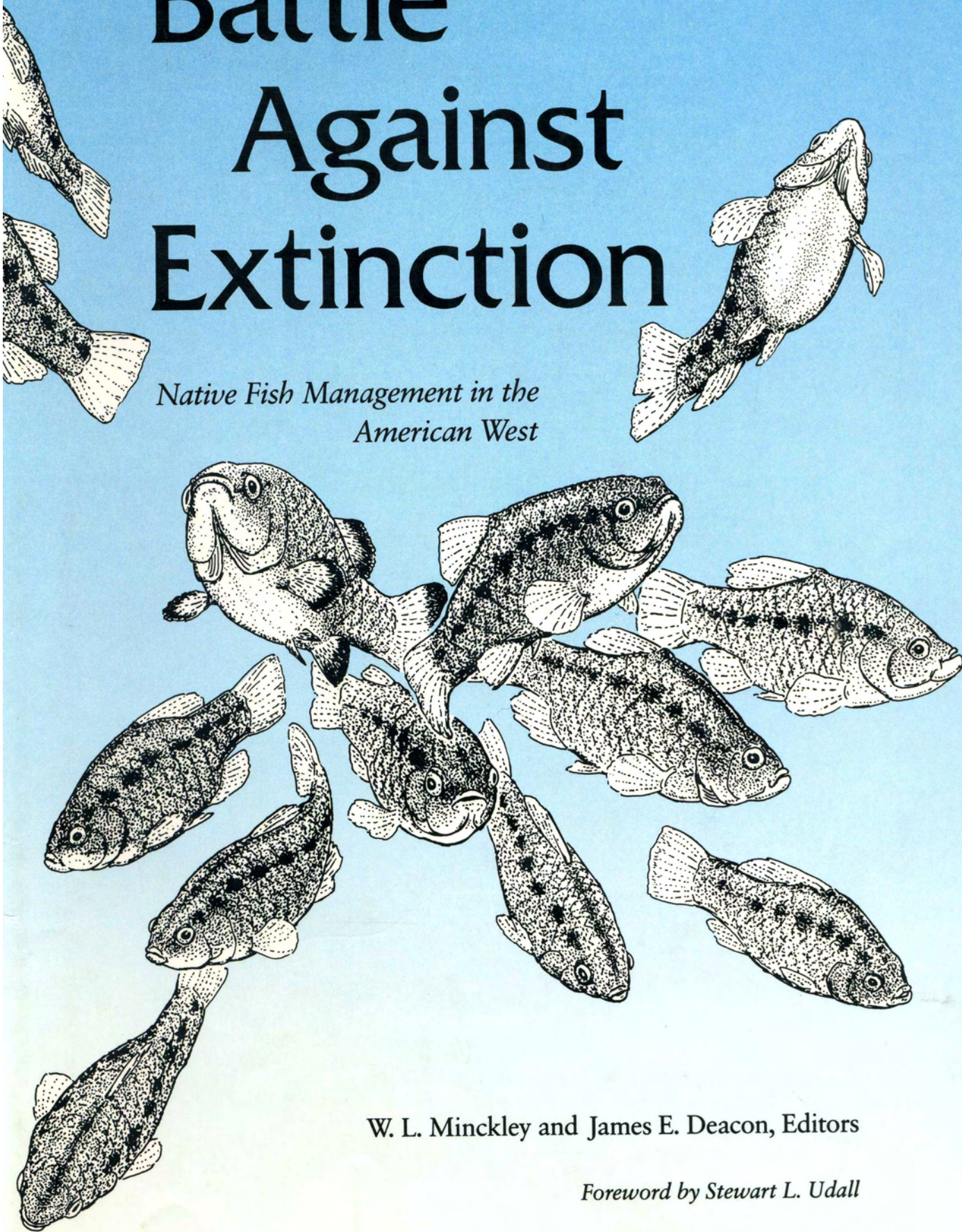


# Battle Against Extinction

*Native Fish Management in the  
American West*



W. L. Minckley and James E. Deacon, Editors

*Foreword by Stewart L. Udall*



March 10, 2008

Edwin P. Pister  
P. O. Box 337  
Bishop, CA 93515

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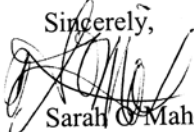
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96 95 94 93 92 91 6 5 4 3 2 1

Library of Congress Cataloging-in-Publication Data

Battle against extinction : native fish management in the American  
West / edited by W. L. Minckley and James E. Deacon.

p. cm.

Includes bibliographical references and index.

ISBN 0-8165-1221-3

1. Rare fishes—West (U.S.)—Congresses. 2. Fishery conservation—  
West (U.S.)—Congresses. I. Minckley, W. L. II. Deacon, James E.

QL617.73.U6B38 1991

333.95'616'0978—dc20

91-6977  
CIP

British Library Cataloguing-in-Publication Data

A catalog record for this book is available from the British Library

## Chapter 4

# *The Desert Fishes Council: Catalyst for Change*

Edwin Philip Pister

*One of the penalties of an ecological education is that one lives alone in a world of wounds. Much of the damage inflicted on land is quite invisible to laymen. An ecologist must either harden his shell and make believe that the consequences of science are none of his business, or he must be the doctor who sees the marks of death in a community that believes itself well and does not want to be told otherwise.*

—Aldo Leopold *Round River* (1953)

### Introduction

For more than a century isolated individuals have expressed concern over a vanishing flora and fauna (Wallace 1863), but until enough of them were brought together by their common concern, little remedial action was taken. Although voices in the wilderness might have protested extinction of the Ash Meadows poolfish (*Empetrichthys merriami*), Tecopa pupfish (*Cyprinodon nevadensis calidae*), and thicktail chub (*Gila crassicauda*), such losses through societal oversight were largely passed off as isolated, albeit unfortunate, incidents, with the only known casualties (besides the fishes) being those few who witnessed and were saddened by their passing. Then, in September 1962, came the infamous Green River poisoning incident, which proceeded despite strong objections from the nation's ichthyologists and resulted in major losses to native fishes and invertebrates in more than 700 km of the Green River, a significant portion within Dinosaur National Monument. So great was the protest following this event that a letter of apology was sent by Secretary of the Interior Udall to Carl L. Hubbs, who at that time was serving as chairman of the Committee on Fish Conservation of the American Society of Ich-

thyologists and Herpetologists. Secretary Udall emphasized:

Whenever there is a question of danger to a unique species, the potential loss to the pool of genes of living material is of such significance that this must be a dominant consideration in evaluating the advisability of the total project. I am taking measures to assure that future projects are reviewed to assure that experimental work is taken into consideration, and that possible deleterious effects are evaluated by competent and disinterested parties. (C. L. Hubbs 1963)

The Green River incident occurred, of course, before implementation of either the Endangered Species Preservation Act of 1966, the National Environmental Policy Act (NEPA) of 1969, or the Endangered Species Act (ESA) of 1973. So, until enactment of the NEPA, followed by similar laws in certain states, little could be done legally to prevent such occurrences. Almost no opposition was forthcoming from either federal or state conservation agencies, especially since it was a consortium of the U.S. Fish and Wildlife Service (USFWS) and counterpart state agencies within Wyoming and Utah that conceived and conducted the Green River fish eradication project. No opposition was expressed, either legal or phil-

osophical, from the downstream states of Arizona, Colorado, Nevada, or California—tacit admission of the highly utilitarian philosophies of the time.

Green River was a seed that was slow to germinate but ultimately created an aura of awareness that would turn the remainder of the 1960s into a period of sharply increased environmental concern. Early “prophets” of the time were Robert Rush Miller (1961), Wendell L. Minckley (1965), Martin R. Brittan (1967), and James E. Deacon (1968b, 1969), whose writings warned of things to come.

Established conservation groups (Audubon Society, Defenders of Wildlife, Sierra Club, The Nature Conservancy [TNC], etc.) had not yet evolved to a point where fishes were of major concern. They were something to be caught and eaten, and their ecological significance was yet to be recognized. Nongame fishes were viewed primarily as competitors for game species.

My own, essentially dormant, concern over such matters was sharply awakened when field research uncovered the sorry state of native fishes within my eastern California purview (Pister 1974, 1985a, b, 1987a). Thus began a shift, in both philosophy and program direction, resulting in remedial actions. The Owens Valley Native Fish Sanctuary, the first such facility of its kind within California, was proposed in 1967 as a program of the California Department of Fish and Game (CADFG) to preserve the four native fishes of the Owens River portion of the Death Valley hydrographic area; it was formally adopted at the April 1968 meeting of the California Fish and Game Commission. The newness of this type of program was reflected by the fact that a paper describing the project published in the July 1971 issue of *Transactions of the American Fisheries Society* (Miller and Pister 1971) was the first ever included in that jour-

nal concerning management of a nongame, or noncommercial, fish species.

So, when U.S. National Park Service (USNPS) naturalist Dwight T. Warren telephoned in early March 1968 and reported that bad things were happening in the Amargosa River drainage of Death Valley National Monument (NM) that the state of California should be made aware of, his concern fell on sympathetic ears. A field trip on 12–14 March revealed major habitat disruption throughout Nevada’s Ash Meadows, an area of enormous biological importance (Pister 1971, 1974; Cook and Williams 1982; Sada and Mozejko 1984). Agricultural development, especially groundwater pumping, threatened to accelerate destruction of a series of desert springs and fishes, and with them an evolutionary drama in progress since the Pleistocene or before.

Various agencies were notified of the problem, but the bureaucracy, equipped only with untested laws and no budget with which to implement them, found itself almost helpless when faced with an unprecedented emergency. Adding to the problem were archaic philosophies pervading upper echelons of government, which gave little value to nongame components of the biota despite the Endangered Species Preservation Act of 1966. A year passed while habitat destruction and alteration proceeded unabated.

### Origin of the Desert Fishes Council

The week of 20 April 1969 proved to be a historic milestone. Following three days of visits to key desert fish habitats, both within Death Valley NM and in the Amargosa River drainage to the east and south, an informal field meeting was held in Ash Meadows to begin a preservation plan. In attendance were A. Edward Smith, Robert L. Borovicka, James D. Yoakum, and Lewis H. Myers, U.S. Bureau of Land Management [USBLM]; Clinton H.

Lostetter, USFWS; Dwight T. Warren and Superintendent Robert J. Murphy, USNPS; James E. Deacon, University of Nevada, Las Vegas; Dale V. Lockard, Nevada Department of Fish and Game (now the Nevada Department of Wildlife); and Leonard O. Fisk and Edwin P. Pister, CADFG. A busy field season was upon us, and neither time nor funds were budgeted for such work; another more general meeting of interested and concerned parties was scheduled for 18–19 November 1969 at Death Valley NM headquarters at Furnace Creek, California.

Although we did not realize it at the time, this April meeting constituted the beginning of an insurrection against established and conventional fisheries management procedures and philosophies. We *did* realize, however, that species extinction would precede implementation of any agency-sponsored preservation program if we were to follow the normal bureaucratic course. It was clear that new ground had to be broken.

The November meeting was viewed as the only conceivable means of circumventing agency inertia and thereby starting a movement to preserve endangered desert ecosystems and their associated life-forms. We were keenly aware of the inherent values involved, but our problem was mainly one of convincing agency administrators, and ultimately the public, of these values. Ironically, the latter generally proved simpler; bureaucratic intransigence is not easily overcome (Pister 1985a, b, 1987a). I agreed to serve as general coordinator for the November meeting, and Superintendent Murphy volunteered the auditorium and full cooperation of the USNPS staff at Death Valley toward making our meeting a success.

Much of the intervening time between April and November was devoted to related activities. My own work was directed primarily toward expediting construction of the Owens

Valley Sanctuary and monitoring the isolated population of Owens pupfish (*Cyprinodon radiosus*) designated to be its initial inhabitants. Despite careful surveillance, an unusual combination of circumstances almost caused the loss of the population (and the species) on a hot August afternoon in 1969 (Miller and Pister 1971). Fortunately, we were able to keep a viable stock alive until June 1970, at which time they were introduced into the newly constructed sanctuary.

Although construction of the sanctuary and the protection afforded it in Fish Slough made things look brighter for the Owens pupfish, the scene was definitely less optimistic for Ash Meadows species and their habitats. Reports from Deacon, Lockard, and others in Nevada revealed that land development, groundwater pumping, and habitat destruction were accelerating (Pister 1974).

### Development of a Common Effort

It was with a mixture of hope and despair that forty-four individuals concerned over the well-being of desert fishes and their habitats met at Death Valley in November 1969 for a symposium relating to their protection and preservation (Pister 1970; Fig. 4-1). In contrast to the more sophisticated symposia of later years, the first meeting was strictly a “brass tacks” affair devoted to an assessment of the resource and what might be done to save it. We had no direction, either legal or practical, and were guided only by our incomplete knowledge of the biology of the fishes. As I review my notes, I can see that we devised rough recovery plans and appointed recovery teams to accomplish their objectives, utilizing procedures not too different, although far less elaborate, than those in effect today under the ESA.

We left the meeting as we entered it, with mixed emotions. We were encouraged by the fact that a roughly organized effort was at

least under way, and that in some cases we could see light at the end of the tunnel in the form of refugia and land acquisition programs. However, looming ever more ominously was the specter of continuing development in Ash Meadows, a result of basic interagency conflicts.

This first meeting was conducted amidst obviously conflicting philosophies and programs of several Interior Department agencies in attendance: the Bureaus of Land Management and Reclamation (USBR) creating the basic problem through promotion of land development and irrigation; the USNPS wondering what to do about declining water levels in Devil's Hole (a disjunct part of Death Valley NM); the USFWS (then the Bureau of Sport Fisheries and Wildlife) perplexed over how to administer provisions of the Endangered Species Acts of 1966 and 1969 when the basic problem was caused by sister agencies; and the Geological Survey (USGS) warning that the USBR's Amargosa River Basin Development Project might well spell the doom of aquatic resources within Death Valley proper, to say nothing of the aquatic habitats and endemic fish species to the east in Ash Meadows.

Two statements made during the first symposium perhaps provide an accurate philosophical perspective for that time. At one point, Carl L. Hubbs, one of the world's great ichthyologists and a pioneer in the study of western fishes (Pister 1979c), rose from his chair and, with great emotion, stated, "I can't tell you what this means to us. Bob Miller [of comparable stature as a scientist] and I thought that those of you in government would never see what we have seen for so long!" The other statement was by Robert E. Brown, then a graduate student at the University of California, Los Angeles, studying *C. radiosus*. Standing toward the front and against the west wall of the Death Valley auditorium, he stated with emotion similar to Hubbs's: "There just *has*

to be something we can do!" Indeed there was, but we were yet unaware that Providence would soon smile upon us.

At this point I feel it appropriate to enter an observation that has been the key to much of the effectiveness of action groups and recovery actions performed to date. When the announcement was made of the proposed meeting, response to a common problem was equally enthusiastic from within both government and academe. Yet, when I looked down from the rostrum, I noted that agency biologists and resource managers were clustered together in one part of the auditorium while university professors and their graduate students occupied another (Pister 1985a, b). Very little communication between the groups was evident; one could sense a feeling of mutual distrust and misunderstanding. When the meeting ended the following evening, these barriers had largely dissolved. The remaining barrier was the one presented by conflicts in goals among various Department of the Interior agencies, which, irrespective of personal feelings of agency representatives, still determined management directions.

Following the meeting, we disbanded, at least physically, to do what we could to accomplish our basic goals and solve our common problems. Not long afterward, I received calls from Sierra Club attorneys asking detailed questions about the problem we were encountering in Ash Meadows. Inasmuch as Devil's Hole was being affected and no one in the upper echelons of the Department of the Interior seemed concerned, the Sierra Club legal staff was preparing a writ of mandamus to force government action to preserve the area's biological integrity. The threat was posed but fortunately never had to be implemented.

### Breakthrough

I must now relate a delightfully fortunate circumstance that constituted a turning point in



**Figure 4.1** Participants in the first symposium on desert fishes (a group that ultimately formed the Desert Fishes Council) at Furnace Creek, Death Valley National Monument, California. U.S. National Park Service photograph (Phil Pister), 19 November 1969.

Front row (kneeling): Tina Nappe, Foresta Institute; Tom Jenkins, UCLA; Bob Brown, UCLA; Jim St. Amant, Cal. Fish & Game; Frances Clark, Cal. Fish & Game; Fran Miller, U. Michigan; Jim Blaisdell, USNPS; Dale Lockard, Nevada Dept. Wildlife; Paul Fodor, USNPS; Bill Richardson, Cal. Fish & Game; Pete Sanchez, USNPS; Phil Pister, Cal. Fish & Game.

Middle row: Leonard Fisk, Cal. Fish & Game; Robert Rush Miller, U. Michigan; Vladimir Walters, UCLA; Bob Liu, UCLA; Laura Hubbs, Scripps Institution of Oceanography; W. L. Minckley, Arizona State University; Dave Greenfield, U. Hawaii; Wayne Alley, Cal. State Los Angeles; Clint Lostetter, USFWS Portland; Jim Deacon, Univ. Nevada Las Vegas; Sterling Bunnell, psychiatrist, Marin County, CA; Bob Borovicka, BLM Portland; Jim Yoakum, BLM Reno.

Back row: Jim LaBounty, USBR Denver; Bob Jennings, BLM Bakersfield; Carl L. Hubbs, Scripps Institution of Oceanography; Bill Templeton, BLM Riverside; Lew Myers, BLM Las Vegas; Wally Wallis, USNPS Washington, D.C.; Vern Burandt, Cal. Fish & Game; Ed Smith, BLM Sacramento; Martin Litton, Sierra Club; Bill Newman, Nevada State Engineer's Office, Carson City; Don Cain, BLM Las Vegas.



[Color photo and legend adapted from original published version by P. Pister, 2008.]

agency involvement to preserve the native western aquatic fauna. During the early part of my career, while I was involved in anadromous salmonid research along California's northern coast, I worked with fellow CDFG biologist Charles H. (Chuck) Meacham. By great coincidence, he was a native of the small, eastern Sierra Nevada town of Bishop, near which I had conducted my earlier graduate research, and where I still live. We obviously had much in common.

Meacham had great interest in salmon research and management, and his pioneering spirit eventually took him northward to fill a position with the territory of Alaska. Alaska achieved statehood not long after that (1959), and when Walter J. Hickel became governor, Meacham worked with him as an adviser in matters relating to Alaska's vitally important salmon fisheries.

Following a long-standing tradition of selecting a westerner as secretary of the interior, President Richard M. Nixon brought Hickel down from Juneau during the early part of his administration. It was not surprising, then, that Hickel should choose certain of his Juneau staff to fill key positions in Washington. Meacham was confirmed as commissioner of the USFWS in June 1969 and given a second hat to wear with a secretarial appointment as deputy assistant secretary for fish, wildlife, and parks. The timing could not have been better.

Following the 1969 symposium, a series of articles was published in the spring 1970 issue of *Cry California* that generally described the natural history of pupfishes (Bunnell 1970), the destructive processes at work (Deacon and Bunnell 1970), and a general plan of action for saving the pupfish (Litton 1970). Despite this publicity—and an increasing awareness within the media regarding endangered species—conditions in Ash Meadows grew progressively worse. The full influence of the media was yet to be felt.

In early 1970 we were in dire need of help, especially in the matter of coordination of effort within the Department of the Interior. Some incredible inconsistencies existed. Although the USBLM's Jim Yoakum and Lew Myers had constructed a refugium at School Spring to protect the Warm Springs pupfish (*C. nevadensis pectoralis*), on USBLM land at Jackrabbit Spring a short distance away, a developer was using a gasoline-powered pump to remove all the water, including the entire population of Ash Meadows pupfish (*C. n. mionectes*). And while our major problem was the decreasing groundwater levels, the USBLM and USBR persisted in trying to put more land into irrigated agriculture. Something had to be done, and the time was ripe to do it.

On the morning of 4 May 1970, I phoned Commissioner Meacham's office in Washington, D.C., and was informed that he was "out west," but would return the call as soon as possible. Later that day I heard his familiar voice ask: "How are things in Bishop, Phil?" I outlined our problem throughout the Death Valley hydrographic area, ending with the seriously depleted populations of Owens pupfish in their sole remaining habitat at Fish Slough. His next query both amazed and delighted me. "Which spring is involved, the northeast or northwest?" Fish Slough, it turned out, was one of his favorite boyhood haunts.

Things happened quickly after that. Within a matter of hours Meacham had started the process of establishing a preservation program, wisely choosing as its leader James T. McBroom, assistant director for cooperative services in the Bureau of Sport Fisheries and Wildlife. Reporting on this at the Third Annual Symposium of the Desert Fishes Council, McBroom (1983:21–22), wrote, "About May 5 last year (1970), Chuck Meacham, then deputy Assistant Secretary for Fish and Wildlife, Parks and Marine Services, called me away

from a meeting I was attending. He said to me, 'Jim, the Interior Department has got to organize an effort to protect the desert pupfish.' Then he said, 'When Secretary Hickel told me to do this, I knew I needed the roughest, toughest man I could think of to lead the program. It turned out to be you!'" McBroom's report is fascinating and should be read in its entirety by anyone interested in the early days of the preservation effort, or by anyone who doubts the ability of government to move quickly and effectively *when* the correct avenue of communication is discovered and individuals in key positions espouse philosophical agreement (Pister 1974).

McBroom's first move was to establish the Pupfish Task Force (U.S. Department of the Interior 1970, 1971) comprising representatives of the USBLM, USBR, USFWS, USGS, USNPS, Office of Water Resources Research, and (very wisely) Office of the Solicitor. A corresponding field advisory group included representatives of the California and Nevada departments of fish and game, the Nevada Department of Conservation and Natural Resources, and the universities of Nevada (Las Vegas), Michigan, and California (Scripps Institution of Oceanography). A Department of the Interior press release dated 14 June 1970 described the task force program and concluded with a comforting statement quoting Secretary Hickel: "The Interior Department will vigorously oppose adverse water use which would endanger the continued existence of these surviving species of fish."

The primary effort of the task force during its seventeen-month existence was to establish programs for hydrologic studies, surveillance of the resource, investigation of transplant sites and refugia, aquarium culture (if feasible), reclassification of 29.3 km<sup>2</sup> of public domain in the Ash Meadows area as not appropriate for disposal or exchange, and an investigation of the legal status of water withdrawals (an action that ultimately led to a favorable judg-

ment by the U.S. Supreme Court; Pister 1985a, b; Deacon and Williams, *this volume*, chap. 5).

It was stimulating to participate in activities of the task force, both locally and in Washington, D.C. Possibly the most remarkable occurrence was how, by secretarial directive, the various Department of the Interior agencies were changed from antagonists to cooperators, each contributing equally to financing a hydrologic study by the USGS and the University of Nevada Desert Research Institute that later would form the basis for the government's legal action against the land developers and the state of Nevada (Pister 1985a, b).

The only known exception to this cooperative atmosphere occurred when, in a discussion with Death Valley NM Superintendent Murphy, the USBLM district manager at Las Vegas staunchly defended the Ash Meadows operation and alleged that it was a shame to interfere with it "just to save a few worthless fish." Such a statement should never be made to a park service superintendent named Murphy!

The task force continued to provide a flow of information and suggestions concerning the common goal of saving the pupfish. The unofficial group that had been meeting regularly since April 1969, and which indirectly caused the task force to be formed, needed a more official status and designation in order to achieve maximum effectiveness. In a letter to me dated 24 August 1970, McBroom stated: "We believe it would be a splendid idea if you and others involved with desert fishes established a council, similar to the Desert Bighorn Council, to coordinate efforts toward the mutual objective. Such a council could speak with more authority and could add more strength to the effort than the independent effort of individuals. You may wish to consider this proposal at the November meeting." This was done, as noted in the summary of the second annual symposium (Pister 1971:12): "*Session III—Consideration of*

proposal to establish a 'Desert Fishes Protective Council' and a Pupfish Advisory Committee to work with Interior's Pupfish task force." Considerable group discussion was held concerning this item of business, and the Desert Fishes Council (DFC) was formed by unanimous vote. I was selected as chairman and given the assignment of preparing a constitution and bylaws, as well as appointing committees and generally getting the council off the ground. Also involved were setting up advisory groups, designating procedures requisite to administering affairs of the DFC, and assisting the task force in solving technical problems. Formal discussion and adoption of the constitution were set for the 16–17 November 1971 symposium (Pister 1984).

The technical advisory group, already in existence for several months, was formalized, and the task of drafting a constitution was given to Peter G. Sanchez of Death Valley NM. Sanchez, a geologist familiar with the program and procedures of the Geological Society of America, drafted the new constitution on the format of that organization. His initial draft, with only minor changes, has served the council well.

### Initial Success: An Impetus for the Future

Press releases from the task force and state fish and game agencies, combined with the inherent newsworthiness of anomalous "fish in the desert" threatened by "big business," soon gained the attention of major news media. The early 1970s saw burgeoning publicity in the form of television documentation, feature articles in major newspapers such as the *Wall Street Journal* and *Los Angeles Times*, and several articles in national magazines (*Audubon*, *Scientific American*, *Smithsonian*). Strong support was received from more specialized publications of the American Killifish Association, *California Caver*, *Defenders of Wildlife News*, *Desert*, *Dodge News Magazine*, *National*

*Parks and Conservation Magazine*, the National Speleological Society, *The Nature Conservancy News*, *Outdoor California*, *Westways*, and others. These were accompanied by numerous technical papers published in agency reports and scientific journals (R. R. Miller et al. 1985).

In August 1970 a Columbia Broadcasting System television news team was flown by CADFG aircraft from Los Angeles to Ash Meadows to film a transplant of Devils Hole pupfish (*Cyprinodon diabolis*) to a site in Saline Valley, Inyo County, California. The ensuing telecast, shown on the evening news, resulted in a rash of letters directed to political figures ranging from California governor Ronald Reagan to Vice President Spiro Agnew, and to a variety of state and federal elected representatives. There seems little question that the publicity given desert fishes in the early 1970s also played a key role in providing a favorable atmosphere for passage by Congress of the new ESA, and its signing by President Nixon in December 1973. Such publicity also provided a favorable political climate for legal action by the Interior Department, acting through the Department of Justice and carried successfully to the U.S. Supreme Court, to protect Devil's Hole from pumping (Pister 1979b, 1985a, b; Deacon and Williams, *this volume*, chap. 5).

### Reflections

As I review events leading to formation of the DFC, and to its evolution into an effective action group, the following points appear to have been instrumental. Concerned and competent persons must first become aware of a critical problem, and then must be willing to make virtually all other considerations secondary to solving it. The initial division between government and academe lasted only a matter of days and was overcome through a process of communication built around an atmo-



sphere of interdependence, respect, and mutual trust (Pister 1985a, b). Very simply, fishes need water to exist; further information regarding biological requirements was a logical function of academic researchers. Research data were used by concerned government scientists and administrators to devise strategies to acquire or build habitats fulfilling the needs of the species.

Passage of the ESA, despite the funding it provided for state, federal, and international programs, did not result in a mad rush by agencies to involve themselves deeply in such matters. The utilitarian philosophies that directed agency programs at that time persist to a large extent even to this day. Laws and programs are no more effective than the motivation of those who implement them. I am reminded of an observation attributed to the German philosopher Goethe, that "man has only enough strength to accomplish those things of which he is fully convinced of their importance."

Death Valley's problems provided a valuable testing ground as the DFC moved into areas of concern throughout other parts of the southwestern United States and northern Mexico. Agency intransigence was so firmly entrenched during the late 1960s and early 1970s that the DFC was compelled to implement a program involving appointment of area coordinators, one for each of the twelve major hydrographic areas within the Basin and Range Province, to be watchdogs over the specific areas of concern and to work with sympathetic agency employees to ensure that no species was lost. The area coordinator program remains in effect at this writing.

### *Fiat Lux*

One cannot help but wonder why such a program was necessary, why professional biologists employed by western fish and wildlife management agencies lacked the motivation to inventory their native faunas and devise

programs to ensure their perpetuation. Having spent most of the past two decades pondering this question, and based on my own experiences as a state fish and game agency biologist (Pister 1985, 1987a), I would lay most of the blame at the feet of a bureaucracy rooted in tradition, an almost-universal program direction and professional ethic built around sport and commercial fishing, and university curricula devoid of courses in environmental ethics and ecological and evolutionary principles.

Lack of funding is often presented as an excuse. However, even with funding provided through the ESA, a large percentage of fishery biologists, state and federal alike, show little interest in the nongame component of the resource and are more than willing to leave such responsibilities to woefully inadequate staffs (or an individual) retained specifically for that purpose. Again, Aldo Leopold (1949) expressed it succinctly: "We fancy that game species support us, forgetting what supports game species."

Many persons, and most agencies, are simply not prepared to deal with the complexities and challenges of nonutilitarian aspects of ecosystem management. Their academic preparation and philosophical orientation are insufficient in breadth, content, or perspective for them to embrace more than a cost-benefit approach (D. A. Brown 1987). Dependence on competent and dedicated persons with knowledge of ecological principles to provide insight into future needs of a biological resource is often rejected as a viable option in decision making. This occurs even though most science, technology, and (for that matter) human cultural development are based on historical projections.

It thus seems appropriate and not at all surprising that the philosophies of great scientists of the past laid the groundwork for conservation efforts for western fishes. The lineage they started has carried on their tradition with ad-

mirable dedication. Carl Hubbs was a student of David Starr Jordan, Charles Henry Gilbert, and John Otterbein Snyder at Stanford University, and Hubbs's students, and their students in turn, continue to provide much of the philosophical and academic direction necessary for such work to succeed (Pister 1979c, 1987a). Hubbs made it clear that utilitarian management practices were of limited long-term value and would do little to accommodate future needs, which can best be met by preserving and managing as complete a native fauna as possible (Pister 1976). Native species constitute a dictionary from which words may be chosen to compose management prescriptions for the future.

Progress in conservation is being made, although leadership emanates not from agency administrators but from academe, isolated field biologists, and the private sector (Pister 1976, 1979a). TNC Natural Heritage Programs have been exemplary in this last regard (Pister and Unkel 1989) and deserve much of the credit for existing state programs. Bureaucratic intransigence still exists in federal agencies, as discussed by Williams and Deacon in chapter 7 of this volume, and is even more pervasive in some state conservation departments.

Table 4-1 summarizes the current degree of responsibility and involvement exhibited by western states regarding the protection of nongame fish faunas. It is evident that, after a substantial delay, most have begun to participate.

I am reminded of two incidents that eloquently express the sentiments frequently displayed by the leaders of western state fish and wildlife agencies in the early 1970s. In the first instance, I responded favorably in public to a keynote address on endangered species problems and solutions delivered in 1972 by Assistant Secretary of the Interior Nathaniel Reed at a meeting of the Western Division, American Fisheries Society (AFS), in Portland, Oregon (Pister 1979a). Shortly thereafter I was soundly admonished by the CDFG top leadership for my "embarrassing behavior" in supporting federal involvement in nongame and endangered species programs. This fit exactly with the second incident I encountered during summer 1974. As a member of the Endangered Species Committee of the Western Division, AFS, I attended a meeting of the International Association of Game, Fish, and Conservation Commissioners in Las Vegas, Nevada. During one session the newly implemented ESA was discussed from

**Table 4-1. Status of nongame and endangered fish programs in the western states.**

Category	States					
	AZ	CA	CO	ID	NV	NM
Date of cooperative USFWS animal agreement	1985	1976	1976	1979	1979	1976
Date of cooperative USFWS plant agreement	1979	1980	1987	1985	1985	1985
Full-time nongame fish biologist?	yes	yes	yes	no	yes	yes
Nongame division or branch?	yes	yes	no	no	no	no
Statutory authority for nongame protection?	yes	yes	yes	yes	yes	yes
Funding for nongame fish programs <sup>1</sup>	1, 2, 3	1, 2, 3	1, 2	2, 3	1	1, 2, 3
State endangered species act?	no <sup>2</sup>	yes	yes	no <sup>2</sup>	no	yes

<sup>1</sup>1, Section 6 (ESA) funding; 2, state income tax check-off monies; 3, funds from general agency budget.

<sup>2</sup>Has commission-approved threatened and endangered species lists.

the perspective of how it might be applied within the states. One commissioner rose and blurted out with considerable emotion: "The Feds better stay out of *my* state. I'd rather have our species become extinct than have the federal government become involved."

Our aquatic resources owe much to private individuals who saw a need in the early years and responded to it. Pasadena, California, schoolteacher Miriam Romero, working with the Sierra Club, organized and published a superb environmental inventory of the Amargosa River Gorge biota (Inyo and San Bernardino counties, California; Romero 1972) and paved the way for establishment of a USBLM Area of Critical Environmental Concern, which protects flora and fauna alike. Barbara Kelly Sada and Cindy Deacon Williams, representing the DFC's Ash Meadows Education Committee, literally accomplished miracles in working with TNC and top Nevada politicians, up to and including Senator Paul Laxalt, to acquire private holdings within Ash Meadows (Cook and Williams 1982; Sada and Mozejko 1984), now a national wildlife refuge (Deacon and Williams, *this volume*, chap. 5).

Garland R. (Bob) Love, a Union Oil Company chemist and longtime weekend resident

of Ash Meadows, laid much of the groundwork for preservation of that area and now represents TNC there. Tasker and Beula Edmiston, well-known conservationists from Los Angeles, brought a tradition of political expertise to the grass-roots efforts of the preservation effort. And Peter B. Moyle, a University of California (Davis) professor, served as chairman of the CADFG's Citizens' Nongame Advisory Committee and did much to get California's nongame conservation program off the ground. Tina Nappe did likewise as a member of the Nevada Fish and Game Commission.

These are but a few of the concerned citizens who have donated their talents and funds toward the preservation of western fishes. For the most part unacquainted with the need for preserving biological diversity that provides compelling motivation to professional biologists, these lay citizens, working through the democratic process, have provided the political support that ultimately underlies any significant conservation effort.

### Looking Forward

It is not surprising that all the above-named individuals are members of the DFC, which provides a medium to enhance their effectiveness. The same is true of virtually every agency fishery biologist in the desert Southwest who possesses a strong interest in native life-forms and recognizes the need for an ecosystem approach to species preservation (J. E. Williams et al. 1985).

These individuals are separated from their agency peers by the way in which they define and practice the land ethic. Aldo Leopold (1949) defined the difference: "Conservationists are known for their dissensions. In each field one group (A) regards the land as soil and its function as commodity-production; another group (B) regards the land as a biota, and its function as something broader." Although the ranks of the B group in the various agencies are growing, they are still outnumbered

OR	TX	UT	WY
1986	1987	1979	1981
1985	1987	1979	1981
no	part	yes	no
no	yes	yes	no
yes	yes	yes	yes
1, 2, 3	1, 3	1, 2, 3	1, 3
yes	yes	no	no

bered by the A faction. The transition from A to B will occur gradually through attrition, and by the ultimate and inescapable realization that human populations will increase in inverse proportion to the availability of fish and wildlife habitat. It will then become apparent that fish and wildlife-oriented recreation can no longer be fully met through contemporary and conventional programs (Pister 1976, 1987a). "To promote perception is the only truly creative part of recreational engineering, [and] . . . the only true development in American recreational resources is the development of the perceptive faculty of Americans. All of the other acts we grace by that name are, at best, attempts to retard or mask the process of dilution" (Leopold 1949). Ironically, these observations apply equally to American outdoorsmen and to fish and wildlife agency staffs dedicated to providing meaningful outdoor experiences. As I view native fishes in a context of ever-increasing human populations in an increasingly arid Southwest, it occurs to me that current management procedures (generally with non-native species) only touch on the potentials inherent within our native fauna. Already angler demand exceeds fish supply in most areas of the Southwest, and there are no signs that point to any real improvement of the situation (Pister 1976). However, although maximum sustained yield obviously has its limits, the infinite recreational and scientific resources provided by natural ecosystems are limited only by our ability to comprehend and appreciate them.

Major areas of emphasis for the DFC have evolved. Today the council is concerned with the following: (1) general coordination of ecosystem and species preservation in the Southwest, (2) encouraging agency biologists and university scientists and students to conduct species inventories and life history research useful in recovery efforts, (3) performing pioneering work in the fields of species

and habitat restoration, (4) furthering communication between government and academia, and (5) continuing to schedule annual symposia for the presentation and discussion of relevant data and programs. The general philosophy and procedures of the newly recognized field of conservation biology (Soulé 1986) have long been subscribed to and practiced by the DFC.

Inasmuch as the council's area of concern extends well below the border into the desert areas of Mexico, Mexican scientists and students have been full partners in the DFC's efforts. The council met in Mexico in 1980 at La Universidad Autónoma de Nuevo León (Pister 1981a), in 1984 at El Instituto de Zonas Desérticas de San Luis Potosí (Pister 1987b), in 1987 at El Centro Ecológico de Sonora in Hermosillo (Pister 1990), and in 1990 at La Universidad Autónoma de Baja California in Ensenada.

Recovery efforts for Mexican fishes are also under way, but more slowly than in the United States. Mexican colleagues are restricted in their efforts by a lack of strong environmental legislation and money, and a conservation ethic within the Mexican public that is understandably tied more closely to immediate human needs than to a concern for genetic diversity or ecosystem integrity. The International Program of TNC is combining with support from within Mexican academia to make some headway here, with one of the first and most important target areas being the biologically rich Cuatro Ciénegas basin of Coahuila (Marsh 1984; Contreras Balderas 1977, 1984, in press, *this volume*, chap. 12).

An example of international cooperation is provided by the 1987 Nineteenth DFC Symposium hosted by El Centro Ecológico de Sonora. Of eighty-four registrants, twenty-eight were Mexican scientists or students; and of twenty-seven universities and research institutions represented, ten were from Mexico. Fifty technical papers were presented, seventeen



from Mexican students and researchers traveling from as far as Cancún (Puerto Morelos) on the Yucatán peninsula, Mexico City, Baja California, and Nuevo León. Both student paper awards were won by Mexican nationals, one of whom is pursuing an advanced degree in the United States (Pister 1990). Although language barriers posed a problem, they were minimized by presentation of English abstracts for papers given in Spanish, and vice versa. An increasing bilingual capability within the membership is also of great assistance. The formation of the Mexican Ichthyological Society in 1987, which had its first meeting in La Paz, Baja California Sur, in November 1988, will do much to further the cause of native fish preservation in Mexico.

The DFC has now grown from a handful of persons who first met in Ash Meadows in April 1969 to an international representation of more than 500 agency and university scientists and resource managers, members of conservation organizations, and private citizens, all concerned with the preservation of aquatic ecosystem integrity throughout the deserts of the United States and Mexico. Related concerns are being expressed, and research conducted, by council members in all three nations of North America. The broad function of the DFC is to detect weak areas within the field of desert ecosystem preservation and provide the full strength of its membership to compensate for bureaucratic inadequacies, and to enhance governmental preservation programs.

The DFC provides a means—unimpeded by constraints of bureaucracy and politics—to meet specific conservation needs and express relevant concerns. In recent years it has used its expertise and influences not only to acquire major land areas within Ash Meadows (working with TNC) but also to influence and work with the USFWS in rehabilitating the area, establishing a national wildlife refuge, and assisting in pioneering efforts to develop new

management strategies directed toward preservation of native life-forms. This is in sharp contrast to the consumptive harvest philosophies underlying the acquisition and management of most such areas.

In 1986 the DFC formed a special committee of experts to review a plan drafted by USFWS biologists to preserve native fishes of the upper Colorado River basin above Glen Canyon Dam (USFWS 1987a). Several areas of concern were detected, and although full agreement was not reached, the plan ultimately will be a better one because of council input. Speaking as a representative of a state fish and wildlife management agency, I can see obvious and enormous value in being in a position to state facts without concern for politics. Such information gives agency administrators a vastly superior negotiating stance when compared with a starting position already weakened by inevitable concern over political considerations. Entrenched bureaucracy does not welcome a rebel.

### To Promote Perception

In spring 1979 a new journal appeared, devoted to a field touched on occasionally by environmental biologists but still far enough afield from the mainstream of biological thought as to belong to a distant but related discipline. Centered originally within the Philosophy Department of the University of New Mexico (later moving to the University of Georgia and in 1990 to the University of North Texas) and led by Eugene C. Hargrove, *Environmental Ethics* is described on the publication cover as “an interdisciplinary journal devoted to the philosophical aspects of environmental problems.” It brings together writings of philosophers and biologists who detect an obvious need for the application of ethical considerations to the work in which environmentalists have been engaged for decades, frequently without giving the subject of ethics more than a passing thought.

There is little question that this new partner in the cause of conservation biology will grow and likely assume a role of importance comparable to the philosophies of Stephen Mather and Gifford Pinchot at the turn of the century (Rolston 1988). Concurrent with development of the journal has been the appearance of courses devoted to environmental philosophy and ethics at certain universities. With the philosophy expressed in Aldo Leopold's "The Land Ethic" (*A Sand County Almanac*) receiving major emphasis, such courses give badly needed maturity and direction to students who otherwise all too often become missiles without guidance systems. In an era fraught with technology and technological advances, this new emphasis on environmental ethics will likely become the most important innovation of the twentieth century as it gradually (yet inexorably) pervades both agency and academe with a philosophy more in line with what we can do for our fish and wildlife resources, rather than what our fish and wildlife resources can do for us. Holmes Rolston (*this volume*, chap. 6) addresses this subject in depth.

It is ironic that when Europeans first landed in North America they encountered native populations who recognized their dependence on the land and lived accordingly. It is only in

recent years (particularly since World War II) that our quest for an ever-higher standard of living has resulted in the accelerating habitat loss and extinction rates that characterize the Western Hemisphere. So now, with increasing perception and understanding, we begin to build a new ethic (Pister 1981b, 1985a, b, 1987a). There is still time to act if we are only willing to sacrifice blind economic expediency to achieve long-term survival. It is also ironic that two of our most basic motivations, greed and self-preservation, should come into conflict in such a terrifying way. It is only through a new awareness of habitat and resource dependence by industrialized nations, and our rejection of the humanistic philosophies that have placed us in our current dilemma, that we can hope to survive over the long term. To paraphrase the theme of David Ehrenfeld's (1978) superb treatment of the subject in his book *The Arrogance of Humanism*: "Just who do we think we are?" It seems appropriate to close this chapter with the same scripture from Isaiah 47:10 (Jewish Publication Society 1985) that Ehrenfeld used to end his book.

It was your skill and science  
that led you astray  
And you thought to yourself,  
I am, and there is none but me.