

**GRAND
CANYON
RIVER
GUIDES**

Workman Leaving Us

Future of Science

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The News

Published by Grand Canyon River Guides, Inc.

Volume 6 Number 1



Winter 1992 - 93

- * Protecting the Grand Canyon *
- * Setting the highest standards for the river profession *
- * Providing the best possible river experience *

GCRG Member (expired) Makes Good

With the changing of the political guard an environmental consciousness has finally arrived. The appointment of Bruce Babbitt as Secretary of Interior is a keystone to supporting the view that environmental well-being is essential to national prosperity.



Marty LaVor © 1991

Bruce Babbitt has always shown a love and concern for the great outdoors, especially the Grand Canyon. He has the perspective that proper management of natural resources is done by looking at the long term. If the methods of using one resource cause a detriment to other resources, Bruce is one who will look for changes in those methods.

Babbitt's credentials include Governor of Arizona, Harvard Law School, wilderness defense counsel and author. He is from a business and ranching family, and promotes the balance between use and enhancement of natural resources. As the new Secretary, he has called for refurbishing the National Park Service and a reevaluation of Western water projects. This is a promising start. We may not always agree with the decisions he'll have to make, but we do know that they will have been made on intelligent and logical grounds.

Bruce Babbitt is an avid hiker and boater. He is sure to be out doing the same when he can get a chance. As a speaker at a previous GTS, he helped ignite the fire that led to the current EIS and subsequent Grand Canyon Protection Act. We hope to have his enlightening input in the future.



View From the Rim

Last November I had the occasion to attend one of the GCRG board of director's meetings at Brads's house. After a good deal of arguing back and forth with the board on various issues, we settled into some very productive dialog. I think the meeting ended on a positive note, with GCRG and myself making a strong commitment to strive to improve relationships between the Park Service and the river community.

The most interesting thing to come out of the meeting is that I think we all realized that we all wanted the same things on the river - resource protection and an incredible client experience. As I see it, many of the NPS river guide conflicts over the past few years seem to have been based more on historical problems and personalities than on the concrete issues and problems.

The keys to improving our working relationship are communication and cooperation. Rather than automatically taking an adversarial and negative stance on every issue coming from each other, we need to sit down and discuss how we can cooperatively deal with the complex problems and issues facing the river, the canyon and our livelihoods. I have seen over and over again minor problems blow up because the responses on both sides have been based on rumors and inaccurate information. When the Park Service hears of some incident on the river, we have to go the source before reacting. When the guides hear of an NPS proposal or operational change, they need to contact the Park and get accurate information and explanations.

As the liaison between the Park and GCRG, I will be attending the board meetings and keep you informed of any new NPS thrusts, projects and de-

velopments which have potential to effect the river community. This will also afford me the opportunity to see what you are thinking and which direction you are going. I also plan to make periodic submissions to your newsletter to keep you informed of anything major that may be in the works.

I realize that we will certainly encounter conflicts and problems with each other in the future, so it is vital to remember that there are mechanisms in place that we can use to fix the problems.

I have to echo Brad's last editorial - it's time that we forget the "them and us" and start working together on some of these issues which demand the immediate attention of us all. We have long been saying and wanting the same things for the Colorado River - now we need to start saying it together and get to work.

*Dan Davis
Canyon District Ranger
Grand Canyon National Park*

Saipan Wins

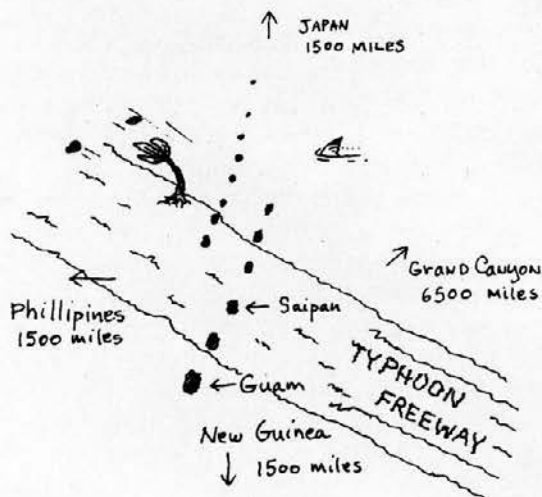
Well, our worst fears have come true. The American Memorial, an NPS administered war memorial on the tiny island of Saipan, saw a good thing, and has hired Tom Workman as Ranger in Charge, effective in mid-April. Tom will be leaving his post as Lees Ferry Ranger, and that's a damned shame.

Tom Workman first appeared at Lees Ferry in April 1976 as a Glen Canyon seasonal ranger. In 1980, to the delight of guides and outfitters, Tom became the Grand Canyon Lees Ferry Ranger.

In his years at the Ferry, Tom continually diffused problems, working with cooperation and education, being a friend while still holding the line of the law. The respect and admiration he gained went far towards smoothing the flow of traffic at the crowded boat ramp, protecting the Canyon and enriching the boating community.

He's leaving a large pair of shoes to fill and we don't envy his replacement. We'll need to give the new guy/gal the benefit of a lot of doubt, because we all know it's hard to be Tom.

Poor old Tom- we heard his new office is in a luxury hotel on the beach. Yesterday, as we were trying to say something appropriate to him he seemed and, with that familiar twinkle in his eye, he said, "I'll be back."



Old Days and New Guys

For better or worse, it's not the same. Being a boatman is altogether different than it was twenty years ago. Over a hundred boatmen currently working in Grand Canyon started in the seventies. Many of us started with companies that were fairly new and the trips consisted largely of getting the folks down the river without too much irreparable damage. Interpretation was minimal, sanitation primitive and food simply dreadful. Equipment was surplus, slipshod, and often downright scary. Side canyons that have well worn trails today were still being discovered.

Although there were a few mythical boatman even then, there weren't many elder boatmen to look up to or learn from other than the outfitters themselves, and many of them were new to the business too. It was not unknown for a boatman to run his own boat on his first or second trip. Reputations were made, egos flourished, and, well, it *was* the seventies. Trips were more of an adventure than a tour.

As we learned more about the canyon and were better able to interpret it, individual egos became a less dominant part of the trip. Cooperation and communication among trips became more commonplace. The food, due largely to the fact that the crew had to eat it all summer, began to improve. Trails formed at side canyons and boats began to hold air. Low water came to seem less desperate as skills improved; ugly rocks and tricky routes became charted in our minds. As boatmen gained and shared experience, they gained a modicum of respect, if only among themselves.

More came to be expected from us. We were expected to know the rocks and plants, to provide decent health care, to find a camp before dark; to be sane, safe and sober all day long. Acts were cleaned up. The expedition gave way to the tour.

The new boatman looking for work is entering a different world. Apprenticeship is more drawn out, training seminars more frequent and comprehensive. The likelihood of getting a boat in the near future is far bleaker. The wealth of knowledge and experience being passed on to younger boatmen is voluminous.

Most campsites are well known, heavily trampled and in high demand. Trails are designated and stabilized. It takes great creativity to do something so new or so dumb that it hasn't been done before.

Gear loads tend more toward how much equipment can be brought along instead of how little; how well we can insulate ourselves from the environment instead of fitting into it. Gone are the days when a Mike Yard would start a trip with a buffalo robe and a pair of shorts.

Use levels are at an all time high. Regulations continue to mount, rules of the road must be observed. Behavior is under ever greater scrutiny. We are licensed, card carrying boatmen.

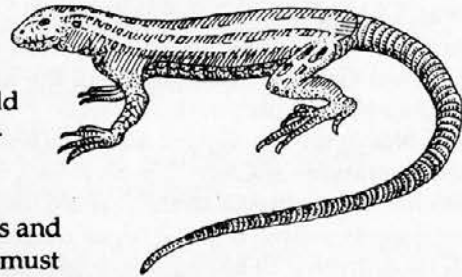
There are still and always will be the adventures of each trip—the bad runs, the storms, culinary misadventures, hijynx, hell takeouts, romance, big days in the gorge; parties, rumors, personalities and the unforeseen. But all this is incorporated into a far more structured framework, a defined profession, an established tradition.

No, it ain't what it used to be. But that's just as well. What we may have lost in total freedom, we have gained in knowledge and professionalism. And we still get to play in the sandbox all summer long.

Into this changed world the new boatman brings enthusiasm, fresh outlooks and wonder. We must welcome you and be open to your insights; without your inspiration, energy and spontaneity the guiding profession would stagnate and decay. We can often pass on to you in a few trips what it took us an embarrassing number of years to learn. Often though, not believing what we say, you must learn things for themselves. Or disprove them.

Challenge yourselves and the old farts. Milk us old fools for all you can. Learn the stories. Discover as much as you can about the place. Be an authority. Read, listen, ask, experiment. Fight undesirable trends. Celebrate and revel in the place and what it does to people. Stir things up. Take care of the Canyon. Treasure spontaneity and wild eyed wonder; pursue excellence.

It is you who must continue the evolution of a wild adventure into a proud tradition. Carry it on. Carry it further.



Brad Dimock

Science in the Grand Canyon An Answer or an Enigma?

Science in the Grand Canyon. It has a familiar ring to many of us as part of the river activities. The Glen Canyon Environmental Studies (GCES) has been important to many of our lives for the last ten years. It was first viewed very skeptically by the river community as another government bureaucracy developed to forestall changes at Glen Canyon Dam, but that view has changed. The studies by GCES have shown that the dam has had a large impact on the natural and recreational resources in the Canyon. The Bureau of Reclamation and Department of Interior have been forced to deal with these *scientifically proven* impacts.

Not too many months ago I hiked into one of the GCES river trips. While waiting for the trip to get to Phantom, I sat in the shade of the tamarisk trees at the boat beach, sipping a cold beverage and engaged in a conversation with several new river guides. The conversation focused on their belief that scientists were taking over the Grand Canyon and that all this effort wasn't needed. Without identifying who I was, I let them tell me what they thought was bad and how they would improve it. That night on the beach at Granite, I thought about the future role that science should play in the Canyon.

Not in the too distant past, decisions regarding the operations of Glen Canyon Dam were made by Reclamation officials in the relative luxury of their conference rooms without input from the public. Today, that has changed. Through the passage of the Grand Canyon Protection Act and the impending completion of the Glen Canyon Dam EIS, the rules and process for making decisions about Glen Canyon Dam operations have been changed *forever*. Now, more than ever, credible scientific data are required to make wise resource decisions.

Faced with the knowledge that we need scientific data to effectively protect and manage the resources, but also aware that in our zest for data collection we may be harming the resources, we must search for **BALANCE** (inherently a conflict for scientists and boatmen!). Lately it appears that science has come under attack from both the old guard, which sees data as a threat, and the recreationists, who see the research as taking up too much of the Canyon. It is like sitting at the top of the bubble line at Lava Falls and not knowing if one is too far left or right, but damn sure that whatever decision is made will result in getting beat up!

GCES has tried to integrate the river community into the scientific efforts in the Canyon. Whether it

has been through support for river logistics or hiring people for specific scientific work, it has always been my intent to forge a strong commitment to the river community to ensure that you understand our role and we work together for the resources.

As we enter the 1993 river season you will see fewer GCES researchers in the Canyon. We are making every effort to reduce our activities in the Canyon while still maintaining a credible scientific program— a program that allows us to meet our administrative responsibilities and retain our scientific credibility. Specific actions we intend to take this year to reduce our impact are: to take out the Little Colorado River mini monitor (Mother Nature and the high rains already helped us on this), move weather stations and telemetry sites into more non-visible areas, remove the mini monitors from the tributaries, reduce video and photographic flights in the Canyon and, again, require that all research trips use non-commercial beaches during the recreation season.

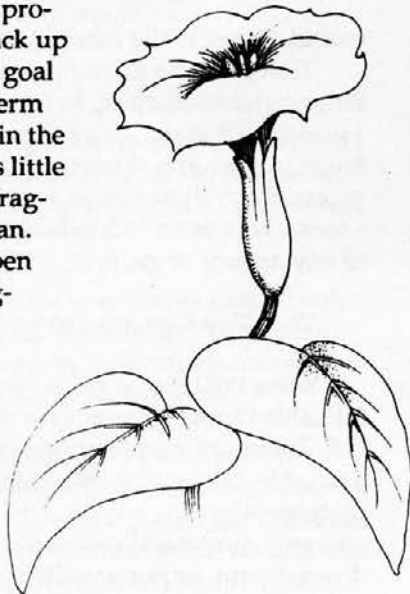
What does the future hold for scientists in the Canyon? The reality is that there is always going to be a need for monitoring resources and scientific data gathering in the Canyon. With the passage of the Grand Canyon Protection Act and the constant and steady move to complete the EIS, a need continues to determine the effects of dam operations. This includes *adaptive management* of the water releases and monitoring resources in the Colorado River corridor to learn how the system responds to our actions. The only effective and credible way to do this is to have data. We are dealing with a living, breathing ecosystem that responds to a variety of stimulants; some are predictable and some are not. Our objective should be to manage within limits and utilize normal ecosystem processes— not to try and play God or make the Canyon into a Disneyland of special effects dictated by abnormal processes or unnecessary manipulation. It is my intent that we begin this year to integrate the GCRG into the adaptive management and GCES monitoring programs. This can begin by using guides for changing film in remote cameras, documenting stage levels at selected beaches, monitoring water quality in tributaries and in the mainstream, and recording quantitative bird, fish, and mammal observations. GCRG has already provided an invaluable service to GCES and to me personally. Without your eyes, ears, comments and occasional haranguing, we

would not be where we are today.

The value of science in the Grand Canyon cannot be underestimated, as it provides the means to back up what we say. GCES's goal is to develop a long-term monitoring program in the Canyon that leaves as little of a footprint on the fragile ecosystem as we can. My door is always open to your ideas and suggestions on how we can accomplish this.

Good Science.

Dave Wegner



More on Datura

There are two species of Datura in this area: Datura stramonium and Datura wrightii. Here are some distinguishing characteristics so you can tell them apart.

Datura wrightii

Range: Everywhere on the Colorado Plateau between 600 and 1500 meters. This is the plant we see all over the Colorado River corridor.

Fruit: (the thistle) is pendulous; it hangs down, and has many more spikes.

Leaves: ovate to oblong with smooth edges. The base of the leaf is uneven on the stem.

Type: herbaceous perennial.

Corolla: 12-20 cm long.

Habitat: lives in sandy to loamy soils.

Datura stramonium (Jimson weed)

Range: found only in a few places in the Southwest, yet native to the Eastern portion of the continent. Was introduced to Utah by the Mormons and is slowly making its way to Arizona.

Fruit: stands erect and has less spines.

Leaves: ovate to oblong, yet toothed along the edges.

Type: herbaceous annual.

Corolla: 6-8 cm long.

Habitat: stream banks, washes, and waste areas (needs more moisture).

Datura meteloides is the species known by some to dwell within the Canyon.

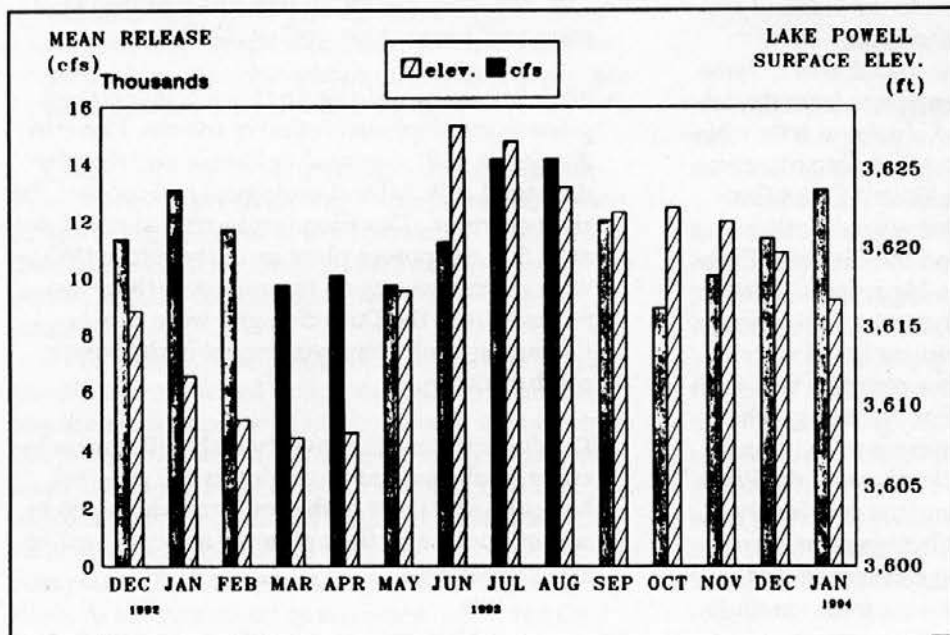
This name is incorrect. Barclay, (Mr. Plant), says meteloides is a Mexican Datura only, and its name is synonymous with Datura inoxia. This name, meteloides, seems to be destined to wander the hallowed halls of plant taxonomy without a species to call its own. If you think you see one, it should have a narrower 10 toothed corolla limb and you should be south of the border.

Citations upon request.

Cynta deNarvaez

Jeanne Dixon Predicts 1993 Flows and Lake Elevations

Below is the Colorado River Storage Project's best guess at this year's lake levels and river flows. Interim Flows, or something very much like them, are expected.



The Glen Canyon Dam EIS: Random Thoughts And Revelations

Brian Dierker's Flagstaff ski shop is always an interesting place to hang out, a place where river reprobates gather and share recent events, re-bond, tell lies, and sometimes plot against government inadequacies. It was there a few months ago that Brad Dimock found me recovering from one of those recent events and asked what was happening on the EIS. His exact words, I think, were, "What do the money grubbers want to do with the river now?" My answer surprised Brad and several other guides listening to our exchange.

In my opinion, this is one environmental impact statement with which we will be pleased—because the opportunity exists to operate Glen Canyon Dam to the benefit of virtually all downstream resources. Brad was surprised with my level of confidence in the process. One thing led to another and pretty soon I had agreed to "tell it all" in the next issue of The News.

First, a little background. During the spring of 1991 I was retained by the Hopi Tribe to represent them as a member of the EIS team. Hopi interests in the Canyon are truly holistic. They seek a spiritual and resource-protective balance within a system that they believe has been insulted by placement of the Dam. However, they do not believe removing the Dam and returning to the "way it was" is a viable or realistic option. In their view, all of mankind and the balance of universal stability will be served by providing maximum protection to the cultural and natural resources of the river corridor.

The team I joined is a loose coalition of diverse interests, consisting of representatives from the following agencies: the Hopi and Hualapai tribes; Navajo Nation; Arizona Game and Fish Department; U.S. Fish and Wildlife Service; United States Geological Survey; Bureau of Reclamation; Western Area Power Administration and the National Park Service. It's a big group with a big responsibility. Our job is to develop and analyze alternative water release scenarios that will minimize impacts to downstream resources. This is a complex task with some significant constraints. For one thing, whatever scenario the EIS team comes up with it must conform to what is known as the "Law of the River." Among other things, this means that previously agreed upon water allocations between the lower and upper basin states must be accommodated. Also, hydropower is one of the resources we must

consider, and to the extent possible, protect.

Though these goals may sound impossibly ambitious and conflicting, in my opinion a pathway exists for achieving this delicate balance. Although I know others who share many of the conclusions expressed in these pages, I want to make it clear that I speak here as an individual, not as a representative of any agency or group.

The Glen Canyon Environmental Studies

Since 1982 the GCES program, led by the indefatigable David Wegner (one of those remarkable U.S. Bureau of Reclamation scientists whose spirit is owned by Grand Canyon), has dedicated its efforts to describing the cause and effect between dam discharge patterns and the condition of all resources downstream. Important GCES findings to remember as we review potential flow scenarios include:

- Once the Dam was in place, there was no turning back. The Colorado was changed forever. The "new" river has given up its sediment to Lake Powell; water temperatures are consistently cold summer and winter; and discharge patterns have stabilized.
- Rare and damaging floods, like those of 1983 and the subsequent high water through 1987, cause far more damage to the downstream resources than the daily discharge patterns required to produce "peaking power" at the Dam.
- Plant operations in effect at Glen Canyon Dam prior to the implementation of Interim Flows in August of 1991 depleted sediment and thereby damaged cultural and ecological resources of the river corridor. Discharge patterns that could peak at 31,500 cfs (power plant capacity before 1983), with no restrictions on ramping rate (how fast releases from the Dam change), were clearly damaging to all resources except hydropower production.
- The current Interim Flows (which will remain in effect until changed through this EIS process) have allowed most of the resources damaged by earlier floods and flow patterns to begin healing and stabilizing.

All the resources and findings of the Glen Canyon Environmental Studies, including continual updates on research by their scientists, have been incorporated into development of a series of possible dam management alternatives.

The Alternatives

First, let's look at options no longer under consideration. Early in the EIS process, the following suggested concepts were discussed and abandoned as unrealistic:

- 1) Remove the Dam. This was simply judged not practicable, and to my knowledge none of the Cooperating Agencies or individuals involved think dam removal is a viable option.
- 2) Build another dam downstream from Glen Canyon Dam near Lees Ferry. Initially, there was a lot of support for this from the power interests. The new "re-regulation" dam would contain the power-related daily fluctuations and release relatively steady flows downstream. Permanent loss of the last 15 miles of Glen Canyon was only one of the reasons this alternative was not considered further.
- 3) Mimic pre-dam flows. This reflects the romantic notion that if we just let the same amount of water through the flood gates of Glen Canyon Dam that passed during the pre-dam era, all the problems would be solved. There are a couple of serious problems with this idea. First, without the old sediment loads, pre-dam discharges would simply scour out the remaining beaches. Second, they would also destroy existing power production capacity without benefiting any other resource—an unacceptable option.

Now, let's move on to more realistic possibilities. There are presently eight alternative flow scenarios being considered in the draft EIS (Table 1). Two of the eight are immediate throwaways: the No Action and the Maximum Power Plant Capacity alternatives.

No Action. The guidelines for preparing National Environmental Policy Act (NEPA) documents require an in-depth analysis of leaving the system as is—hence, No Action. In the case of Glen Canyon Dam and the Grand Canyon, changing nothing would result in continued decay of natural and cultural resources, defeating the reason for an EIS in the first place. Thus the No Action alternative is unlikely to be considered as an option when the final

decision is made.

Maximum Power Plant Capacity. This alternative would exacerbate existing destructive conditions. It is just like the No Action alternative, with the exception that peak discharges could reach 33,200 cfs, the power plant's maximum capacity, rather than the operating limit of 31,500 cfs.

The six remaining alternatives can be divided into two basic groups. The first, the Restricted Fluctuating Flow Alternatives, includes low, moderate, and high daily fluctuations. The second, the Steady Flow Alternatives, includes a year-round steady flow, a seasonally adjusted steady flow and a monthly steady flow.

One of the commonly held beliefs regarding the Dam and its impact on the Grand Canyon is that daily fluctuations in discharge are bad. Following this notion is the belief that if daily fluctuations are bad, then steady flows are good. As with most generalities, things are not quite so simple. All studies to date seem to indicate that some daily fluctuations can occur without directly compromising natural and cultural resources, with the possible exception of native fishes. Their reactions to changes in discharge remain unclear. Nevertheless, two camps have developed regarding future discharge patterns. The majority opinion holds that daily fluctuations with significant restrictions would be acceptable for both environmental protection and hydropower production. The other opinion maintains that fluctuating flows are unacceptable (mostly because of perceived impacts on fishes), and that steady flows are required despite the limitations they place on power generation.

The Fluctuating Flow Alternatives

High Fluctuating Flow is so similar to No Action that it accomplishes little in the way of changing the existing impacts.

Moderate Fluctuating Flow begins to control the ramp rate, which is known to affect rates of beach erosion, but it still allows peak flows to reach 31,500 cfs. During low-water years maximum flow would not exceed 22,300 cfs.

Low Fluctuating Flow restricts the low discharge to 8,000 cfs during the day and 5,000 cfs at night and the high, to 20,000 cfs. This alternative also includes a habitat maintenance spike of high water (31,500 cfs for 7-14 days) during spring of each year. The intention of this pulse of high water is to redistribute sediment within the backwaters. Ramp rates are contained within a 2,500 cfs/hr change as the river rises and no more than 1,500 cfs/

Table 1 - Operating limits of Glen Canyon Dam Environmental Impact Statement
Alternative Flow Scenarios

	No action	Maximum powerplant capacity	Restricted fluctuating flows			Steady flows		
			High	Moderate	Low	Existing monthly volume	Seasonally adjusted	Year-round
Minimum releases (cfs) ^{1,2}	1,000-3,000	1,000-3,000	3,000-5000	5,000	5,000-8,000	8,000	8,000	prorated ³
Maximum releases (cfs) ⁴	31,500	33,200	31,500	22,300 31,500	20,000 plus habitat maintenance spike ⁵	prorated	12,000	prorated ³
Allowable daily change in flow (cfs/24 hours)	30,500	32,200	15,000 to 22,000	± 45% of mean now for the month not to exceed + 6,000 Jun ± 2,500 Jul-Sept	5,000 ⁶ 6,000 or 8,000	same as moderate from Oct-May ± 2,000 Jun	2,000	2,000
Allowable scheduled ramping (cfs/hr) ⁷	Unrestricted	Unrestricted	Unrestricted up 5,000 or down 4,000	4,000 up 2,500 down	2,000 up 1,500 down	2,000 cfs/day	2,000 cfs/day between months	2,000 cfs/day

- 1 In high volume release months, the allowable daily change would require higher minimum flows (cubic feet per second (cfs)).
- 2 Releases each weekday during recreation season (Easter to Labor Day) would average not less than 8,000 cfs for the period from 8 a.m. to midnight.
- 3 For an 8.23 maf year, steady flow would be about 11,400 cfs.
- 4 Maximums represent normal or routine limits and may necessarily be exceeded during high water years.
- 5 Actual maximum 31,500. However, during minimum release years, the highest flows will be limited to 22,300.
- 6 Daily fluctuation limit of 5,000 cfs for monthly release volumes less than 600,000 acre feet, 6,000 cfs for monthly release volumes of 600,000 to 800,000 acre feet, and 8,000 cfs for monthly volumes over 800,000 acre feet.
- 7 Cubic feet per second per hour (cfs/hr).

hr as it drops. Compared to what the resources and the river running community have dealt with in the past, this is a pretty mellow river. Actually, this alternative is very similar to existing Interim Flows, and GCES scientists have demonstrated that Interim Flows have benefited most critical resources (including native fishes).

Steady Flow Alternatives

The objective of the three steady flow alternatives is to provide relatively constant flows on either a monthly, seasonal or yearly basis.

Existing Monthly Volume calls for flows to be adjusted at the beginning of each month, then remain steady until the beginning of the next month.

Seasonally Adjusted Steady Flow attempts to follow more of a "natural" hydrograph, with constant low flows in winter and higher flows in the spring and summer.

Year-round Steady Flow provides for constant releases all year, with the discharge determined in advance by what is predicted to flow into the system. For example, if 8.23 million acre feet of inflow were expected for the year, an unchanging discharge of 11,400 cfs would occur day and night, month after month.

One of the problems with the steady flow alternatives is that they depend on accurate forecasts of runoff and of the amount of storage space available in Lake Powell. However, to be perfectly honest, the main problem with all the steady flow alternatives is that they are not good for natural ecosystem processes and they destroy flexibility in the Dam's hydropower production capacity. At this time, there appear to be no environmental benefits to steady flow alternatives that cannot be achieved through one or more of the restricted fluctuating flow scenarios.

The Common Elements

Though the six alternatives described above are wildly different in their extremes, in some ways, a great victory will be won for protection of Grand Canyon resources with the selection of any one of them. How is that possible? The answer lies in provisions built into all the discharge patterns that are guaranteed to improve the condition of downstream resources. The elements common to them all are:

- Adaptive Management. This requires that from now on the system will be under continual study. If data scientifically demonstrates that the se-

lected discharge pattern compromises environmental resources, the pattern can be altered (see the article by Dave Wegner in this issue).

- **Flood Frequency Reduction Measures.** The frequency of flood releases (flows greater than 40,000 cfs) would be reduced to 1 in 100 years. This would likely be accomplished by permanently installing 4.5 foot flashboards on the dam spillways. This action is meant to provide some insurance against the kind of flood that occurred in 1983.
- **Habitat- and Beach-building Flows.** Under low fluctuating and steady flows, it has been demonstrated that backwaters, which are important fish habitat, can slowly fill with sediment. This damage can be reversed and these habitats maintained by annually releasing pulses of high water (within power plant capacity) lasting one to two weeks. It has also been suggested that once the bed of the river accumulates sufficient sediment, flows in excess of power plant capacity (as much as 45,000 cfs ?) for several days could actually re-build beaches.
- **Studies on a Multilevel Intake Structure.** Studies will continue on impacts of selectively withdrawing water from different levels in reservoir to warm the river. One of the big unknown issues is what this would do to the native fishery. It is thought to be beneficial, but the jury is out.
- **Protection of Cultural Resources.** Except for reducing strong daily fluctuations and floods, none of the alternatives can substantially influence, either positively or negatively, the archaeological sites that have been exposed by erosion since the Dam. The EIS includes provisions for stabilizing sites or recovering data if the sites cannot be saved.

One River Guide/Scientist's Preferred Alternative

I like the **Low Fluctuating Flow Alternative**. Under this flow scenario the following happens:

- 1) Sediment accumulates and long-term beach degradation stops.
- 2) Streamside vegetation stabilizes from the 20,000 cfs level up to the Old High Water Line of pre-dam flows. This means lots of emergent vegetation for nesting ducks and near-shore birds, and

increased proliferation of willow, tamarisk, arrowweed and other plants—a habitat we know to be highly productive for birds, small mammals, lizards, amphibians and insects.

- 3) The rainbow trout fishery will do as well in this alternative as in the moderate fluctuating flow or any of the steady flow alternatives. Data are insufficient to predict what will happen to the native fishery.
- 4) Cultural resources are protected as much as possible.
- 5) River runners have a steadier river with less high and low water extremes and slower rates of change.
- 6) Hydropower production flexibility is reduced, but not radically, and certainly less than in any of the steady flow alternatives.

The Dispute Goes On

The unknown future of the native fishery is the primary reason there is yet dispute within the EIS team over selection of the Preferred Alternative. The choice has narrowed to the Low Fluctuating Flow Alternative and the Seasonally Adjusted Steady Flow Alternative. The former does good things for almost every resource, including power; the latter does good things for almost every resource except power. The main argument for the Seasonally Adjusted Steady Flow regime is that it may improve the native fishery. More studies are needed to know for sure how native fishes will fare under any change, and I for one opt to allow the adaptive management process combined with the Low Fluctuating Flow Alternative to make this determination.

A Draft Environmental Impact Statement will be made available for public comment during the summer of 1993, and though that is six months away, it is not likely there will be major changes from what we know today. The ultimate decision on the future water release patterns from Glen Canyon Dam will be made by the Secretary of the Interior, and the really good news is that the Secretary is none other than our own Bruce Babbitt, a man whose leanings toward protection of Grand Canyon are well known.

When the Draft EIS hits the street, please review it and let the powers that be know your opinion. Have a good river trip.

Steve Carothers

FAA Backs Off

There has been progress towards resolving recent disputes concerning overflights issues between the National Park Service and the Federal Aviation Administration (FAA). In a letter to the FAA last September, Grand Canyon National Park Superintendent Robert Chandler expressed concern about new helicopter routes established by the FAA, and of the FAA's practice of directing air traffic into the "flight-free" zones. In a meeting held December 17th, Chandler met with FAA officials, including Jack Washington, Manager of Las Vegas Flight Standards District Office. According to Washington, the meeting resulted in agreement on 4 resolutions:

Flight Free Zones will not be penetrated to resolve overflow air traffic problems. The FAA will establish a "working group" to include representatives from the FAA, the NPS, and User Groups to develop alternative solutions.

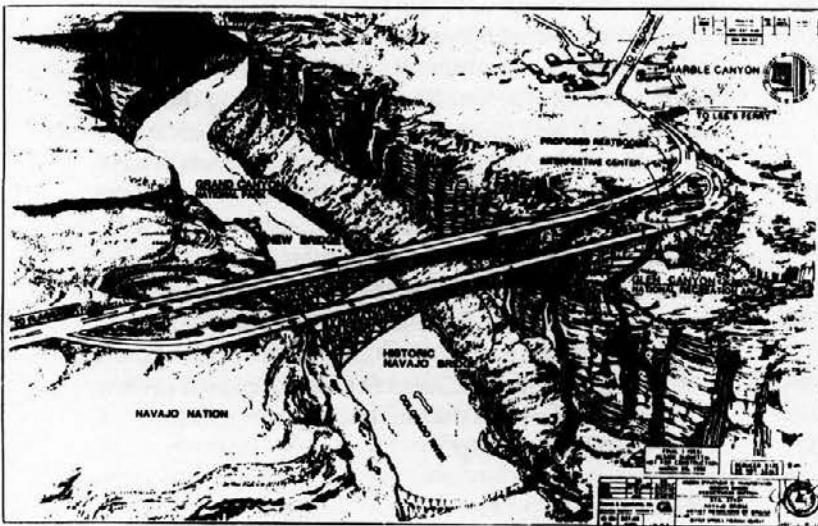
The contested helicopter routes to the North Rim expired on November 30th and will not be renewed. Further, any routes over Grand Canyon National Park to Kaibab lodge must be approved by the Superintendent. The FAA affirmed that their interests are strictly limited to aviation safety.

Southern portions of Bright Angel and Desert View Flight-Free Zones will be restored. According to Washington, these flight free areas were inadvertently deleted when the NPS recommendations were incorporated into the new FAA regulations in 1988. Appropriate amendments will be made to the regulations and new aeronautical charts will depict the

change.

The FAA will abide by the requirements of the National Parks Overflights Act of 1987 by consulting with the NPS before making any changes to routes or flight free zones. If agreement is reached to make a change, a notice will be published in the Federal Register to provide opportunity for public comment.

This agreement shows great improvement of the working relationship between the NPS and the FAA, which is vital to finding equitable solutions to overflights issues. Their cooperation is also important for the completion of two studies called for by Congress. The 1987 Overflights Act directed the NPS to conduct a study of the effectiveness of the new regulations and to submit a report within 3 years. Due to lack of funding, this report was delayed, but should be completed this year. In a recent letter to Grand Canyon River Guides, Senator John McCain (R-AZ), included a copy of an amendment he attached to an FAA reauthorization bill which was enacted prior to adjournment of the 102nd Congress. The amendment directs the Administrator of the FAA to conduct an additional study and to submit a report to Congress. The report should examine increased air traffic since 1987, forecast projected increases through 2010, and present a plan of action to manage those increases. This plan should be designed to ensure aviation safety and to meet the requirements established by the Overflights Act, "... including any measures to encourage or require use of quiet aircraft technology by commercial air tour operators."



Navajo Bridge II

Construction on Navajo II, the sequel, is supposed to begin in July. Once that happens, the river beneath it will be closed to all traffic except from 11AM till 1PM. So you'd better plan on lunch below. If, at the Ferry, you think that you can't make it - late bus, bad winds, low water, motor won't start... - the ranger can radio ahead and make an appointment for you. But there might be a considerable delay before they'll let you through. Best to try and make that two-hour window.

But really, what was wrong with the other bridge?

Making an Impact

There you are. You've just tied up at Saddle Canyon and shut down the motor, and you begin to lead your 20 folks up the heavily worn trail. Arriving in the upper valley, you sit down for a moment to let everyone catch their breath. Just ahead, you notice one of the folks walking off the trail to pee in the bushes. The drone of an airplane begins to reverberate off the walls.

Several thousand feet above, air tour passengers looking down upon the side canyon can easily distinguish the deeply etched trail, cut over the years by countless thousands of river traveler's

feet. The aircraft passes out of earshot, their temporary impact ended. The trail, however, will remain for generations. Surely, there is no visitation without impact. Who's right? Who's wrong? Neither? Both?

Although banning all human visitation would drastically reduce impact, it is obviously not a realistic option. Nor is it realistic to allow any one type of visitation to become so overwhelming that it detracts from all others. The realistic solution, as always, is balance. Enforcing reasonable restrictions on each form of visitation ultimately protects them all.

It must be conceded that a good deal of Grand Canyon's most invasive air traffic is a direct result of the boating industry. And when a crew member or passenger is injured, we rely heavily on pilots for assistance. We are bound together, and we aren't so very different.

We aren't trying to defeat the air tour industry, nor was anyone trying to defeat the river industry when use limits became a dire necessity to protect the river corridor. That action was taken none too soon, illustrated by Havasu Harbor on a busy day in June. Examples abound of other rivers where such measures weren't taken soon enough, resulting in zones of bumper-boats which make Havasu seem pristine.

In 1971 the number of Grand Canyon outfitters was frozen, as was their individual growth. Obviously the restrictions weren't detrimental to the river industry; quite the contrary. River companies increased substantially in value partly as a result of

the limits imposed upon them.

Since the 1987 Overflights act was passed, the number of flights has doubled; the number of air tour operators has more than doubled, rising from 20 to 43. Perhaps the first step to manage this rapidly expanding industry is to prohibit further influx of operators, thereby protecting current ones. With such protections in place, air tour operators need not be adversely affected by growth restrictions.

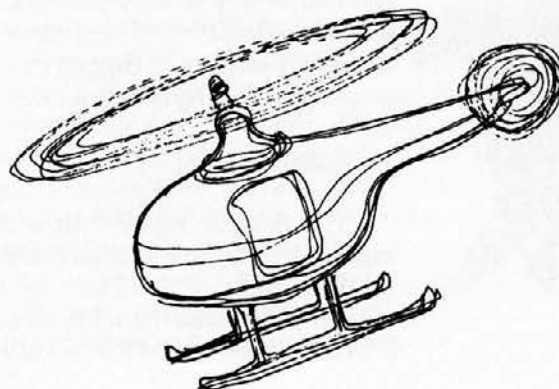
Many among the air tour industry have shown remarkable initiative by striving to reduce the impact they generate. The river industry has also made admirable effort, but all must continue to reexamine their own impacts.

It is well known that some motor rigs, due to a combination of boat design, type of motor, speed of schedule, and driving style, are louder than others. It is to our advantage, as our equipment is replaced, to evolve quieter rigs and lean towards less invasive schedules.

Rowing trips, by design, spend more time in the Canyon and more time off the river, thereby producing far greater human impact. Boatmen should stress and overstress the importance of staying on trails, peeing IN the river (not just near it), containerizing ALL solid waste, and refraining from remodeling the beach to one's immediate needs. Some boatmen denounce motor trips, then proceed to Whitmore for a passenger exchange via helicopters. Perhaps a step away from hypocrisy would be for outfitters to refrain from offering such trips during non-motor season.

The air tour industry is quick to point out such inconsistencies. Their industry is currently under fire, but we all are, right? All those who work in the Canyon impact the Canyon. Accepting that, we should all strive to keep our impacts to a minimum.

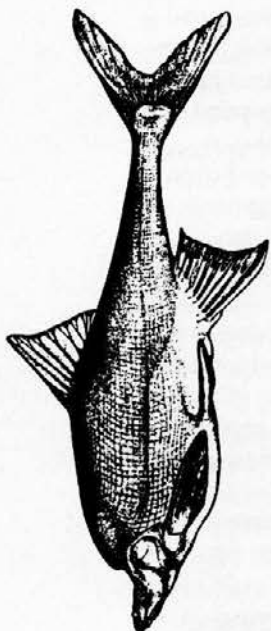
Jeri Ledbetter



A Fish With Finesse

In May of 1911, Ellsworth and Emery Kolb came across a school of fish at the mouth of the Little Colorado River (LCR), near Beamer's Cabin, and wrote:

"...The striking of their tails had caused the noise we had heard. The 'bony tail' were spawning. We had hooks and lines in our packs, and caught all we cared to use that evening.... They are otherwise known as Gila elegans, or Gila Trout, but 'bony tail' describes them very well. The Colorado is full of them; so are many other muddy streams of the Southwest. They seldom exceed 16 inches in length, and are silvery white in color. With a small flat head somewhat like a pike, the body swells behind it to a large hump. Behind the dorsal fin, which is large and strong, the body tapers down slender and round, ending with a large, strong tail..."



The Kolb's description and photographs became the first record of one of the most unique river fishes in the world—but it was not the bonytail (*Gila elegans*)! It was the humpback chub, a closely-related species that was not described until 1946 by Dr. Robert Rush Miller, who also gave it the generic name *Gila* and the specific name *cypha*, which is Greek for "hump-backed" — a fitting synonym for a fish with a prominent dorsal hump. The humpback chub has been called unusual, anomalous, bizarre—even grotesque! But the more we learn about this fascinating fish, the more we learn to appreciate its accomplishments as a species, and instead use descriptors like beautiful, graceful, and with finesse. The humpback chub is the fish species that most strikingly characterizes the graceful beauty of the whitewater canyons of the Colorado River. It is symbolic of how a seemingly harsh and rugged environment can shape such a thing of splendor.

Manifest Destiny

This first encounter with white European explorers may have spelled manifest destiny for the humpback chub, having survived 2 million years of torrential floods, drought, and debris flows in one of the muddiest and most

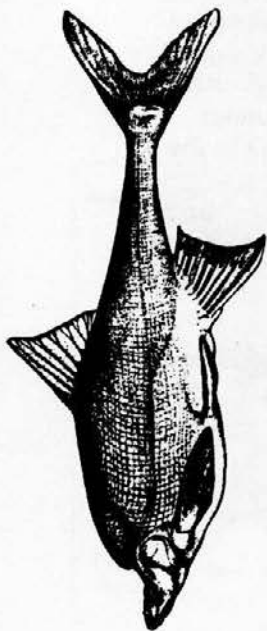
variable rivers in the world—The Colorado. Can a fish that survived all that nature has been able to concoct, survive the onslaught of modern technology and the likes of Glen Canyon Dam? No one really knows for sure, but a handful of scientists with the Glen Canyon Environmental Studies (GCES) of the Bureau of Reclamation are trying to determine how the dam and the fish can coexist. These studies began in 1982, and continue to reveal much about a species that is all but hidden from us by the deep, turbulent, most muddy waters.

Virtually nothing was known about the humpback chub in Grand Canyon before the completion of Glen Canyon Dam in 1962. Based on a few collections, it is believed that the species was widespread through Glen and Grand Canyons. It is now confined to one spawning population in the LCR, primarily because cold water releases from the dam prevent mainstem spawning. This Grand Canyon population is one of only six in existence; the others are in the upper Colorado River basin in Black Rocks, Westwater Canyon, Cataract Canyon, Desolation Canyon, and Yampa Canyon. Populations in Flaming Gorge, Lodore Canyon, Whirlpool Canyon, Split Mountain, and Debeque Canyon, to name a few, are gone.

Losses of populations and numbers caused the U.S. Fish and Wildlife Service to classify the humpback chub as "endangered" with protection from the Endangered Species Act of 1973. GCES since 1982, has added much to understanding the life history and needs of this unique fish in Grand Canyon. Presently, studies are being conducted by BIO/WEST, Arizona Game and Fish, U.S. Fish and Wildlife Service, and Arizona State University, in an effort to recommend to Bureau of Reclamation, dam operations that will enable the humpback chub and the associated ecosystem, to survive.

Soaring To Greater Depths

The humpback chub is a member of the minnow family (Cyprinidae) with a maximum size of about 18 inches and 2 1/4 pounds. A distinct, smooth, muscular hump that rises abruptly behind the head provides the fish



with a hydrodynamic stabilizer in swift currents. Although a relatively weak swimmer, this hump and the large fan-like (falcate) fins enable it to "soar" in deep roily currents, much like an eagle soars over mountain cliffs on updrafts and thermals. The humpback chub has finessed its way through 2 million years of existence in the swift whitewater regions of the Colorado River Basin, where other more powerful fish species have failed in the face of catastrophic floods, debris flows, high temperatures, and high salinity. Even the strong and more powerful Colorado squawfish—the "white salmon" of the Colorado River—is respectful of these swift canyon regions, and tends to use the slower, more gentle river areas. Not the humpback chub. All known populations, existing or extinct, occurred only in whitewater regions.

The humpback chub is one of only eight fish species native to the Colorado River in Grand Canyon. The others are the Colorado squawfish, bonytail, razorback sucker, roundtail chub, flannelmouth sucker, bluehead sucker, and speckled dace; the first three are also federally endangered, and the first five are endemic (found in no other river basin on earth!). This high level of species endemism makes the Colorado River fish community unique and important to protect. The Colorado River has undergone a long period of isolation from connection to other river basins, and so, no other river in western North America has such a high percentage of species that evolved unique to the basin.

Today the humpback chub in Grand Canyon is found primarily in an 8-mile reach of the Colorado River around the LCR inflow, as well as the lower 8 miles of the LCR in what appears to be two population components. Adults from the mainstem swim up the LCR to spawn in April and May. Each female broadcasts up to 3,000 tiny eggs, each the size of a BB, that hatch after 5 days into minute, transparent larvae less than 1/3 inch long. These young fish grow about 1 inch per month, and many move into the mainstem in late summer. Humpback chub mature at about 3 years of age and may live up to 30 years—some of the fish in the Grand Canyon were probably around before Glen Canyon Dam was built.

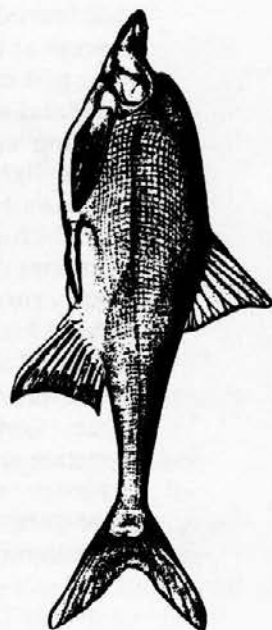
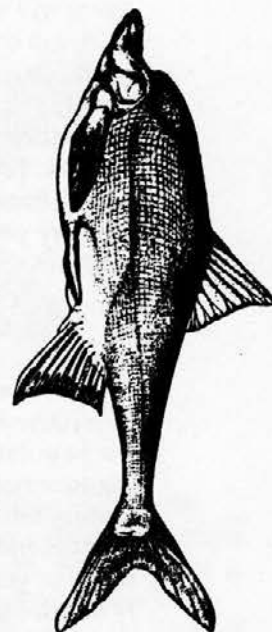
Each adult humpback chub spends much of its life in a relatively small area. Except for spawning migrations, these fish typically

move less than 1 mile, and usually feed in large eddies in mornings and evenings, while remaining in deep pools in the day. The preferred food of humpback chub in Grand Canyon appears to be freshwater shrimp (*Gammarus lacustris*) and blackflies (Simuliids), although they will eat a variety of aquatic and terrestrial insects, seeds, algae, and plant fragments. In the upper basin, they are known to gorge themselves on the annual migration of Mormon crickets as these locusts move across the Green and Yampa rivers.

Humpback chub, like most minnows, have no teeth. That is, they have none on their jaws, tongue, or on their palate, like many other fish. Instead, they have throat teeth or pharyngeal teeth, which are located on their last gill arch deep in their gullet. Humpback chub have only two rows of these teeth on each opposing arch (4 and 2 teeth on each row). These teeth face inward and function as rakers and for tearing food with the normal swallowing action of the fish. Pharyngeal teeth are replaced regularly like shark's teeth, erupting from specialized epithelial tissue instead of from the arch itself.

Why 'Study' These Fish?

GCES scientists in Grand Canyon are trying to determine how the operation of Glen Canyon Dam affects the food, habitat, reproduction, growth, and survival of the humpback chub. With no known reproduction in the mainstem, because of cold water temperatures, it is feared that young chubs hatched in the LCR are fatally temperature-shocked in the transition from 70°F in the LCR to 45°F in the mainstem. Also, since fish are cold-blooded (poikilothermic), their growth is slower in colder water. Removal of sediments in Lake Powell also removes a lot of the original food items carried by the river, and has changed the kind of food produced in the river. Another area of research is the impact of non-native fishes such as trout, channel catfish, striped bass, and other potential predators on survival of the young fish. The eight original native fishes in Grand Canyon have been overwhelmed in numbers by some 20 non-natives. In other populations, young humpback chub rely heavily on backwaters for nurseries, but in the Grand Canyon, the daily fluctuations prevent the permanence of backwaters, and could be reducing the growth



and survival of the young fish. Also, the loss of sand beaches, where most backwaters form, is also a loss in fish habitat.

The intensive studies in the mainstem Colorado River will wind down after 1993, while work in the LCR will continue through 1995. A long-term monitoring program is being designed that will mean a greatly reduced effort to follow key features of fish populations identified through the present GCES studies. For example, status and trends of fish populations may be monitored by looking at only the very young fish on an annual basis, and the adults every 3-5 years.

What Good Are They?

The security and well-being of the aquatic ecosystem in Grand Canyon is vital to maintaining the population of humpback chub and the remaining four native fish species. It is likely that this population has been isolated from the other upper basin populations for hundreds or perhaps thousands of years and could be genetically unique. Maintaining the population of humpback chub in Grand Canyon is an important component of Grand Canyon National Park. This and other native species are barometers to ecosystem health, and their decline is a sign that the relationships between the land, water, plants, and animals that took millions of years to evolve, is out of balance. Furthermore, it is clear evidence of a lack of ethics, and a realization that humankind chooses to allow extinction of those life forms which seem insignificant and do not provide immediate and direct economic benefit. Yet, it is prudent to remind ourselves that many medicines were first developed from plants and animals, that radar and sonar were first conceived from understanding bats and dolphins, and that the very concept of flight is based on the wing design of birds. The humpback chub has a highly sensitized lateral line which enables it to feel and locate underwater vibrations caused by a tiny struggling insect in a muddy surrounding, as well as tiny sensory cells on its head known as "neuromasts" that enable this fish to "smell" the unique chemical components of different waters at sensitivities that exceed our instruments. Perhaps these uncanny senses will unveil detection and navigation systems so sophisticated as to render our present technology obsolete, and make all of us realize that value is not limited to present understanding.

What To Do If You Catch One

Humpback chub are commonly caught by fish-

ermen using live bait (grasshoppers, crickets, earthworms) or artificials (small lures, flies, spinners). They readily take live bait, salmon eggs, or cheese balls used to catch catfish in deep holes, or midwater lures and surface flies used to catch trout. Although they are excellent fighters, anglers are discouraged from fishing for humpback chub. If you catch a humpback chub, Colorado squawfish, bonytail, or razorback sucker, do not remove it from the water. Gently, remove the hook and let the fish swim away. If the fish is deeply hooked, gently handle it in the water or with wet hands, and cut the fishing line even with the fish's mouth, and release it. A fish will survive with a hook in its stomach or mouth, because the hook eventually dissolves.

The penalty for possessing one of these endangered fish—or parts thereof—is a federal fine of up to \$100,000 and one year in jail, as well as a state fine, which is up to \$2,500 and one year in jail, depending on the state where the fish is caught. If you find a dead fish or parts thereof, that look like an endangered species, we ask that you place the carcass or parts in a plastic bag and freeze it, if possible, for immediate transport to a permitted biologist or one of the resource agencies (Game and Fish, National Park Service, etc.). The above penalty is not imposed under these conditions, and recovery of these specimens is appreciated. Biologists that work with these fish in Grand Canyon must possess proper permits from the U.S. Fish and Wildlife Service, Arizona Game and Fish Department, National Park Service, and the Indian Tribes, when on reservation lands.

Richard Valdez BIO/WEST

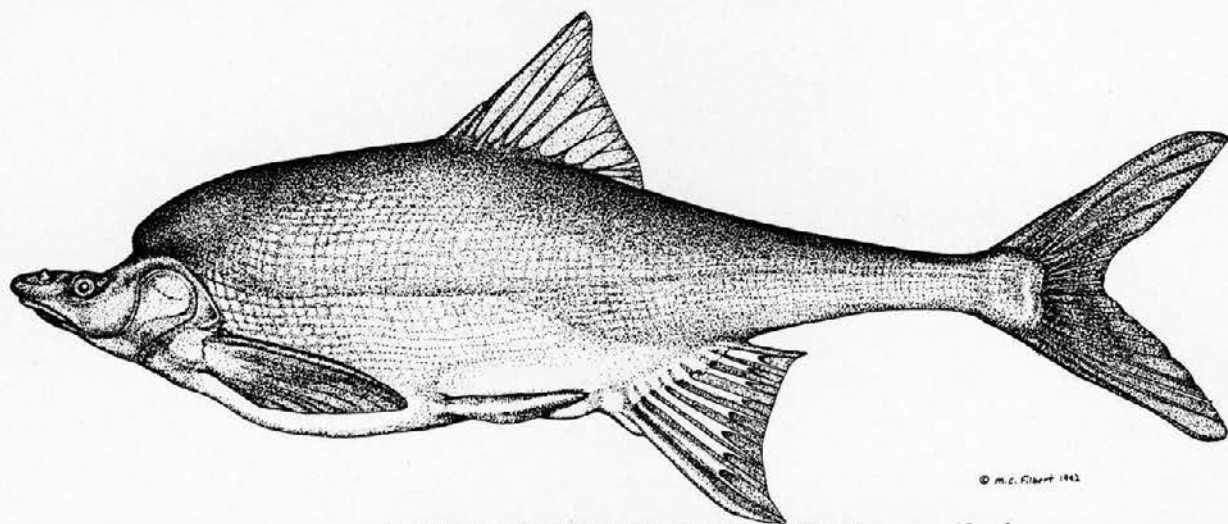
Fish and Rocks

The Native Fish insert is the second in what we hope to be a continuing series of informative pieces designed to present up to the minute and often complex material in a comprehensible form that fits in an ammo can. It is our hope that these will not only help guides to keep abreast of canyon knowledge, but aid us in interpreting this knowledge to our clients.

Extra copies of the Fish insert as well as last issue's Metamorphic insert are available from us for \$3, or 2 for \$5 postpaid. They are also available at Expeditions in Flagstaff for \$1.50. We are looking for other outlets—let us know if you know anyone else who'd like to carry them.

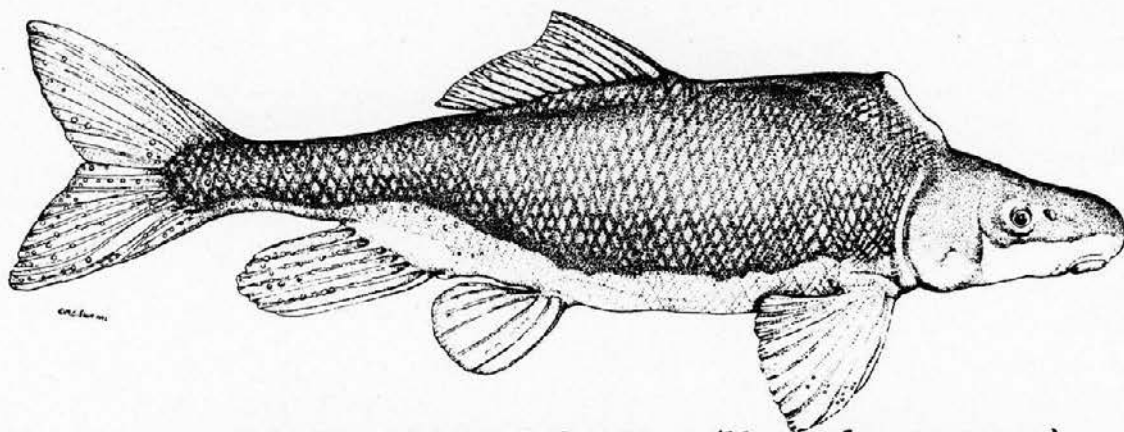
A very special thanks to Rich Valdez for writing both the chub article and the native fish insert.

NATIVE FISHES OF GRAND CANYON



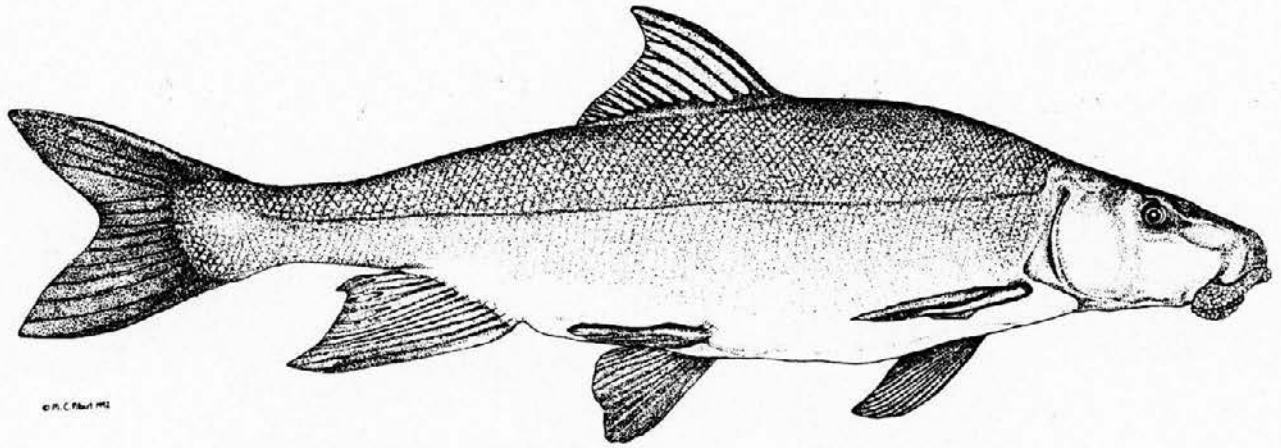
HUMPBACK CHUB (Gila cypha)

Found as one population in Grand Canyon. Characterized by an abrupt fleshy hump behind the head, that starts developing when the fish is about 6 inches long, and becomes more pronounced with age. Color is a slate gray/green back with silvery sides and a white belly. Matures at about 3 years of age and can live up to 30 years. Maximum size about 20 inches and 2 1/4 pounds. Spawning occurs in spring following peak runoff; females broadcast about 2,000 tiny sticky eggs over gravel/cobble bottom. Transparent larvae (1/3" long) hatch in 5 days and grow to about 3 inches in one year. Found in only six locations in canyon areas of the Colorado River Basin in Colorado, Utah, and Arizona (Grand Canyon, Westwater Canyon, Black Rocks, Cataract Canyon, Desolation Canyon, Yampa Canyon). Is a federally "endangered species" with major threats from flow depletion, altered water chemistry, flooded habitat from reservoirs, introduced parasites and diseases, competition and predation from introduced non-native fish, and possible hybridization with roundtail chub and bonytail due to breakdown of reproductive isolating mechanisms.



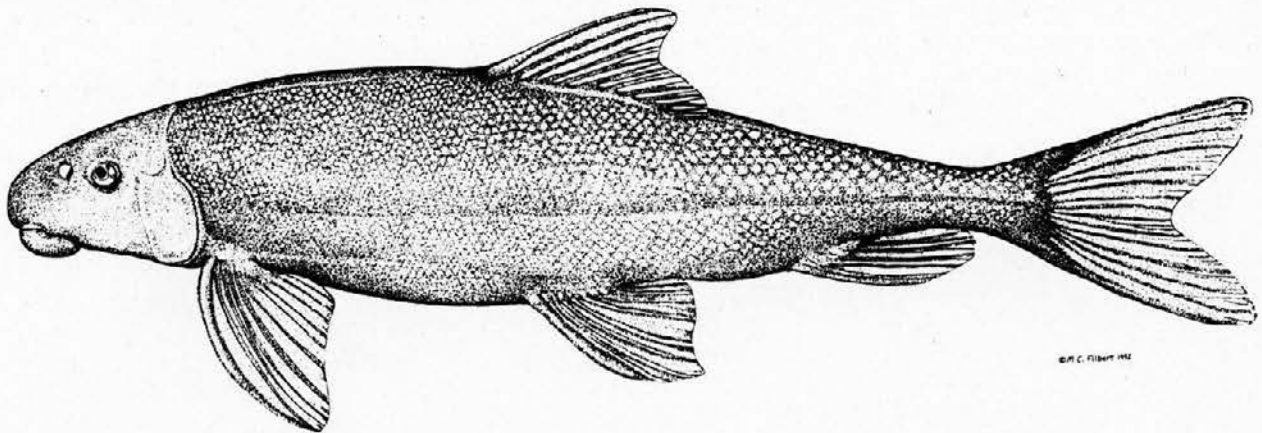
RAZORBACK SUCKER (Xyrauchen texanus)

Extremely rare in Grand Canyon. Named for the ridge-like bony keel on the back that first appears when the fish is about 6" long. Color is a dark green/brown back with olive sides and yellowish-white belly. The fleshy mouth is used to feed on insects and algae in the drift and on the river bottom. Matures at about 3 years of age and can live over 40 years. Maximum size about 3 feet and 13 pounds. Spawn in spring during peak runoff on gravel bars; females broadcast up to 100,000 tiny sticky eggs that hatch in about 5 days into transparent larvae (1/3" long) and grow to about 6 inches in one year. Found in the Colorado, Green, Yampa, White rivers of the upper basin, as well as the Gila, Salt, Verde rivers of the lower basin, with greatest numbers in Lake Mohave. Very rare in the Grand Canyon. Is a federally "endangered species" with major threats from flow depletion eliminating flooded bottoms, altered water chemistry, flooded habitat from reservoirs, introduced parasites and diseases, competition and predation from introduced non-native fish.



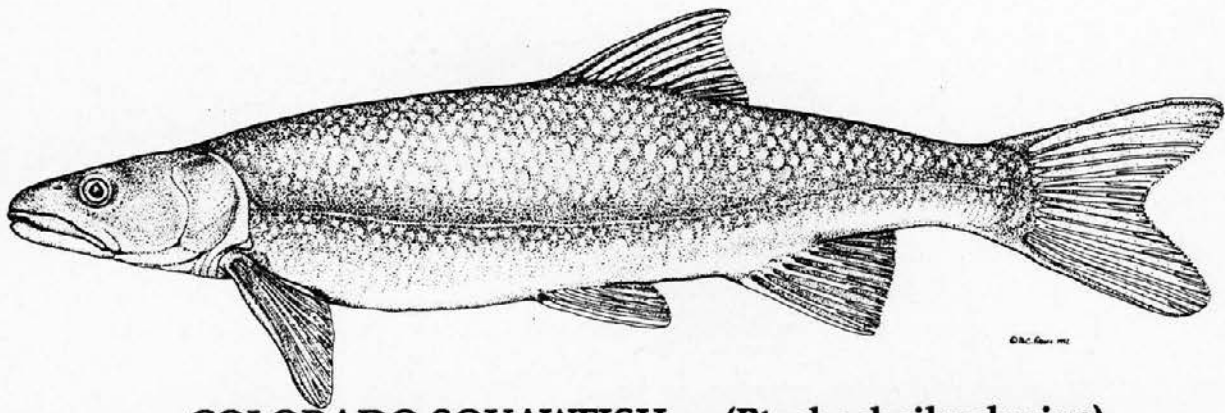
FLANNELMOUTH SUCKER (Catostomus latipinnis)

Found in small numbers in Grand Canyon. Similar in appearance to the razorback sucker but with no prominent bony keel. Color is an olivaceous back with brownish-yellow sides and a creamy belly. The fleshy mouth hangs prominently with many small protrubances used to gather insects and algae from drift and the river bottom. Matures in 3-4 years and attains a maximum size of about 20 inches and 5 pounds. Spawn in late spring over gravel bars; females broadcast sticky eggs that are fertilized by numerous males. Transparent larvae (1/3" long) hatch in about 5 days and can drift for great distances downstream to nursery backwaters. Common in some reaches of the Colorado and Green rivers and their tributaries in the upper basin, with fewer numbers in the lower basin. Common but decreasing in number in Grand Canyon. Protected by the States of Colorado, Utah, New Mexico, Arizona, California, and a federal "candidate species" - possible for consideration as an endangered or threatened species. Major threats from flow depletion, altered water chemistry, flooded habitat from reservoirs, introduced parasites and diseases, competition and predation from introduced non-native fish, and hybridization with introduced white suckers.



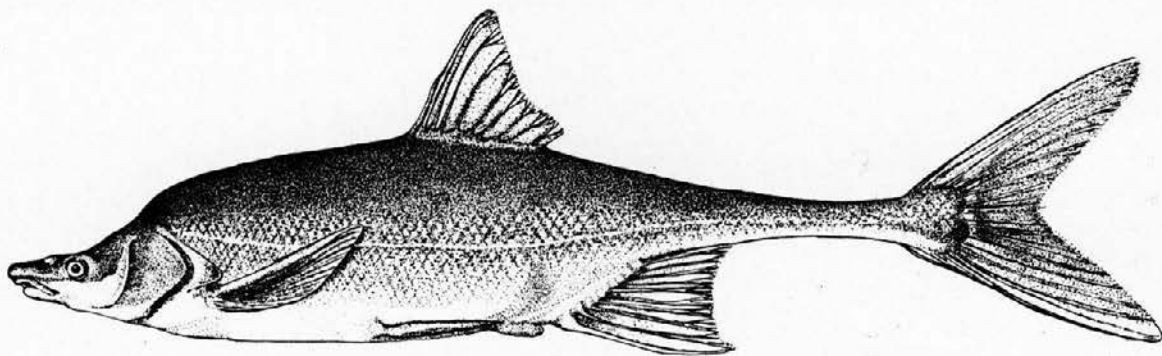
BLUEHEAD SUCKER (Catostomus discobolus)

Found in small numbers in Grand Canyon. A more slender, torpedo-shaped sucker than the flannelmouth or razorback. Has small body scales near the head that gradually increase in size toward the tail. Color is a gray/blue back fading to a whitish belly, often with a rosy band along the side of the body. The fleshy mouth has a sharp ridge or "radula" on the lower jaw that enables this fish to scrape insects, algae and diatoms directly off rocks for food. Can inhabit swift rocky areas, and can be seen in spring spawning runs in very shallow swift water (e.g., Shinumo, Kanab creeks). Matures at 3-4 years and attains a maximum size of 16 inches and 1 1/2 pounds. Females broadcast sticky eggs over gravel/cobble. Transparent larvae (1/3" long) hatch in about 5 days and can drift for great distances downstream. Common in some reaches of the Colorado and Green rivers and their tributaries in the upper basin with fewer numbers in the lower basin. Decreasing in numbers in Grand Canyon. Also found in other rivers in western North America. Protected by the States of Colorado, Utah, New Mexico, Arizona, California. Major threats from flow depletion, altered water chemistry, flooded habitat from reservoirs, introduced parasites and diseases, competition and predation from introduced non-native fish, and hybridization from introduced white suckers.



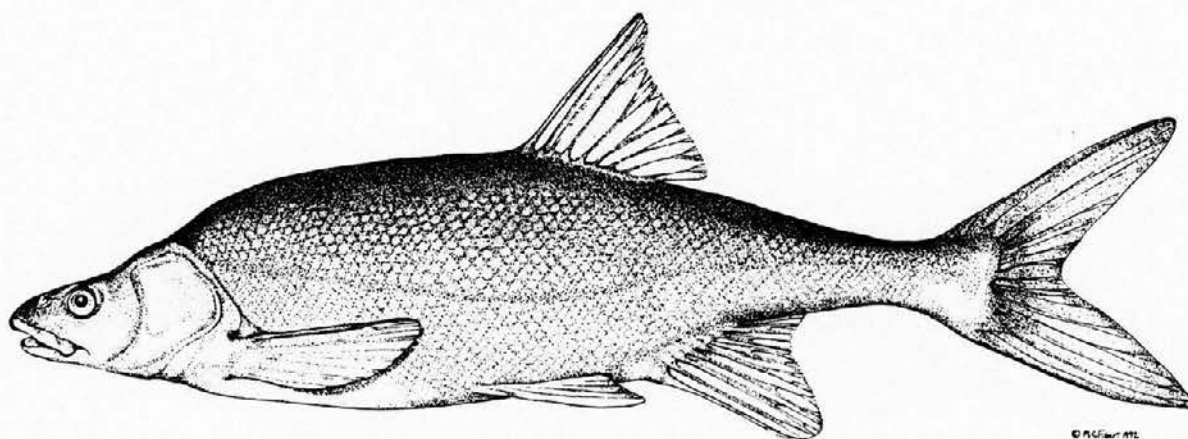
COLORADO SQUAWFISH (Ptychocheilus lucius)

Extirpated from Grand Canyon. Once the top predator of the Colorado River, known as the "white salmon of the Colorado River". Slender body with light green back, silvery sides, and white belly. Young fish often have a black diamond-shaped spot at the base of the tail. Documented length of 4 feet and weight of 30 pounds in the wild, with evidence of fish up to 6 feet long weighing 80 pounds. Largest captured recently was 3 feet long and weighed 20 pounds. The genus Ptychocheilus means "folded lip" and the species name lucius means "pike". Colorado squawfish have large lips with no teeth on jaws, tongue, or palate, but sharp jagged throat teeth (pharyngeal teeth) that rake and tear swallowed prey. They are primarily piscivorous (fish eaters), but will take insects, small mammals, and birds. Mature at 4-5 years of age, and may live to 30 years. Once inhabited the warm regions of the Colorado River and its tributaries, now limited as wild populations to the Colorado, Green, Yampa, Gunnison, White, and Dolores rivers in the upper basin, and reintroduced in some rivers of the lower basin (Verde, Salt). Females broadcast up to 75,000 tiny sticky eggs over cobble and gravel during June and July that hatch in about 5 days. Tiny larvae (1/3 inch long) drift into backwater nurseries where they remain for most of their first year of life. Young squawfish are slender, silvery, and may resemble young chubs. Colorado squawfish have a larger mouth—upper jaw extends past the center of the eye—while chubs have smaller mouths with the jaw extending only to the front of the eye. The Colorado squawfish is a "federally endangered species" because large mainstem dams have blocked migration routes, inundated habitat, and altered flow regimes. Related species include the northern squawfish (Columbia River), Sacramento squawfish (Sacramento-San Joaquin rivers), and Umpqua squawfish (Umpqua-Suislaw rivers).



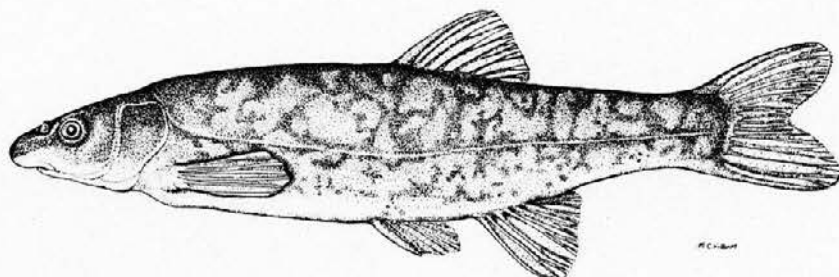
BONYTAIL (Gila elegans)

Extirpated from Grand Canyon. Characterized by a longer slender tail trunk and tail fins, slender body, and small eye. Color is a gray back with silvery sides, black diffused specks, and a white belly. Matures at about 3 years of age and can live up to 30 years. Maximum size about 24 inches and 3 pounds. Spawning occurs in late spring; females broadcast about 4,000 tiny sticky eggs over gravel/cobble bottom. Transparent larvae (1/3" long) hatch in 5 days and grow to about 3 inches in one year. This is the rarest of the Colorado River mainstem fishes. Found in small numbers in Lake Mohave, and as isolated individuals in Black Rocks, Cataract Canyon, and Desolation Canyon in upper basin. Is a federally "endangered species" with major threats from flow depletion, altered water chemistry, flooded habitat from reservoirs, introduced parasites and diseases, competition and predation from introduced non-native fish, and possible hybridization with roundtail chub and humpback chub due to breakdown of reproductive isolating mechanisms.



ROUNDTAIL CHUB (*Gila robusta*)

Extirpated from Grand Canyon. Related to the endangered humpback chub and bonytail, but not a federally endangered species. Characterized by a robust body and tail trunk. Color is a green back with silvery sides, and a white belly. Matures at about 3 years of age with life expectancy unknown. Maximum size about 18 inches and 2 pounds. Spawning occurs in late spring; females broadcast about 2,000 tiny sticky eggs over gravel/cobble bottom. Transparent larvae (1/3" long) hatch in 5 days and grow to about 3 inches in one year. Found in most tributaries of the Colorado River basin and in some mainstem areas, but rapidly decreasing in numbers. Can be found in aggregations along eddy lines feeding on drifting insects. Major threats from flow depletion, altered water chemistry, flooded habitat from reservoirs, introduced parasites and diseases, competition and predation from introduced non-native fish, and possible hybridization with humpback chub and bonytail due to breakdown of reproductive isolating mechanisms.



SPECKLED DACE (*Rhinichthys osculus*)

Common in Grand Canyon. The smallest of the mainstem Grand Canyon fishes, attaining a maximum size of about 5 inches. Body is cylindrical with a tapered head and snout. Color is variable from dusky yellow to speckled with a bright orange lateral band. The consistent characteristic is a black lateral face band running from the snout through the eye. Common in riffles, shorelines, backwaters, and tributaries in Grand Canyon. Spawn in tributaries in spring and summer. Feed on small insects and crustaceans, and their small size provides a readily available food source for predaceous fish in Grand Canyon, such as large trout and channel catfish. Speckled dace appear widespread in the Colorado River basin and throughout the western U.S., but their status and population trends are unknown.

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Produced by Grand Canyon River Guides, Inc. Additional copies available for \$3 each
or 2 for \$5, postpaid, from: GCRG, P.O. Box 1934, Flagstaff, AZ 86002. (602) 773-1075

Grand Canyon River Guides is a non-profit organization dedicated to:

- * Protecting the Grand Canyon *
- * Setting the highest standards for the river profession *
- * Providing the best possible river experience *



Protecting a Pot



The day finally begins to cool and you're off kitchen duty for the evening. It's a good chance to duck away for a quick look up the terrace above camp— never had the chance to get there and it'll feel good to stretch the legs. Up over the boulders, traverse the short talus slope and hop up over the little ledge. Wait a minute. Something not quite right catches your eye, a shape out of place, a line that doesn't fit. It's too smooth, too regular to be Mother Nature's work in this land of rough and sharp. You retrace the last few steps and peer into the darkness under the ledge. You catch your breath. It's a pot shard, a big one. No it's whole; an entire undamaged pot sitting quietly there for the past 8 centuries. Don't that beat all?

The Canyon's a big place, really big. And stumbling across a stash of pots would seem very unlikely. But it happens and has happened several times in the past few years. The knowledge of each find spreads like fire through the river community; it's an exciting thing to witness. But the excitement of the discovery leads to a classic quandary; what do I do now? Do I report the find or not?

We can keep the find a secret, or try to, and leave it where it is. But that pot will be stolen. Despite our faith in human nature, that has been the fate of a nearly every pot found in the past few years. The alternative is to report the find. Maybe our fear here is similar, that the pot will be removed from the Canyon and left to reside on some dusty backroom shelf. Removal goes against our grain. The spirit of the pot has lived in the Canyon for 800 years. It should stay there. If we felt the pot would stay in the Canyon would it be easier to report? It would for me. Good news, the Park feels the same way.

There are two good reasons to immediately report the find. 1) The Park archeologist, Jan Balsam, can gather whatever knowledge she can from the pot and it's surroundings before they are altered, and 2) it will guarantee the pot won't end up on someone's mantle. Will it end up on a Park shelf? No, says Jan, the Park wants it to stay in the Canyon as well. In the past, Park policy may have been to remove pots but Jan has brought a new sensitivity to the issue. Her intent is to return the pot to the Canyon, to re-hide it securely nearby. Sometimes the find includes a burial site as well, making it all the more important that it not be disturbed even unintentionally. Can we trust her? The answer is yes. I have personally seen her commitment.

It would be nice if it could be left in place and admired by those who visit the Canyon. Like a ruin. But the pot is decidedly different from a ruin, mainly in that it's portable. Very portable. And on the black market it can bring thousands of dollars.

History has shown that although 99.9% of us will respect the pot and neither touch nor remove it, eventually someone will. And at that point the pot and its spirit is lost to us all. The best way to protect the pot and its spirit is to report it immediately. We can learn from the find and protect the pot too. We have the same goal, Park and guides, to protect the pot. And we need each other. We're the ones that find them. The Park can interpret and re-hide them. We're a team and that's the way it should be. Protect the pot. Report it.

Tom Moody

Wanted: Pot Snatcher \$1000 Reward

As most of you know, a well documented pot was stolen from a small cave near river mile 200 a few seasons ago. There is no trail access to the site, nor is it likely that the looter came by helicopter. It was taken by a boater.

It's bad enough that it is gone but it is especially disheartening that it was taken by someone we may know, someone who found out about it through a grapevine of people who trust each other, someone who decided they were the chosen one who should have something that belongs to everyone.

It is an offense that is *extremely* illegal. It tramples the Canyon's spirit and goes entirely against our unwritten code of ethics; it violates an honor that we all wish to share.

GCRG would like to make every effort to bring the pot back into the park, to apprehend whoever took it, and to get the word out to the entire extended boating community that theft of artifacts cannot and will not be tolerated. We'll put our money where our mouth is.

In cooperation with the NPS and Silent Witness, GCRG is offering a \$1000 reward for return of the pot and apprehension of the culprit. If you have any information on this or any other theft, call Silent Witness at (602) 638-7767. You will remain anonymous.



First Aid

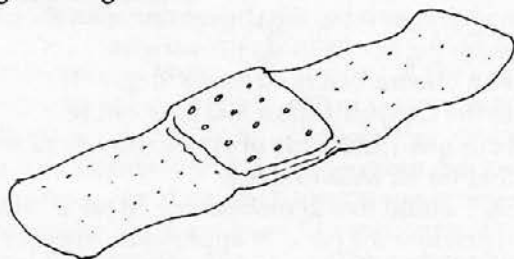
Emergency Response. Responding to Emergencies. Wilderness First Responder. Advanced First Aid. Wilderness EMT. First Response. What's the deal?

About two years ago someone at American Red Cross announced that the *Advanced First Aid* course, which had long served us well as our bottom line for guides' first aid training, was being discontinued. Two years of low grade chaos followed. Finally, after ten, maybe twenty thousand phone calls and countless hours of frustration on the part of us, the NPS, the Red Cross, Patty Ellwanger and more, we see the light at the end of the tunnel. Here's the deal:

Starting some time this spring or summer, ARC will begin offering, on a *national* basis, a new 43-hour course called *Emergency Response*. From that time forward, *Emergency Response* will be the minimum qualification for guides in Grand Canyon.

It's what we do *until* then that's tricky. Several states, including Utah and Arizona, have agreed to offer *Advanced First Aid* until *Emergency Response* comes on line. If you now hold an *Advanced First Aid* card or get certified with an approved *Advanced First Aid* course this spring, that card will be valid until the expiration date on the card.

If you took last year's *Responding to Emergencies* course with Patty Ellwanger or Dan Dierker, your card will be valid for three years. These were the last *Responding to Emergencies* courses that will be recognized by the Park. That's it. No more *Responding to Emergencies*.



Enough for the bottom line. What's exciting is that the Wilderness First Responder course, which by all accounts is *the* course for boatmen, with the *most* usable and valuable information, has become easier to find in Northern Arizona. If you can possibly swing it, sign up for one of these. They are long; they are pricy; they are the best.

We'd like to commend all the outfitters who have sponsored this course, paid for guides' training or are offering a wage incentive for boatmen maintaining this higher level of qualification.

Woofers

The screams came from the tree-line a hundred yards away, and nothing about them was funny. Help. Somebody please help. Help Kevin. He's bleeding to death.

Gloeckler looked back over his shoulder at me. We were trudging through a snowy field, carrying a bunch of equipment piled on a backboard. The tree-line seemed light years away. Screw it, I said. Let's go. I dropped my end of the backboard and started to run.

Later, in a nice warm classroom, Paul Nicolazzo showed us a videotape of this fool who had let ASR get the best of him and was running toward the scene of an accident. ASR is short for Autonomic Stress Reaction, a condition which often includes mass amounts of adrenaline and is pretty much a given any time you have a serious accident. Victims exhibit it. Bystanders get it. Rescuers do too.

Nicolazzo was instructing a Wilderness First Responder Course, originally developed for Outward Bound by a group called Wilderness Medical Associates. And Nicolazzo was hot.

The fool on videotape was me. "This is exactly how you get roped in by an hysterical person and lose control of an accident scene," Nicolazzo explained. He drew a neat little zig-zag diagram which showed two possible responses: what happens when you run to them, or when you make the hysterical bystander come to you.

This was a 64 hour course, (but really more like 85). We started Saturday and basically never quit until the next Friday. I've had an EMT, etc. This was ten times better. It was built just for us.

Mornings we had class. Afternoons we practiced. Everyday the simulations got more real. Harder. Before the week was out we'd been exposed to or confronted by more pertinent stuff than you could shake a stick at. Like: a systematic response pattern for all injuries; spine injury- how and when to rule it out; dislocations- how to reduce them; CPR- the real story; death. Vital signs- how and why do you take them (really)? The only kind of shock to worry about. The right way to splint people. What serious problems always accompany near drowning? Etc. They made us give ourselves shots so we wouldn't hesitate too long if anaphylaxis really showed up. They strapped us onto backboards so we'd know what that felt like. Etc.

Paul Nicolazzo. Wilderness Medical Associates. Whatever it costs, do it. It's worth it.

Lew Steiger

Photos Still Hyding

Don't forget to take your last issue of The News downstream with you this season. We still want to find out where the Hydes' shutter last clicked. So keep you eyes open and send us a photo when you spot those spots.

Oral History

Uh-oh. Here we go again. Off on another mission. Same type impetus as the Grand Canyon Protection Act, really. Something important is slipping away and if we don't catch hold of it now, it's out of here. So the River Runner's Oral History Project is up and running. Sort of. It's a joint endeavor of GCRG and the Special Collections branch of NAU's Cline Library. We've got the equipment and manpower. We have a good long term home for what we collect. The saga is out there.

What saga?

Our own. Our best stories. Our worst wrecks. How we got where we are today. What we've learned along the way. So far we've talked to Georgie and Martin Litton, P.T. Reilly and Don Harris. The following interview with Martin is the first tangible fruit of the project. If we can keep the project rolling, over the next few years we'd like to visit with somewhere between 30 and 90 more people.

Why? Somebody might appreciate it someday. Our grandkids maybe. (ha!) Ok, whoever they get to do this job after we're all dead and gone.

What's the catch? It costs money. You don't just do them and put them in the closet. To be accessible, they have to get cleaned up and filed safe in the library. By the time the average 2-hour interview is researched, taped, transcribed, edited, reviewed and archived... somebody has spent between four and five hundred bucks, either in real money or donated hours.

Since the regular GCRG \$ is supposed to be for political ends or works that directly affect the Canyon, we don't feel it's right to tap into any of that for this project.

Bottom line? Fifteen grand (one new car) sent to the GCRG Oral History Fund saves forever the bits and pieces of about 30 people. Of course, we'll take anything. Five bucks. Five thousand. A quarter. Send it in. Specify *Oral History Fund* on your donation. Thanks.

First Aid Schedule

Begins	City	Contact	Phone
Wilderness First Responder (\$365)			
3/13	Flagstaff	Dave Wescott	602 523-2732
American Red Cross			
3/14	Salt Lake	Dave Mackay	801 261-1789
3/27	Flagstaff	Dierker/Melville *	602 774-4274
4/17	Page	Jody Sanderson	602 645-9427
4/17	Moab	Cnylnlds Field Inst.	801 259-7750
4/21	Verm. Cliffs	Patty Ellwanger	602 355-2259

* \$40 for 1st Aid 3/27-3/30, \$15 for CPR 3/30, \$50 for both. You must send \$ 10 dep. to GCRG to sign up.

GRAND CANYON

by Parker J. Palmer

*They say the layered earth rose up
Ancient rock leviathan
Trailing ages in its wake
Lifting earthness toward the sun
And coursing water cut the rock away
To leave these many-storied walls
Expose' of ages gone
Around this breathless emptiness
More wondrous far than earth had ever known*

*My life has risen layered too
Each day, each year in turn has left
Its fossil life and sediments
Evidence of lived and un-lived hours
The tedium, the anguish, yes the joy
That some heart-deep vitality
Keeps pressing upward toward the day I die*

*And Spirit cuts like water through it all
Carving out this emptiness
So inner eye can see
The soaring height of canyon walls within
Walls whose very color, texture, form
Redeem in beauty all my life has been
The darkness and the light, the false, the true
While deep below the living waters run
Cutting deeper through my parts
To resurrect my gravebound heart*

Making, always making, all things new

"My God, It's Waltenberg!"

We caught him red-handed at the dory warehouse in Flagstaff, in the fall. He was sitting in the Ootsa Lake sponging his hatches out, just off a Grand Canyon trip. 75 and still doing it. His third trip in two years

"Golden trip," he said, and Bronco laughed.

"You should've seen this guy pulling in," (Bronco had been the trip leader and now he demonstrated in pantomime as he spoke.) "Here's Martin, he rows into shore and throws his sand stake and the stern line over his shoulder, kinda aims them at the nearest passenger... 'Here, tie me up!' he says."

Martin Litton grunted. Scowled at Bronco for passing secrets. Georgie Clark did it until she was 82, but she didn't have to jump off and tie her boat up either. She didn't have knee surgery pending and her boat was a little more stable, too. Last year Martin got sucked left at Bedrock. He flipped after he got over there and it wasn't pretty when he came out the other side. Took a lot of C-clamps and duct tape to fix that one. But here he comes again, back for more. Indefatigable. Don't think he doesn't know what a golden trip is, though, or that it doesn't mean something to get through clean, no matter how many times you've pulled it off.

They're tippy little boats and they make a bad sound when you hit a rock. Only a certain kind of person...touched, would think of starting a company that ran a fleet of them.

Wooden dories named after lost places. Who but a crazy man would dream up such a thing?

We sat Martin down and cranked up the old tape recorder for about 2 hours, trying to find out. It wasn't enough. Nowhere near enough time to do more than grab a faint sketch of one man's part in a very big story.

He grew up in the Depression. First saw the Grand Canyon in 1939, when he was 22 years old. Became a glider pilot in WWII, landing troops behind enemy lines in the thick of the European invasions. Hiked in at Toroweap in '51 and took photos of the Rigg brothers lining Lava Falls on a Mexican Hat trip. Met the Hatch boys up in Utah around '52, when they were teenagers learning to be guides. Wrote articles on Dinosaur for the

LA Times and got enlisted by the Sierra Club because of what he said, the photos he'd taken. He ran the Grand in wooden boats with Pat Reilly in '55.

According to David Brower, Martin Litton saved the Grand Canyon. Turned the Sierra Club board of directors around at a critical moment in the Marble Canyon Dam fight.

"Oh, that. Well, I don't consider that to be the thing that saved the Grand Canyon," Martin said. "But I know the thing you're talking about..."

"The problem was, the Club figured it would lose, you see. The government had all the high-powered lawyers on its side, and all the politicians... the dams were a foregone conclusion. They were calling it the Marble Canyon Dam. They didn't want people to realize it was going to be in the Grand Canyon, and they could easily confuse people across the nation by saying Marble Canyon Dam and Bridge Canyon Dam instead.

"The Sierra Club wanted to look strong and tough, and in control. So the President stood up before the board of directors, before the whole Club for that matter, all who were there, and he

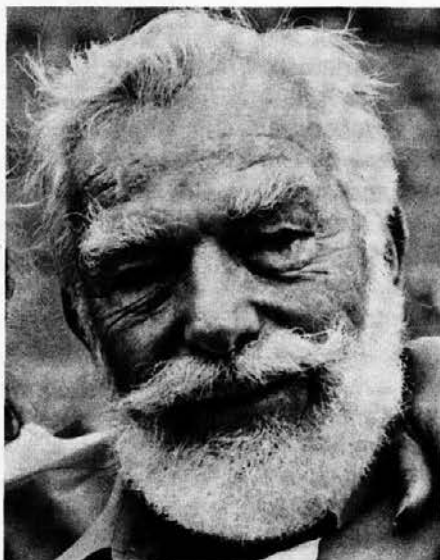
said 'The Club must be adamant. We must insist there be elevators in the dam so that tourists can get to the bottom for the wonderful trout fishing that will be created there.

"Well, that sent me into a fit of rage. I stood up and, expressed myself and... Brower gives me credit for causing the vote to go not for elevators but against any and all dams in the Grand Canyon. But he's just being generous, really."

"What did you say that changed their minds?"

"I suppose I acted horrified that the Sierra Club could pretend to be on the side of saving the earth and still acquiesce in the damming of the Grand Canyon... as it had in Glen Canyon, without really knowing what it was up to there. But here it had a chance to know. It knew what was going to come and was avoiding the issue.

"It was much the same with the SST when that



Martin Litton

D. Bremner

was under consideration: that it would be built and all our airlines would be SST's. I knew we didn't want an SST and yet the board of directors squabbled over whether it would fly over the wilderness or over the cities. I said Why don't we say what we mean and say it shouldn't be here at all? We don't want it. Vote against it. We can't always prevail but at least we don't have to take the compromise position to start with.' So finally after hemming and hawking around about it, the board voted that no SST be built in the U.S. and none ever was. I had a terrible time with John Oakes— one of the owners of the New York Times —he was on the board then. He said 'We'd look ridiculous if we said no SST, because we all know it's coming. Why do we want to be on the losing side all the time?' I said 'We don't want it to come, do we?' He said 'Well, no.' I said 'Well, you'd better vote with me.' He said 'Oh, I couldn't do that.' But when the vote came, he did."

Litton is a complicated man. Irascible, opinionated, irrepressible. "They were very one-sided," he says of his articles on Dinosaur which caught the Sierra Club's eye in the first place. "That is, they told the RIGHT side."

Asked "Why use dories?" He says, "Anyone who looks at a dory and has to ask why... will never understand." Then he rambles for twenty minutes non-stop about their virtues, never once touching on their unique disadvantage (which comes to mind every time you hit a rock in one). He was against motors in the '70's and according to one of his original boatmen, no one on a dory trip was allowed to bail in sight of a motor trip. Everybody had to sit still and smile till the motors went by, even if they sat in water up to their belly buttons.

He is not a saint. Rumor has it he's been known to take a drink every now and then; known to scare people half to death barnstorming around in his airplane; known to admire a beautiful woman or two. Rumor has it that he was not the greatest small businessman who ever lived, or the most organized.

But something about him is special, almost larger than life. And sitting in a room with him, asking him to relive the old battles, you can feel that.

He's right about the dories of course. Most boatmen who see them don't have to ask why.

Litton conceived them after rowing an open drift boat on the McKenzie River. He called Pat Reilly in '62.

"Let's go run the Grand."

"We don't have any boats," Reilly said. (He'd abandoned his in disgust during the high water years of the late 50's.)

"Oh yes we do," Martin said, and they ordered hulls

from Oregon. Which, once they got them decked over, became the first dories to run the Grand Canyon. One of them (Reilly's) resides at the South Rim today.

Slowly the boats evolved. Reilly packed it in eventually but Litton kept going. His fleet matured and grew, and finally each boat began to take on her own special identity.

"At first they were named after various things. Pat Reilly had one named after his wife Suzie and I had one named after the place I came from and so forth, but very shortly after I acquired the whole dory thing it occurred to me we weren't even noticing the places we were despoiling. So I thought: people ought to be reminded of what we have injured on this earth and how we have hurt it unnecessarily. We shouldn't be able to just walk away and think there's something else waiting. So those places we've spoiled or destroyed seemed appropriate names for boats, and also places that we see going, going, not quite gone. We need to be reminded of them too. Lake Tahoe, for example. It's really beyond repair yet people still think it's beautiful and want to go there. We ought to be reminding them that it's not what it was. Other places that are hurt badly but are still worth a fight... the dories should be, I felt, used to help, to remind people we've got to get to work on this. Mono Lake is an example of that. We had dories named for places in other parts of the world, not just our own country. Other places are down the tubes too."

"So was that why you really started the company?"

"Oh, I never intended to be a commercial outfitter. I had a job I thought I'd probably end up getting my gold watch from. I was senior editor at Sunset Magazine, finally. Which was a really pointless place for me to be, but it was comfortable. It wasn't helping the world but on the other hand I could use the medium of Sunset— and the access it gave me to things and places—to do the things I thought I should do. Like trying to get a Redwood National Park and all that. I just... was running the river for fun, for pleasure. But more people, more friends wanted to go and sometimes there were 3 or 4 trips a year and I could only go on one or two of them. So my oldest son or Francois Leydet would lead trips. Word of mouth spread and after awhile it wasn't even friends anymore. Eventually people I didn't even know were coming and I thought: well we've got to start getting people to pay for the cost of these trips or we'll be in the poorhouse. So I began to set a price on it. It kind of crept up on me without

my realizing it was happening. But it did, and in late 1968 I was having somewhat of a feud with the management at Sunset and one day I said 'That does it. I quit.' And walked out. Threw away my security blanket and what was left was the Dories. And, uh, it just blossomed and grew. I didn't do much to cause that, but... that became the main thing that we did."

"How was that better for the world than editing Sunset?"

"I don't know what impels one to want to show people the Grand Canyon... to help them see enough so they could care more, I suppose. Have them on that river. Let them feel its life. The way it stirs and rumbles and moves you along at its own pace. It has tremendous force and appeal. It's not just a physical force but... it has an appeal about it that... I can't describe. But getting people on that river means they can understand it, and that was part of the motive. Part of it was that I liked to be there. And people who were becoming my friends liked to be there, and it's hard for me to say no. I don't have any willpower that way. Maybe I didn't want to say no."

You have to hear Litton talk to really appreciate him. His voice is warm and gravelly, mellifluous. He is a world class charmer and in light of all he's seen and been and done, it's nice to realize he's mortal too. It wasn't a grandly inspired plan or a vision from God he's been operating under. He just got sucked into this thing like the rest of us. Couldn't say no. And the finer moments? For him too, they just... happened along the way.

The tape rolled on. There came a point in time where the interviewer began to panic. Litton- warts and all - was something all right, and the history of the dories was too, but we were just blasting by the bulk of it at warp speed. "Hit the high spots," Karen Underhill (the NAU archivist) had said. "Go for the most important things. Don't assume you'll get another chance." But what were those? Words of wisdom? Pointers on how to deal with boating in the 90's?

He has changed his mind about motors. Worked against them for many years but now realizes if you're going to see the numbers the Park wants down there, you have to have them.

"If those same numbers are going at the pace of an ordinary rowing trip, it means crowding. If

people don't want to spend a lot of time there, let them get in and get out. Leave more of the Canyon for those who prefer to stay longer."

"How are we doing otherwise?"

"Well, trips seem to have gone from the simple camping trip to the cruise-ship mentality: how much stuff can you take with you from civilization and have it there all the time? All these things are appreciated by the guests but on the other hand I keep thinking maybe they'd appreciate more having their trip cost cut in two. It's hard for people to afford these trips and the cheaper you can make them, the better... given safety and nourishment and all that. Letting nature be the main focus rather than how well you ate, or how much this and that you had along the way. Maybe to bring these points home it would be interesting for people, no matter how long their trip is, to

have one John Wesley Powell day. On which we assume that at that point we have just what Powell had: a very little bit of wormy bacon and flour that's been reduced to gruel... a few dried apples and all the coffee they can drink. Really the most important thing is the majesty of the Canyon. And what it does to people's lives to be away from their normal routines for awhile. Even a short while."

One hears this comment and has to wonder how much Martin really knows about normal routines, or the good it might do to get away from them. The early days on the river were anything BUT routine. They never ran Lava Falls at first- didn't dream of it. One party (not a trip Martin was on) gave up trying to line it at a particularly bad stage and just let their boats go. Hiked out and hitched a ride around to the lake to pick them up. They found one boat still floating and Georgie towed another one out upside down. All the hatches had blown off it and the cameras were gone and people on the trip thought Georgie had stolen them. "Ridiculous," Martin said. He'd flown them around looking for the one Georgie didn't tow, anyway.

When Martin finally got around to running Lava, plan A was to drop straight over the ledge. (Who knew? Rumor has it that Martin found the slot completely by accident one time. Got out there and wasn't quite sure where to go and just... slipped through.)

One particularly bad day dawned at Crystal shortly after it was formed in '66.



"We got there with four dories and one old basket boat raft and it looked bad. I thought I could see the way to go but I didn't want to damage boats if I could help it, and I also didn't want others to damage boats and then feel bad about it... so I told them I would take all the boats through.

"Well I took the first boat and went into the big hole, went up on the crest and turned over. And the boat went upside down through the rock garden, oh, kind of pushing me along as it went. And ripping its decks off. And its bow. And its stern. And everything. Tearing itself up generally and the gear kind of oozing out through all the open places that were torn out. Anyway it ended up down there and I ended up with it. Way down at the bottom of the rapid. So I couldn't right it and I just tied it up there and went back to get another one. Flipped the same way and this time the boat drifted left over to the sheer wall near the bottom. Its decks were all ripped up too. Bow and stern torn to pieces and I couldn't get it back across the river so I tied it there to some little chip of rock or something. Then I swam back across the river and headed up to get the third boat. Then a fellow named Ned Andrews, a boatman with us, wanted to accompany me. Now that's really crazy. Saw two boats go over and wanted to ride in the third one. Thought maybe he could help. So he got in the boat and we went down and turned over the same way... there we are, two of us swimming instead of just one. But we got down and tied the boat up and went back and I was ready to take the fourth boat but before I got up there Curtis Chang got in and took it through and flipped the same way I had. So we had four upside down boats all wrecked down there. And then Charlie Stern took the raft through and he flipped that and he was down clear to Tuna Rapid before he got ashore."

Martin laughs. "So we got down to Bass believe it or not that night by some miracle, I don't know how. I guess we still had oarlocks. And it was dark. I landed first, went as fast as I could. So I grab a flashlight and run up along the little cliffs there above Bass camp trying to beckon the guys in because I wasn't sure they knew where they were or that they could find their way in. I'm trying to wave the flashlight two hundred yards upstream from the camp and still hope they'll make it in at the camp.

"So that was a pretty wild night. And we spent a couple of days patching boats. Something you don't want to repeat. I mean, it's worth the effort to run Crystal right.

"Of course a lot of people don't remember that

the year Crystal was formed so was House Rock. House Rock used to be just a little tiddly sort of thing until that fan pushed it all over on the left side, same as Crystal, right up against those cliffs. You never had any trouble. It was a straight shot... so that was a big year for... that rain fell, what? 15 inches in some few hours up on the plateau. Tore out everything along Bright Angel Creek, too. That was a big year... 1966."

"When you looked over the edge that first time back in the 30's, did you ever think you'd stay this long down there?"

"It never occurred to me I'd go on the river. Nobody was going then. There had been trips, but they were considered very special expeditions. You know, heroic kinds of things. You might as well go to the North Pole or something."

"Well, where do we go anymore? Are we running out of space?"

"In the world?"

"Yeah."

"We have. We're due for the lemming effect. We're halfway in it now. There get to be so many of these animals and finally they can't stand it anymore- they run off a cliff and commit suicide. ... I don't think we can stand each other."

"Well... where does the Grand Canyon fit now, then? In the 90's?"



"Many people... make quite a thing of how the Grand Canyon experience, going down the river, has changed their lives. And I don't just mean the people who got married as a result of

a river trip or swapped mates or whatever they did- but how the experience has somehow opened their eyes to something bigger and greater in life. It's made their lives... better. They understand... the whole universe better because of having been in the Grand Canyon and isolated from other things. Having time to think. A river trip has sometimes, it's been called 'The Voyage of Life.' The famous series of paintings from the National Gallery. Oh, who painted them? It's about a voyage down this river of life. It begins with a little baby in a little floating cockleshell, shaped like

a swan, you know, floating into this canyon and then the paintings go on and the party ages. You see the roughness of life by the rapids in the river and so forth. The obstacles and all that. And that's where you have a young man able to grip all these things and master them, the problems of life. It's all related to a voyage down a river. And then you see suddenly the calm and the sun shining through the clouds and this old, old man comes out of this canyon onto the calm water. And it's amazing how like a Grand Canyon trip that is. Wish I could remember the name of the painter. Thomas... Thomas Cole. That's it. C. O. L. E. It's a wonderful American series: The Voyage of Life. We put phony names on these paintings... how did we start it? Well, something about leaving Lee's Ferry... I can't remember. But then in the rough part, where it shows the tempest and the great rushing waves and all that, we titled that painting 'My God, it's Waltenberg!' and the last one, the voyage is ending in peace and serenity. We called that 'Lake Mead at Last.' I know this is all silly, but you get silly. On the other hand there's something very fine and ennobling and serious about the whole experience. It is a microcosm of life when you go down that river. You start, a kind of a lighthearted effect and the challenge isn't so great at the beginning and then it develops and develops and you find yourself able to cope with it and finally you've done it. You've done the whole thing."

There was a way that Martin said the last part. You knew he wasn't talking about just the river. It got to us, and the silence stretched out for quite awhile.

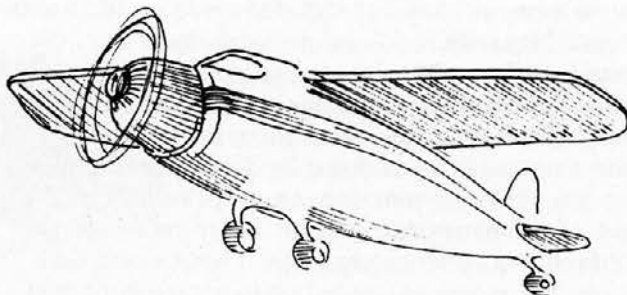
"You better tell one more," Bronco said finally. "Tell that Waltenberg story."

"Oh, that," Martin said. "Well, Pat Reilly used to sit in his boat... of course in the old days you didn't wear the life jacket until you were coming to a rapid. You waited until you had some reason to put the thing on. And Reilly would sit there in the boat ahead of me and when he'd come to a rapid he would stand up and put his life jacket on and then I'd get up and put my life jacket on too. Everybody else would. So this day he was sitting in the boat paying no attention to the river, just making notes. He kept long extensive notes about every little thing. What time he brushed his teeth, you know, all these things... what happened that day at mile this and mile that, what he observed, what was there, what he hadn't observed the last time and so forth, so on. We got to going down the river this day and the water was nice and calm and I never did anything unless there was some indication from him... and all

of sudden in front of us he jumped up! Grabbed his life jacket and put it on! He was yelling 'My God! It's Waltenberg!' We were coming to Waltenberg Rapid and he hadn't noticed it, you see..."

The interview wound down. Finally we were out of gas. Frustrated at all we'd missed. "We'll do it again, ok? Next time get it right. Start at the beginning, maybe go through the whole thing chronologically."

"Sure," Martin said. "Call me."



A handful of us gave him a lift to his plane the next morning because Coby Jordan had cautioned us not to miss the experience. We got to the airport and sure enough, she was a beauty. A 1949 Cessna 195 tail-dragger. Pure Humphrey Bogart: Enormous radial engine, little bitty windshield, clean glorious all-American lines, just like the old cars from that time too. Classic. The country's finest hour. Martin fired her up and blue smoke belched and billowed out of the engine. A lot of smoke. It streamed past the fuselage and out across the airfield while the engine caught and spluttered and finally gathered itself into a roar. (Martin had warned us about this in advance. Something to do with oil dripping whenever she sat idle.) We stood off to the side and watched the old girl warm up and settle down, all choked up over something we couldn't really describe. Finally the smoke thinned a bit and Martin throttled back long enough to toss a comic aside out the window at us.

"Ah yes! She roars to life with a burst of fire and glory!"

He squinted at the horizon, then turned back toward us.

"Those were the days," he said. "When men were men, and women were glad of it!"

Vroooooom. He was back on the throttle and moving once again, off down the runway.

Lew Steiger

Yo, Leroy!

Dear Leroy:

Wuddyathink? Are too many too few? I dunno anymore. Back when, I thought YES; I thought a couple for the road were okay. Livin' was easy then, right? A few trips, a few beers. Whatever...

But lately I have got to thinking maybe it was the other way around. Best I recall, too many wasn't near enough. Hell, took me a sixer to get from 44 Mile all the way down to 47 Mile. And I had a motor, which was, most of the time, bust. Maybe I just couldn't start the thing. Who cared? Hike...? Where?! I'd have rather sat on the boat and drank beer. Listen: by 47 Mile I was ready to party like the big dogs, like all the big dogs. Yeah!!

...Until I fell off the boat. Dead sloppy drunk I was that time. Best part was that nobody saw it because they were off hiking, doing just what they wanted to do. Me too. When they got back everybody saw me passed out in the pilot's box, my face cut to ribbons, blood all over. Somebody asked my swamper how come I was sleeping and my man just said, "He's gotta...look at his face."

A couple weeks later I sorta came to my senses. I decided to quit. But I couldn't figure if I should quit rafting—or—drinking.

Then, a few days after that, I woke up at One hundred and Twenty Mile. It felt—and by God it acted like—the first day of Fall, and I knew it straightaway. I

knew it because my whole deal was different, my whole world was different, way different. I was out of beer!

I also realized, somehow spontaneously right then and there, during that beautiful morning moment, that I didn't need the stuff anymore. No way! I didn't need it to make good runs or to keep me happy or, even, to loosen me up. I was loose enough already, you'll recall. What I needed was to tighten-

up and be loose about it, not the opposite.

I've been clean ever since. Yeah, sure, every once in a while I'll mosey down to Joe's Place and let em' know that I'm gonna quit rafting but everybody knows I'm just blowin' smoke anyway....

So to answer your question: Too much ain't near enough. Never has been, never will be. Of course not. But it will suffice, I suppose, until you run out.

Keep 'er straight, Pard.

—Bubba



PS: Leroy, you asked me an honest question. I gave you an honest answer. Sorry if I got hard on you; I was trying my best to lend you my understanding of boozing out there on the flood.

Deep down, I've got two sides to me on it. I'm not entirely convinced its "wrong" to have a beer on the river, like when you're stretching the boundaries, when you and your buds are alive below crystal or something. Suckin' down a cold one is part of the challenge, the job, the persona projected. It comes with the territory.

But its hard to make a solid decision with a bottle in your hand. I know that. You know that. And, because we both know that, I need to ask: Is it right? Is it proper professional behavior to drink while you're driving, whatever it is you're driving, on the Colorado River? How many people on the boat? Four? Six? Sixteen? Twenty? Does it matter? Should you, Leroy, be consuming alcohol when people are sitting on the boat you are driving? That is the guts of it. It is a sincere, vexed and knotty question. It deserves an honest, introspective, reply.

That ignores the legal ramifications for you and the company you represent out there. We know that, too. And I'm gonna pass on that entirely except to say—and here is the crux move—does federal law actually stop anybody from doing the unmentionable dirty deed? No, it does not. Enforcement is not the solution. It is a method at issue, yes, but it ain't gonna stop anybody who really needs a buzz. That is the deal. God bless...

Shane Murphy



In Kinship With Tamarisk

On a commercial trip a couple of years ago, one of the guides was fishing in a lazy eddy somewhere in the Muav Gorge. It didn't take long before his line was taut with a particularly combative fish splashing and thrashing at the other end. I was paying close attention, as were some of the passengers, as he landed the fish. "AACK! a striped bass," he exclaimed with disgust, as he smacked it against the nearest rock to break its neck and threw it back in the water. "They're taking over," he responded to what must've been a look of shock on my face and the faces of the others watching, "they're junk fish anyway."

The tamarisk is another much maligned species, as it has often been said to me, "Tie your boat off to a tammie; if it breaks or uproots, no big deal, it's just a tammie." Maybe it's because striped bass and tamarisk are introduced species allowed to survive in the canyon only through the artifice of Glen Canyon Dam that they are relegated to a place of scorn and ridicule. The dam provides a narrower range of flows and clear cool water, and the resultant changes will persist as long as the dam persists.

Shocking though the thought may be, the river running industry in the Grand Canyon owes much of its expansion, success, and stability to Glen Canyon Dam. The number of visitors increased manifold during the 1960's. There were more known travellers through the Grand Canyon in 1972 alone than in its entire history prior to 1965. As Roderick Nash observes in his book, *New Courses for the Colorado River: Major Issues for the Next Century*, "It was no accident that the rise of visitation [of the canyon lands] coincided with a flood of information about the values of Grand Canyon and the tragedy of the lost Glen Canyon." Glen Canyon, then, may be said to be the sacrificial lamb for a feast we all share—all of us river runners as well as the tamarisk and the striped bass.

I am certainly not an advocate of the dam, but I temper my disdain with an understanding of my kinship with the tamarisk. We are both introduced species vying for a place in what will become the new balance of biota in a changed Grand Canyon ecosystem. The tamarisk has its place. It stabilizes the remaining ancient beaches, preventing them as much as it earnestly can from slumping into the abyss. It gives shade and shelter to chats and grackles, birds as new to the river corridor as all but a few river concessionaires. Because the dam is there, tammies are there, and because tammies are there

countless varieties of plant and animal life are allowed to make their home in a place they may, at the most, have only visited.

Somehow the human presence will fit into the balance, but smashing striped bass against a rock or uprooting tammies—is this part of the new order? Passengers clue in to the actions of their guides as a meter on how to interpret what for the overwhelming majority of them is an altogether new experience. To this extent the commercial crew has the opportunity to plant its seed in the minds of its guests; to determine the nature of at least some of the memories he or she will take home. What could these memories be? What *should* these memories be? Is there an overall message that should be communicated?

Is the mission of a river trip mostly "look how much fun we can have in this playground of nature?" I have accompanied trips that have offered no deeper a theme than just that. In retrospect, I can see more similarities than differences between the wild river water park experience of such a trip in the Grand Canyon and the Wild Rivers Water Park experience in Irvine, California. Both experiences left satisfied customers, renewed and refreshed. Both experiences brought handsome profits to their respective industries. Both experiences were made possible by "gifts" from the Colorado River.

The river-running industry is growing and evolving like the post-dam river corridor itself. Whether it will become another money making exploit of an already overexploited river, or an enterprise committed to ecological awareness and education depends largely on the attitudes the river companies wish to promote in their guides.

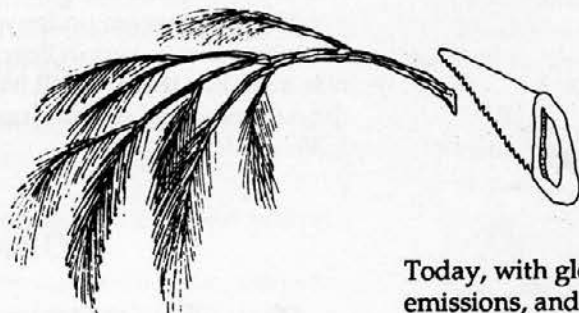
But on the other extreme to an attitude that slams bass against rocks and uproots tammies exists the assumption that a passenger has a certain political bent and environmental understanding akin to our own. The appeal of a Grand Canyon river trip is unique in the eco-tourism industry. Many—perhaps most—who book a trip through the Grand Canyon have an interest in the ecology of the place, and may to some measure expect their guide to be a naturalist of sorts, able and willing to point out this plant or that rock and tell all the whats and hows and whys that come with them. Others may want to just drink beer and howl in the rapids.

A step relation of mine has expressed an interest booking a trip. He's an outdoorsman all right, hunting every chance he can get, an active member of the NRA and a proud veteran of World War II, it's all

we can do to convince him not to throw his aluminum cans and glass bottles into the campfire. I wonder how he'd react to a bearded, perhaps pony-tailed guide espousing the virtues of the Sierra Club and denouncing the sins of the Bureau of Reclamation. Perhaps the only pearl of wisdom he can glean from two weeks in the canyon is that cigarette butts and candy wrappers don't go away when you throw them in the sand. But isn't that something? As long as he's not alienated by esoteric eco-talk, maybe he can learn this and other tidbits about the world around.

That's the nice thing about having the same passengers for several days: there's time to assess the capacity of each individual to absorb the many stories and lessons the trip provides. As for addressing the group as a whole, I find many opportunities to communicate an environmental message without proselytizing. One of my favorite hikes is Nautiloid Canyon. There in the deep recess of ancient Mississippian slime lie the cephalopods for all to see. It's a nice cool place to tell a story and to introduce the folks to geologic history as recorded in fossil record. I tell them about the Muav at river level, about the shallow Cordilleran seas that covered the area during the Cambrian, and about the trilobites that reigned supreme, accounting for some 60% of all life on the planet and consisting of at least a thousand different species. What's missing from the space where the trail levels out is the Ordovician, Silurian, and Devonian Periods representing about 175 million years of geologic record (with only a few spots in the entire canyon giving us a glimpse of the Devonian).

As a bit of a digression, I go on to explain what partitions geologic time into eras, periods, and epochs. Dramatic changes in fossil record, which usually coincide with dramatic changes in the global environment, allow us to differentiate distinct periods in the Earth's history. The sudden appearance of a new type of organism, the expansion in variety and population of an already existing type of organism, or the mass extinction of one or many types of organism seem to have occurred in Earth's history at intervals distinct enough to quantify. Somewhere between the little climb at the beginning of the hike and where we can walk atop nautiloid fossils, the trilobite reign as rulers supreme came to an end.



Hundreds of species vanished, and the only types that survived, like *Teratopsis*, *Dipleura*, and *Calymene* had bony armor which either had spines or allowed the critter to roll up like a pill bug. Hitherto trilobites had no known predators. Then came the nautiloids and their mollusk cousins, whose sharp beaks crushed soft trilobite bodies. This was the Ordovician. By the time the Kaibab Limestone was formed there were no more trilobites at all.

To me the rocks of the canyon tell the story of the rise and fall of dominant species. The story repeats itself with different players every time, layer upon layer, formation after formation. Precambrian and Paleozoic rocks form the raw stuff of the canyon, Mesozoic rocks tinge its waters red and have given *Colorado* its name, and the canyon itself was brought to life in the Cenezoic.

Today, with global deforestation, accumulated toxic emissions, and the ultimate change in world climate through the greenhouse effect, thousands of species have vanished as a result of human tamperings. This mass extinction marks the end of the Cenezoic Era, and whether humans will emerge in the era to come remains to be seen.

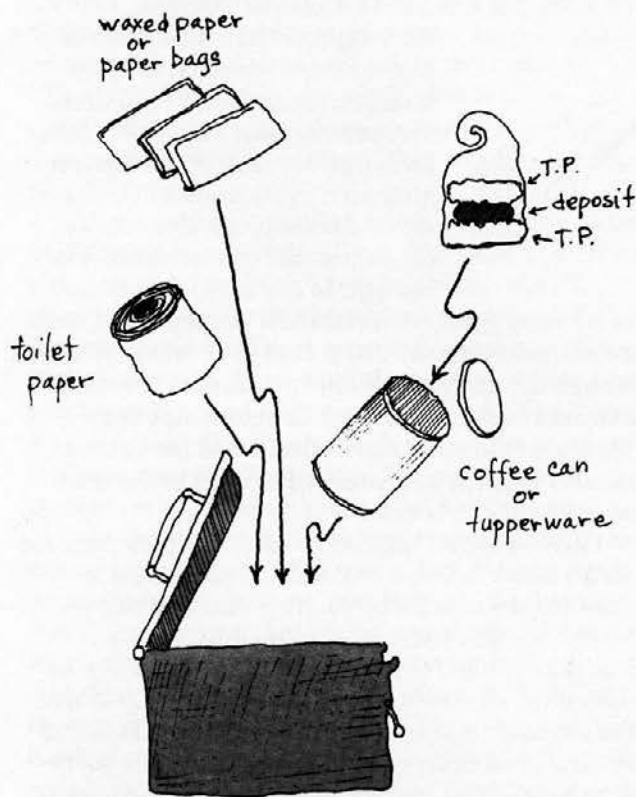
Glen Canyon Dam can be seen as a metaphor for human intervention worldwide in how it has affected the microcosm of the river corridor below. The change was sudden, sending into chaos a regime that had lasted for at least 8,000 years. As we travel downstream we have the opportunity to witness the new regime-in-the-making. Tamarisk and rainbow trout came onto the scene relatively early on, as bald eagles and striped bass are newcomers finding their niche in the emerging state of stability.

No measure of bass-beating or "tammicide" will halt these forces of change and evolution's relentless effort to reach a balance. It seems to me that such actions serve only to display the forceful hand of human intervention—the same mentality that dams rivers and "creates Eden from a wasteland." I believe that there is a more auspicious side of human nature, and that the best action for us to take is to watch closely and to learn. As we witness this process of change while we float down the river, let us consider our role not only in having caused the change, but what our place may be *within* the change. The lessons of the canyon are there to read like a book and we are writing its next chapter. So have fun on your trips but please bear in mind that the pen may be in your hand.

Eben Rose

Day Tripper

There has been concern over how, with the new bag-less waste carry-out system, the day use toilet system could survive. Tom Workman, bless his heart, came up with a system that, with only slight modification of the old set-up, will fill the bill admirably.



Instead of the small plastic bags, we will now need to use a paper or waxed paper bag, housed in a coffee can or tupperware container. This will still fit neatly in a personal sized ammo can.

It might be worth mention when introducing the new system to your folks, that they may want to put a bit of toilet paper in the bag before-hand for absorption, particularly if they anticipate an especially volcanic eruption.

Na na na na na na na na na na na na na na... Scatman!

The new bagless poop collection system is now the law. A variety of new containers, from coated rocket boxes to custom aluminum vaults will be tried out this year. For those taking out at Pearce Ferry or South Cove, the new Scatman box cleaning system should be on line imminently, located at the Meadview Ranger Station and supposed to leave your can squeaky clean.

Negotiations are under way with the Hualapai tribe for a similar one in Peach Springs. Until one comes on line there, you'll have to find a suitable depository elsewhere, such as the Sewage Treatment in Flagstaff.

Books

Michael Ghiglieri's book, *Canyon*, is now in its second printing. It's an insider's look at professional guiding in Grand Canyon by a guide of twenty years. *Canyon* is available from The University of Arizona Press, from many local bookstores or, for an autographed copy, send \$15.95 plus \$1.50 shipping to Michael at:
814 North Leroux
Flagstaff, AZ 86001

Correction: Last issue we mentioned Dick Westwood's book on Elwyn Blake, but mistakenly listed the title of Roy Webb's Bus Hatch biography, *Riverman*. The Elwyn Blake biography is titled *Rough Water Man*, and, as we said, is captivating reading for the Canyon junkie.

Luncheon Town Meetings

The Grand Canyon Trust is sponsoring a series of informal, bring your own sack lunch discussions of current conservation issues. All interested guides should make a point of attending. They will be at the GCT office in Flagstaff, across the street from the Museum of Northern Arizona, from noon - 1:30, March 24 and May 19. Be there.

Guides Training Seminar

Hey you guys! This year's GTS is hap-
pening again at the Old Marble Can-
yon Lodge. The Dates are: April 2, 3, 4
& 5. Come on up. If you're not sponsored by an
outfitter you're still welcome for a \$20 donation
which buys your food and everything else.

FRI - 8-12 Highway clean-up walk with Workman.

12-1 Lunch on your own.

1-5 GCRG Spring Meeting under the bigtop.

DINNER (With the incomparable Martha Clark).

LATER Cool old guys by firelight.

SAT - A full day of informative speakers, great chow
and old movies. More cool old guys.

SUN - More chow, great speakers, more old geezers.

MON - Rock talks galore, last of the chow, stargaz-
ing by daylight, archeology stuff. 1983 stories.

Bring sleeping bags and other camping and eat-
ing equipment; don't forget your tent. We can camp
behind the lodge again, but **DON'T DRIVE OFF
THE ROADS!** Get ready to see your friends.

SPEAKERS

Bob Chandler	Bob Rigg
Kim Crumbo	Don Harris
Mark Law	Roy Webb
Jim Traub	Steve Carothers
Sheri Collins	Jeff Howland
Jan Balsam	Jeffe Aronson
Dan Davis	Brad Ilg
Larry Stevens	Jack Schmidt
Mike Yard	Andre Potochnik
Dave Wegner	Ivo Lucchitta
Loretta Jackson	Nancy Brian
Mel and Alice Telakte	Noel Eberz
Doug Ottoson	Brad Dimock
Dr. Tom Meyers	Charly Heavenrich
Karyn Shrinkle	Shane Murphy

Ten Years After

It's been ten years since the monumental
floods of '83, the highest water and the most
significant biological change we're likely to
see in the post-dambrian era. Sunday night will be
'83 story night. Bring five or ten great slides and
some ten, maybe eleven minute stories. It could be
fun...no, really, there I was...

GTS River Trip

7 nights, 8 days to Bright Angel Beach. This
trip rigs on Monday the 5th and launches
on Tuesday the 6th. More great speakers,
lots of river rescue with Jim Traub, and plenty of
river stories and other know-how. You need a com-
pany to sponsor you, so talk to your boss if you
want to go.

There's room for ten to continue out to Diamond
Creek on the 17th. First come, first served. Call
Tom Vail, (602) 589-6943 for more information.

Thanks to the outfitters for financing this and to
the NPS for financing an extra day's food.

What's in a name?

At 5,000 cfs, the rapid which makes
grown men cry and women faint is
Horn Creek Rapid. Some boaters think
the rapid is named for the two standing waves re-
sembling horns at the
top of the rapid -- but
the creek, canyon, and
rapid were named in
1906 for Tom Horn by
Henry Gannet, who
served on the U. S.
Board of Geographic
Names. Tom Horn

(1860 - 1903) never even saw Grand Canyon, but he
was a pretty incredible fellow who led a checkered
life. He was one of the founding fathers of Tomb-
stone, an Army scout and Apache interpreter for
Geronimo, miner, deputy for Sheriff Buckley
O'Neill, a civilian packer in the Spanish American
War, and a detective for the Pinkerton National De-
tective Agency. While working as a cattle detective
in Wyoming, he was convicted and hung for the
murder of a 13 year old boy. The story of the later
part of his life is told in a video (Tom Horn) starring
Steve McQueen. Better yet, read his autobiography:
Life of Tom Horn, Government Scout and Interpreter!



From: *River to Rim* by Nancy Brian.

Available through Earthquest Press or your
local bookstore.

The News is published quarterly
Text and Editing: Tom Moody, Lew Steiger,
Shane Murphy, Dan Dierker, Dirk Pratley, Dave
Edwards, Jeri Ledbetter, Brad Dimock and as
noted. Illustration: Ellen Tibbetts

Wuddyathink?

Last issue we asked what y'all thought about Air traffic. Here are a few responses:

Inalienable rights? ... sort of... add customer entrance fees, concessionaire fees and limits on launches/day for starters... can you imagine the non-motor season applying to aircraft?!?!

Mimi Murov

In consid(r-r-r-R-R-ROOAARRR-R-R-r-r-r)rtant that we ma(whumpa-whumpa-WHUMPA-WHUMPA-WHUMPA-whumpa-whumpa)ience.

Tom Dimock

Nefandous, non nucleated, not novel nor natural- numerous nitid, noisy, noxious, nagging, numbing nuisances, near notable, nostalgic, named, nirvana, now numbering nigh nine-score ninety need nobbled now.

Russell

We, too, exploit and impact the Canyon. We, too, show folks the Canyon from a unique perspective. Our numbers and horsepower (decibels) are limited. Theirs should be too.

Brad Dimock

Our next issue:

Tamarisk Trimming

Wuddyathink? Send 25 words or less to GCRG.

GCRG Spring Meeting April 2 Marble Canyon

Extended Memberships

By popular demand, (no kidding!), we are now offering lifetime memberships. (Your life or ours, whichever ends first). And for our mutual convenience, we are offering a 6-year membership at a reduced price.

And remember: if you renew *before* your membership expires, you'll save us a lot of time and expense. Thanks!

1 year membership	\$20
6-year membership	\$100
Life Membership	\$195
Benefactor *	\$277 (a buck a mile)

* Benefactors get a silver split twig figurine pendant, a life membership and our undying gratitude.

Stuff For Sale

T-shirts (Available 3/27)	long sleeve	\$17
(M, L, XL)	short sleeve	\$15
Metamorphics Chart	\$3 ppd., 2 for \$5 ppd.	
Native Fish Chart	\$3 ppd., 2 for \$5 ppd.	
Stickers	\$.50 (+\$.50 per order Postage)	



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