THE OSPREY

A Newsletter Published by the Steelhead Committee
Federation of Fly Fishers

Dedicated to the Preservation of Wild Steelhead • Issue No. 47 • JANUARY 2004

A Bridge Between Research and Conservation in Washington State's Hoh River Basin

by John McMillan, James Starr and Dave Moskowitz

— Wild Salmon Center —

Staff from the Wild Salmon Center have embarked on an innovative plan to establish salmonid refuges, similar in philosophy to the system of federal waterfowl refuges.

As part of that effort, it has been conducting an extensive survey of salmonids in the Hoh River basin in Washington's Olympic Peninsula, where the Center would like to establish its first refuge as part of its Cascadia Salmon Biodiversity Program.

The following article by staff salmon ecologist John McMillan, habitat biologist James Starr and Program Director Dave Moskowitz updates readers on what they have learned to date.

Learn more about the Wild Salmon Center at www.wildsalmoncenter.org

Introduction

The Wild Salmon Center (WSC) believes the most effective strategy for conserving salmonids is to focus investments on river systems that still support relatively healthy and diverse natural stocks and contain a high ratio of protected habitat. The WSC initiated the Cascadia Salmon Biodiversity Program to identify the last, best salmon rivers in the Pacific Northwest where salmon and steelhead still thrive. After reviewing the distribution and status of wild salmonids throughout the region, the WSC identified the Olympic Peninsula as a regional stronghold for salmonids. The rivers of the Olympic Peninsula represent the last pristine coastal river systems of intermediate size in the western U.S.

We believe we must move aggressively to protect important parts of the Hoh River basin before its salmonids are at risk of extinction.

The WSC selected the Hoh River basin as a pilot watershed for refuge status and implemented an extensive salmonid monitoring project to identify stream sites that could serve as the foundation for conservation strategies. Located on the western slopes of the Olympic Peninsula is the Hoh River, a temperate rainforest watershed anchored by pristine habitat in the Olympic National Park (ONP) that supports, by today's standards, relatively healthy runs of wild salmonids, largely unaffected by mass hatchery supplementation programs. The Hoh River is one of the only watersheds in the lower 48 that currently maintains relatively healthy populations of winter steelhead, fall chinook, spring/summer chinook, fall coho, and native char. Although the upper reaches of the basin are protected, most of the mainstem floodplain habitat and main valley tributaries are located outside of the ONP on industrial forestlands, and the land use practices have resulted in adverse alterations to the physical processes controlling habitat formation.

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IN THIS ISSUE:

FROM THE PERCH — EDITOR'S MESSAGE

Can National Fish Refuges Save Salmon?

by Jim Yuskavitch

You might call this issue of *The Osprey* the "Olympic Peninsula Special," since two of our three features focus on that part of the wild steelhead's realm.

Besides the obvious fact that the Olympic Peninsula region holds some of the best and healthiest populations of wild salmonids in the lower forty eight states, there is something very important happening there, although now in its nascent stage, that may well result in a new concept for protecting the last of our wild salmon, trout and char.

The concept in question is a refuge system for fish, much like the wildly successful network of federal waterfowl refuges that were instrumental in saving a variety of birds from the jaws of extinction by out of control market hunting at the turn of the last century. If it works for ducks, geese and herons, why not for salmon and trout?

The Portland, Oregon-based Wild Salmon Center aims to find out. Working with the Western Rivers Conservancy, they have been acquiring lands in the Hoh River basin while conducting an extensive survey of the salmonids in the basin. Their goal is to establish a pilot fish refuge in the basin. In this issue's cover story, Center staff report on what they have discovered so far.

You'll also read Charles St. Pierre's analysis of how the National Park Service is failing to protect wild steelhead in Olympic National Park — the only native flora or fauna inside park boundaries not fully protected.

Lastly, just in case you were about to accuse us of hopeless Pacific Northwest parochialism, we include a report by Tim E. Hovey on the progress of a remnant population of Southern California steelhead rediscovered in a San Diego County stream in 1999, which we first reported on in our January 2001 issue.

We hope you enjoy this issue, and feel free to let us know what you think.

Letters to the Editor

Keep Up the Good Work

Dear Editor:

I just finished the September 2003 issue of The Osprey. Nice job! It had a good blend of science and lore. Great reading two stories about Ralph Wahl. And Bill McMillan's evocative photos of the Skagit added a lot to his article. Keep up the good work!

Dick Williamson
Beaverton, OR

WASHINGTON COUNCIL FFF EVENT FEBRUARY 21, 2004, BELLEVUE, WA

The Washington Council of the Federation of Fly Fishers will host a social/cocktail party with live auction, silent auction and raffle beginning at 7 pm, Saturday, February 21st in Rooms 407, 408 and 409 of the Meydenbauer Center in Bellevue, Washington. The theme for the evening will be "Fly Fishing Legends of the Northwest – Celebrate our heritage!" The $45 admission charge will cover substantial hors d'oeuvres, your share of the first six cases of wine, and participation in the auction and raffle. A no host bar will be available, and all anglers, conservationists and friends are invited.

Proceeds of the event will be used to support the conservation and education programs of the Washington Council FFF. For the convenience of interested participants, this gathering is being held the same weekend and location as the commercial "Fly Fishing Show" February 20-22, 2004.

The Washington Council will also have a booth in the Show manned by greeters and fly tiers. Stop by the booth to learn about the Council's activities.

THE OSPREY

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The Federation of Fly Fishers is a unique non-profit organization concerned with sport fishing and fisheries

The Federation of Fly Fishers (FFF) supports conservation of all fish in all waters. FFF has a long standing commitment to solving fisheries problems at the grass roots. By charter and inclination, FFF is organized from the bottom up; each of its 360+ clubs, all over North America and the world, is a unique and self-directed group. The grass roots focus reflects the reality that most fisheries solutions must come at that local level.

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CHAIR'S CORNER

Some Thoughts on the Endangered Species Act

by Bill Redman
— Steelhead Committee —

For over a year and a half, representatives of many of the leading sport fishing and conservation organizations with a common affection for steelhead and steelhead fishing have been meeting periodically in "Steelhead Summits" with the goal of preserving wild steelhead stocks and bringing them back to abundance. Some of the organizations represented include the Federation of Fly Fishers, the Wild Steelhead Coalition, Trout Unlimited, the Native Fish Society, Washington Trout, American Rivers, the National Wildlife Federation, the Isaac Walton League, and numerous fishing clubs from California to British Columbia.

The representatives formed about a dozen committees and have been developing policy statements and working toward consensus on most of the key issues affecting the health of steelhead stocks. It became my task to draft a policy on the Endangered Species Act (ESA). This policy has not been reviewed by the other ESA Committee members yet, so it is not final. However, it is an approximation of the FFF Steelhead Committee's posture on the ESA. It is published here to encourage our readers' comments.

Draft Policy on the Endangered Species Act

Factual Basis

The Endangered Species Act is a Federal Law created to protect and recover species of fish and wildlife that are in danger of extinction or may be in the not too distant future. Responsibility for implementation and enforcement of the ESA for steelhead and Pacific salmon in the United States rests with NOAA Fisheries (formerly called the National Marine Fisheries Service).

For purposes of implementing the ESA, NOAA Fisheries has divided the native steelhead stocks of the four states (California, Idaho, Oregon and Washington) they inhabit in the lower 48 states into 15 geographically and evolutionarily contiguous groups of stocks, called Evolutionarily Significant Units (ESU's). As of January 2004, ten of the 15 steelhead ESU's were listed under the ESA. Two of the ESU's were listed as Endangered, the more urgent and restrictive classification (Upper Columbia River and Southern California). Eight were listed as Threatened, the less urgent and restrictive classification (Snake River Basin, Middle Columbia River, Lower Columbia River, Upper Willamette River, Northern California, Central California Coast, Central Valley California, and South-Central California Coast). One was a candidate for listing (Oregon Coast). Only four were classified as healthy (Olympic Peninsula, Puget Sound, Southwest Washington, and Klamath Mountains Province). Among scientists, anglers, and others with substantial knowledge of these fish, even the unlisted ESU's do not come close to approaching historic abundance levels.

The ESA is a friend of the angler/conservationist, and 2004 is shaping up to be an important year for the future of these fish.

Steelhead have been extirpated from over 40 percent of their native range in the lower 48 states due to habitat destruction and the construction of impassible dams and other barriers. In short the overall status of steelhead is severely depressed. The status and ESA listing of Pacific salmon is similarly depressed.

Most of the ESA listings of steelhead have resulted from petitions to NOAA by citizen sport fishing, commercial fishing and environmental organizations, often followed after an appropriate time lag by law suits against NOAA by the same organizations. NOAA has not been proactive in implementing the ESA.

Most of the ten ESA listed steelhead ESU's include only the wild steelhead in the ESU, not hatchery steelhead. In most cases sport fishing is not allowed for steelhead listed as Endangered, although occasional exceptions have been made with catch and release of wild fish when significant populations of hatchery fish are available for harvest; e.g., in the Methow and Okanogan/Similkameen tributaries of the Endangered Upper Columbia steelhead ESU. Sport fishing is generally allowed for steelhead listed as Threatened, with catch and release of wild fish, harvest of hatchery fish, and usually with gear restrictions such as single barbless hooks and/or artificial lures and flies only.

In the last couple of years a series of petitions and law suits has been brought against NOAA Fisheries by the real estate development, timber, agriculture, and other industries, and local governments, requesting delisting of most of the ESA listed steelhead and Pacific salmon ESU's due to the presence of substantial numbers of hatchery fish. These actions were triggered by federal judge Michael Hogan's decision to remove ESA listing protection from the Oregon Coastal coho ESU based on hatchery coho populations. NOAA Fisheries declined to appeal the Hogan decision, but a group of conservation organizations did. The appeal is now before the Ninth Circuit Court of Appeals.

An opposing petition was sent to NOAA Fisheries by Trout Unlimited, The Oregon Council of the Federation of Fly Fishers, and other organizations, arguing strongly that only wild fish

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Hoh River basin, Continued from page 1

We believe we must move aggressively to protect important parts of the Hoh River basin before its salmonids are at immediate risk of extinction. The identification and conservation of refugia, including large tributaries and the mainstem Hoh River floodplain are critical to the persistence of salmonids in the watershed. Our approach to establishing a salmon refuge in the Hoh River basin is two-tiered: the first step is to identify and map the most important unprotected habitats ("refugia" or "anchor habitat"); and, secondly, move to protect the habitat with strategies including policy advocacy and land acquisitions. The objective of this article is to describe our efforts in the Hoh River basin, including the ongoing scientific monitoring project and our conservation strategies.

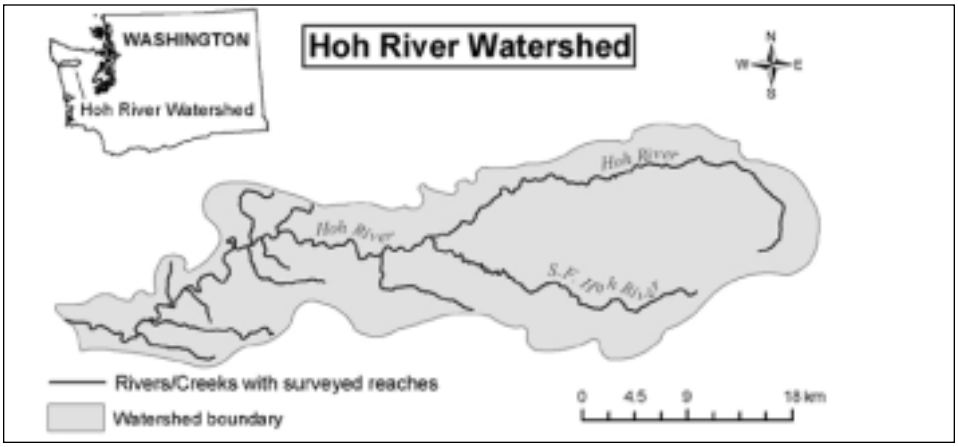
Description of the Hoh River Watershed and its Salmonid Population

The Hoh River (Map 1) has its headwaters on Mt. Olympus at an altitude of 2,425 meters (m) (1.5 mi.), and is the third largest drainage on the Olympic Peninsula ranging for 90.3 kilometers (km) (56.11 mi.) with a watershed area of 481 sq. km (185.7 sq. mi.). The Hoh River (Figure 1) is a large, glacially influenced river with an extensive, active floodplain associated with numerous sidechannels and spring-fed terrace tributaries. The alluvial floodplain on the Hoh River is the site of significant exchange between nutrient rich groundwater and surface water, resulting in high levels of productivity. In addition to the floodplain habitat, non-glacial main valley tributaries serve as temperate rearing and spawning areas for several species of salmonids. The wet, mild climate of the Hoh River is characterized by the highest precipitation levels in Washington State, ranging from about 225cm (90 inches) in the lowlands to 600cm (240 inches) per year in the headwaters.

Figure 1. Overview of Hoh River basin, which shows the steep valley walls, the U shaped glacially carved valley, and the meandering mainstem river working across its floodplain. Photograph by Guido Rahr.

The Hoh River supports a diverse assemblage of salmonids, including five species of Pacific salmon, two species of trout and two species of native char. Specifically the Hoh River contains one of the last remaining relatively healthy populations of spring/summer chinook (Figure 2) in the lower forty-eight, a strong population of fall coho, a genetically unique population of fall chinook, and a robust population of native char. Of the nine species of salmonids found in the Hoh River, four stocks are actively managed, including fall coho salmon, fall chinook salmon, spring/summer chinook and winter steelhead. The Hoh River also supports coastal cutthroat, resident rainbow trout, native char, and small populations of summer steelhead, chum salmon, sockeye salmon, and pink salmon.

Map 1. Hoh River watershed and river/creek survey reaches.



Hoh River Salmonid Monitoring Project

The process of protecting habitat begins by extensive, year round monitoring to locate potential areas of refugia habitat. Over the last decade a new paradigm has emerged emphasizing the role of refugia in recovering and sustaining salmonid populations at the watershed scale. Within watersheds refugia exist as "hot spots" or "anchor habitat" that support peaks in salmonid abundance and diversity. The refugia concept asserts that the most effective strategy for maintaining salmonid populations is to identify the hot spots and use those sites as focal points for conservation strategies.

Although salmon refuges have been discussed for over a century, the task of defining and identifying stream refugia within a watershed is a relatively new challenge for scientists. Refugia are difficult to define because they are highly dynamic and operate across a variety of temporal and spatial scales. For example, thermally stratified pools can provide thermal refugia at the unit scale, while floodplain river reaches with abundant off-channel habitats offer refugia to overwintering juvenile

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salmonids. Added to this complexity are as many as ten salmonid species in a watershed, some with unique habitat requirements at different life stages. The WSC defines refugia as streams that support the greatest diversity and abundance of salmonids when compared to similar stream types. Identifying the tributaries and mainstem floodplain habitats that support the greatest abundance and diversity of salmonids is crucial to the long-term investment of land conservation.

The identification of refugia habitat at the mainstem river reach and tributary scale requires a new approach to sampling salmonids and physical stream features. Traditional sampling schemes often gather data over small spatial scales (e.g., <200m) (656 ft.), single seasons, and randomly selected survey reaches that contrast with the tendency of salmonids to carry out their freshwater life histories at intermediate spatial scales (e.g., 1-100km stream segments) (.62 - 62 mi.). Therefore, traditional strategies may miss large-scale influences that drive small scale patterns in salmonid distribution and abundance.

Our approach to identifying refugia uses a combination of snorkel surveys and habitat measurements to estimate the diversity and abundance of salmonids over a five to ten year period. It requires scientists to conduct surveys over long stream sections (e.g., 30-60km) each year to cover the spatial scales necessary for refugia identification. By using old technology, such as walking and snorkeling, to collect data over intermediate scales, we believe our sampling scheme can account for the inherent patchiness in salmonid distribution and will identify important relationships between stream features and salmonids.

In the summer of 2000 we initiated an extensive monitoring and research project to evaluate the refugia potential of several streams in the Hoh River basin. The goal of the monitoring study is to determine the distribution, abundance, and diversity of salmonids in each stream with snorkel surveys, habitat measurements, and a review of previously collected data. Upon completion streams with the greatest abundance and diversity of salmonids will be selected as refugia and the continuous monitoring project will allow us to track our habitat investments over the length of the project.

We strategically selected fifteen streams in the Hoh River Basin according to geomorphology, hydrology, and fish usage, and each stream site was placed into one of three categories, including mainstem river, large tributary (Figure 3), or mainstem floodplain habitat (Table 1). All survey sites were located outside of the ONP and included mainstem of the Hoh and SF Hoh Rivers, nine large tributaries, and four mainstem floodplain streams. Although we reviewed redd data for the mainstem Hoh River, we could not snorkel survey the river because of low water visibility associated with its glacial influence.

We used a combination of previously collected data, snorkel (Figure 4) and field surveys to determine the abundance, distribution, and diversity of salmonids at each stream site. Redd count data (1990-2003 period of record) from Washington Department of Fish and Wildlife and the Hoh Tribe provided information on the distribution and abundance of spawning adult salmonids. Stream habitat measurements were collected according to the Oregon Department of Fish and Wildlife Aquatic Inventory protocol. We developed our snorkel survey technique according to suggestions in previous research that attempt to reduce the observational bias associated with underwater fish counts. For example, because most variability in surveys is associated with human error, we have conducted all surveys using the same two people over the course of the project. We also implemented summer and winter snorkel surveys to identify seasonal differences in salmonid abundance, including night surveys during winter months to account for changes in juvenile salmonid behavior.

Surveys started at the mouth of each stream and worked upstream until juvenile salmonids ceased to exist or the stream went dry, which typically coincided. We surveyed at least 60 percent of the linear stream length at all of the sites. From the summer of 2000 to the summer of 2003 we conducted seven sets of summer and winter/spring surveys over 250 kilometers (155.34 mi.) of stream habitat and sampled over 600 channel units (e.g.,

Table 1. Description of stream types we identified in the Hoh River basin.

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Stream Type	Description
Mainstem Rivers	Broad rivers with relatively shallow channels that meander through exposed gravel bars and the occasional bedrock canyon.
Large Tributary	They are the largest tributaries, generally have a basin size greater than 8.8 sq. km, and drain valley side slopes for short distances before continuing across old river terraces to the mainstem river.
Mainstem Floodplain Habitat	The three floodplain habitat categories, including mainstem floodplain complexes, single mainstem sidechannels, and spring brooks. Mainstem floodplain complexes form where tributaries join the mainstem Hoh River, creating a forested network of sidechannels. Single mainstem sidechannels are formed when large woody debris sources divert water from the mainstem river. Spring brooks are small tributaries formed by spring networks or the channeling of runoff through swales created by the migration of the mainstem river.

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Figure 2. The Hoh River basin is one of the only remaining watersheds in the lower 48 that still supports relatively healthy runs of chinook salmon. Refugia identification and conservation are crucial to the persistence of these remarkable fish. Photograph by John McMillan.

Figure 3. Winfield Creek, an important spawning and rearing tributary located in the middle of the Hoh River basin. Photograph by John McMillan.

Figure 4. Snorkel surveys were used to determine the distribution and abundance of juvenile salmonids. Photograph by James Starr.

pools) during our field surveys in the Hoh Basin. We focused our surveys on pools, because they serve as congregation points for several species of salmonids during summer low flows. In winter months we surveyed fewer sites, shorter reaches (100-300m long), and sampled all habitat units.

After four years of surveys our understanding of the Hoh River basin is still incomplete; however, preliminary results of adult and juvenile population data indicate that salmonids were unevenly distributed among stream sites. Redd data from 1990-2000 indicates redd abundance was almost equally divided between the mainstem Hoh River (53 percent) and its tributaries (47 percent). Despite similarities in total abundance, species richness (Figure 5) and mean annual redd abundance (Figure 6) varied by stream and species. For example, species richness was highest in the largest streams with the most complex habitat, such as the mainstem Hoh River and SF Hoh River, while smaller tributaries with more specialized habitat such as Pins Creek catered to a single species.

We also found differences in redd abundance between ONP and non-ONP habitats. The ONP boundary reflects land use, but salmonid utilization between ONP habitat and non-ONP habitats is important because our conservation efforts are focused on non-protected habitats. The ONP section of the Hoh River includes 65 percent of the basin's acreage, yet this area supported only 39 percent of the total redds counted from 1990-2000. Among species and races 85 percent of the fall chinook redds and 68 percent of the winter steelhead redds were observed in non-ONP habitats, fall coho redds were evenly split between the two areas, and the majority of the spring/summer chinook redds were located within the ONP.

In terms of mean annual redd abundance, the mainstem Hoh River was the most important spawning site in the Hoh River basin (Figure 6). The river contained 53 percent of all the redds counted in the watershed and was the only site to provide spawning habitat to all salmonid species. Winfield Creek supported the greatest abundance of spawning salmonids among large tributary streams. Among all streams, 76 percent of the fall coho redds were found in tributaries, while 76 percent of the winter steelhead redds and just over 60 percent of spring/summer and fall chinook redds were observed in the mainstem Hoh River.

Summer and winter juvenile snorkel surveys provided interesting results. In general juvenile species richness was similar to adult diversity, including juvenile coho, steelhead, and coastal cutthroat. Juvenile coho were generally the most abundant species, followed by young-of-the-year trout, while older and larger specimens such as steelhead parr were less abundant. Although juvenile chinook prefer to rear in the mainstem Hoh River, most tributaries and mainstem floodplain habitat contained a few fish. Populations were skewed towards coho in the tanic, low gradient streams, such as Elk Creek, Pins Creek, and Braden Creek, while populations in the steeper Owl Creek and Willoughby Creek were dominated by juvenile steelhead. Among mainstem floodplain sites the spring brook and single sidechannel were used mostly by juvenile coho salmon. Conversely, the diverse habitat in the floodplain complexes was used by all species across different life stages.

Winfield Creek contained the highest density and abundance of juvenile salmonids among tributaries (Figure 7). It was the only tributary to exhibit an abundance level that was significantly higher than all other streams, and it contained the greatest abundance for each species. The Elk Creek floodplain complex was the most productive mainstem floodplain stream. The complex con-

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tained the greatest abundance of salmonids during summer months, while the SF Hoh River single sidechannel supported the highest density. Similar to Winfield Creek, the Elk Creek floodplain also supported the greatest density and abundance of each juvenile species.

Results of winter surveys revealed minimal differences in juvenile density among most tributary streams (Figure 8). Despite the small differences, it should be noted that Braden Creek had the single highest annual density during the winter of 2001, while Winfield Creek, exhibited a stable and moderately high winter density. Population composition also shifted in several streams, with a reduction in species richness in Anderson Creek and Willoughby Creek, while diversity increased with the addition of bull trout and whitefish in Nolan Creek and Winfield Creek. The Elk Creek floodplain complex exhibited the highest juvenile density among mainstem floodplain sites, although the spring brook had the highest density of juvenile coho. Large differences in seasonal density for Anderson Creek, Willoughby Creek, and the SF Hoh River sidechannel demonstrate the importance of conducting winter surveys, because winter is often a limiting factor for juvenile salmonids.

Because we applied an intensive sampling scheme over large spatial scales, in addition to multiple seasons and years, we were able to identify the diversity, distribution, and abundance of salmonids at each survey site in the Hoh River basin. Each stream was demonstrated to be important to salmonids; however, according to a combination of redd counts and juvenile surveys, we identified four streams including the mainstem Hoh River, the SF Hoh River, Winfield Creek, and the Elk Creek floodplain as refugia sites within their respective habitat categories (Table 2). The mainstem Hoh and SF Hoh Rivers are obviously important areas for many salmonids; however, the habitat is inadequate for some life stages, and our conservation strategies would be incomplete without identifying important tributaries and mainstem floodplain streams.

The mainstem Hoh River and SF Hoh River are the most important spawning streams in the watershed.

Figure 5. Species richness for each site; Y axis represents number of species utilizing the survey stream. The mainstem Hoh River was the only site to support all species. All charts depict the tributaries and SF Hoh River order of location along longitudinal profile of mainstem Hoh River, with the left representing the mouth of the Hoh River.

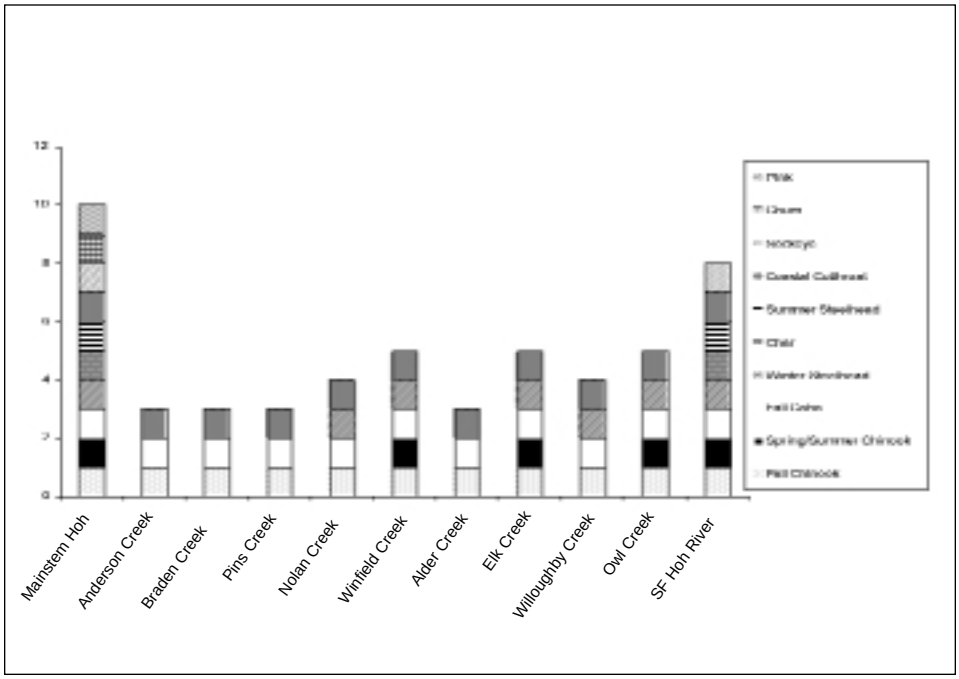
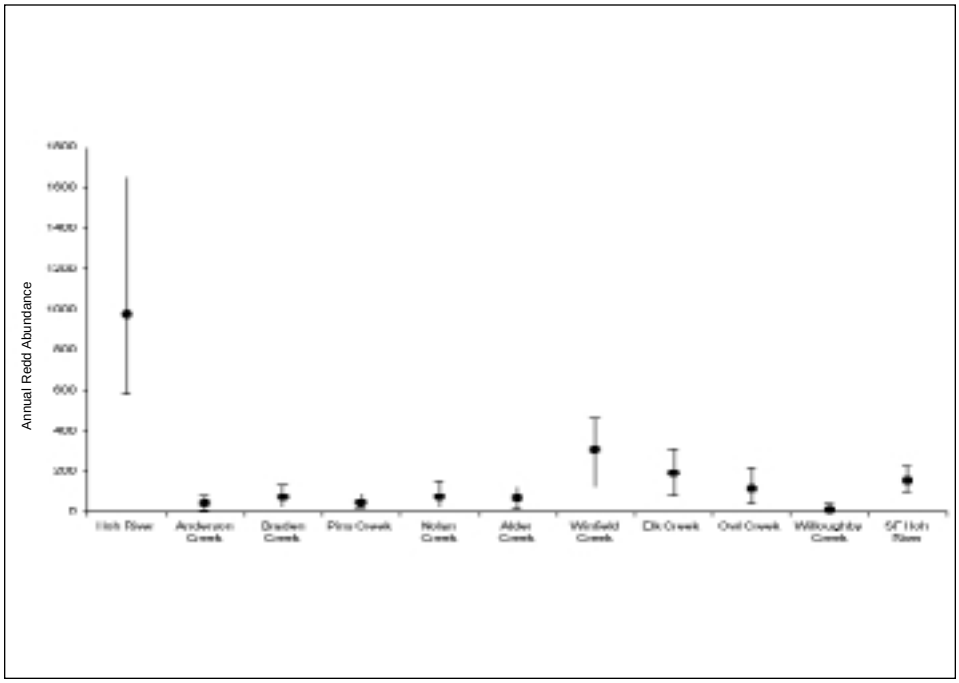


Figure 6. Annual mean (with range) redd abundance for mainstem Hoh River, SF Hoh River and all tributary streams from 1990-2000.



They also support the majority of rearing juvenile chinook, represent the primary migration corridor that all anadromous salmonids utilize to access other habitats, and serve as an ecological nexus. The mainstem rivers are low gradient, broad rivers, with extensive

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Figure 7. Mean annual juvenile salmonid summer abundance (with range) in large tributaries survey sites (2000-2003). The term juvenile salmonid represents the aggregate count of juvenile coho, steelhead, chinook, and coastal cutthroat.

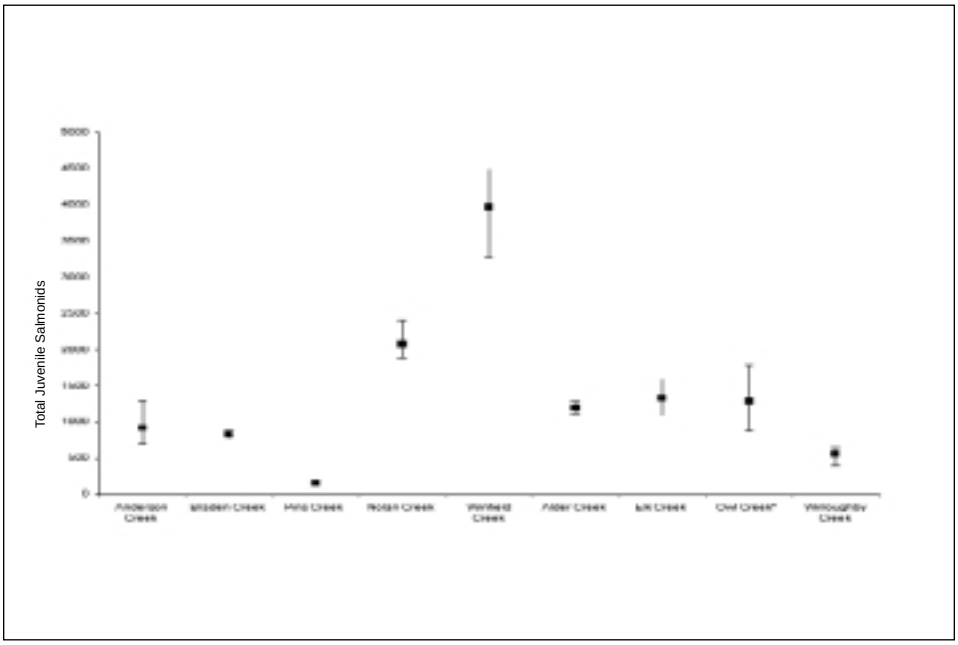
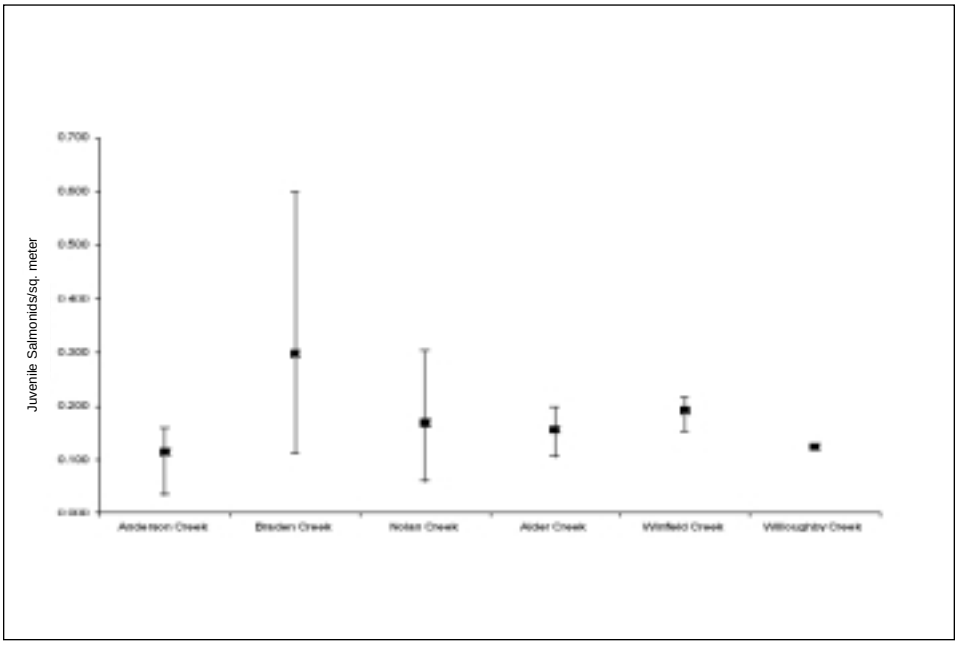


Figure 8. Mean annual winter juvenile salmonid density/m^2 (with range) observed in large tributary streams (2001-2003). We surveyed fewer sites during winter months because of poor access.



floodplains used for spawning, while infrequent, short bedrock canyon reaches provide staging habitat. The large rivers exhibit several characteristics that are important to salmonids, including a mixture of single and braided channels, abundant cobble substrate, large wood and numerous downwelling and upwelling areas that help regulate water temperature.

Winfield Creek was the largest main valley tributary site we surveyed, and it supported a diverse salmonid assemblage, including coastal cutthroat, fall coho, fall chinook, winter steelhead, spring/summer chinook, mountain whitefish, and bull trout. The stream annually contained two to three times the number of salmonids found in other tributary sites and supported its highest abundance during drought summers when most streams experienced significant population declines. Although the stream accounted for only 22 percent of the linear stream km surveyed during redd counts, it contained 22 percent of the coho redds, 46 percent of the fall chinook redds, and 44 percent of the winter steelhead redds observed in all non-ONP tributaries from 1990-2000. Amazingly, over the 11 year period of record, almost 16 percent of all fall chinook redds counted in the entire Hoh River basin were observed in the lower 1.6 km (.99 mi.) of Winfield Creek.

The Elk Creek floodplain complex conveyed the highest degree of habitat complexity and salmonid usage when compared to other floodplain streams. It is a unique floodplain complex in the Hoh River basin, because it is undisturbed by roads, culverts, and logging, and at over 220 acres it is the second largest tributary floodplain complex in the basin. Although many floodplain streams serve as specialized rearing habitat for a few species, the floodplain complex also contained important migration and spawning habitat for fall chinook, bull trout, fall coho, spring/summer chinook, sockeye, and winter steelhead. Congruent with our findings, a recent basin wide limiting factors analysis suggests the Elk Creek floodplain complex is the most important piece of floodplain habitat for juvenile salmonids outside of the ONP.

Hoh River Conservation Policies and Partnerships

Historically conservation policies have been directed towards protecting a single species and restoring habitat at small scales (50-100 meters) when compared to the concept of a salmon refuge at the watershed scale. While the Endangered Species Act forced attention to single species in dire straits, subsequent policies have done little to protect entire populations of fish and their ecosystems. Conservation strategies for

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birds and other wildlife have taken an ecosystem approach towards saving an entire community of organisms. For example the waterfowl refuge system has a network of protected habitats located throughout their range, including nesting habitat in Alberta, migration corridor habitat in the contiguous United States, and important overwintering habitat in Mexico. Although this may provide an over simplified version of the waterfowl refuge system, there are many similarities. The argument can be made that spawning and rearing hotspots for salmon are analogous to the important nesting areas in Canada, while mainstem river staging areas are like the continental migration flyways used by waterfowl, and the ocean provides nutrients to grow and reproduce, as does Mexico for overwintering waterfowl. This paradigm has just begun to take hold in salmonid conservation.

Over the last three years the WSC has worked in concert with the Western Rivers Conservancy (WRC) to protect important river lands in the Hoh River basin. The WRC is a small, nimble land conservancy based in Portland, Oregon, that has acquired title to nearly 4,000 acres of land within the Hoh River basin. Most of these lands lie within the riparian and floodplain reaches of the Hoh. The phase one goal of our partnership with the WRC is to acquire 10,000 acres within the river corridor over a five-year period. Our preliminary scientific work identified the Winfield and Elk Creek land as the highest conservation priority in the basin. WRC, with help from the WSC, acquired these lands, known as Schmidt bar, in early 2002. Together the groups share a vision of the Hoh River salmon refuge, a vision where science and conservation blend into one and salmon always return home to a protected watershed. When complete, the Hoh River will serve as a model for future wild salmon conservation efforts in North America and abroad.

The phase one goal is to acquire 10,000 acres within the river corridor over a five-year period.

Table 2. Summaries of streams identified as refugia habitat in the Hoh River basin. Juvenile abundance contribution is not available for mainstem rivers, and the metric represents the cumulative contribution of juvenile salmonids within each site's habitat category. For example, the 33 percent for Winfield Creek in the juvenile abundance contribution column indicates that 33 percent of all juvenile salmonids counted in tributary habitat during summer months were found in Winfield Creek.

Stream	Summer juvenile abundance contribution (%)	Adult redd count contribution (%)	Summary
Hoh River	NA	53	Major migration corridor, supports greatest diversity and abundance of all salmonid species. Single most important piece of habitat in the basin, especially for spawning and rearing chinook and steelhead.
SF Hoh River	NA	10	Major migration corridor, supports high level of diversity and abundance of salmonids. Especially important habitat for spawning steelhead, coho, and bull trout.
Winfield Creek	33	14	Second largest tributary in the basin, replete with high quality habitat. Among tributaries the stream supported 36 percent of all juvenile coho, 30 percent of steelhead parr, and 26 percent of cutthroat during summer months.
Elk Creek floodplain complex	41	NA	Large floodplain complex in pristine condition that supported unmatched diversity and abundance of adult/juvenile salmonids, including bull trout. Only floodplain stream to provide rearing, spawning, and migratory habitat for salmonids.

Olympic National Park:

Contradictions Between Wild Steelhead Conservation and Harvest

by Charles St. Pierre

— Steelhead Committee —

In this article, Steelhead Committee member Charles St. Pierre eloquently outlines how less protected wild steelhead are in Washington State's Olympic National Park than its other flora and fauna and how wild steelhead harvest contradicts the National Park Service's mission to preserve the country's national treasures.

St. Pierre is a lifetime resident of Washington and grew up fishing for steelhead in the Puget Sound region. If he's not travelling to teach speycasting lessons or at his day job as a hairdresser, he's probably fishing for steelhead somewhere between Oregon and British Columbia. He lives with his wife, dog and cats in Gig Harbor. He can be reached at saintcoz@harbornet.com.

Introduction

Olympic National Park encompasses almost one million acres of protected forest and thousands of miles of creeks, streams and rivers. One of the most important wild steelhead streams in the park, located in the heart of the western slopes of the Olympic Mountain Range, is the Queets River.

Currently, catch and release, selective fishery regulations protect some of the anadromous wild steelhead populations inside Olympic National Park. The wild steelhead of the Queets River do not enjoy the same deserved status. To many, this represents a contradiction in park wildlife management policies; the wild steelhead populations that make this portion of the park's wilderness their home are not as protected as the other native species. Along with diminishing run sizes and increased angling pressure, the sport harvest of wild steelhead in recent years has risen to levels that beg the following questions: If no other native wildlife or vegetative species can be lawfully hunted and harvested inside Olympic National Park, why is it legal to harvest and keep wild steelhead? Shouldn't the boundaries of the park afford these runs of wild, native fish the same protection as its other inhabitants?

In order to gain a more thorough understanding of what is occurring here it is useful to review some of the practical, historical and ideological foundations of the National Park Service (NPS) and Olympic National Park, past and current challenges regarding wild steelhead fisheries management of the Queets River, and some thoughts and perspectives of how these current challenges might be more consistently met in the future with regard to the overall objectives of the NPS.

A Brief History of the National Park Service and Olympic National Park

The ideals and history of protection and preservation of public lands in America dates back to the early 19th Century prior to the formal establishment of the National Park Service by President Woodrow Wilson in 1916. The NPS and its land management directive, "to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of future generations" would literally and figuratively shape the landscape of America.

In 1832 while visiting the Great Plains area of the U.S. and contemplating the impact of westward expansion on the native cultures, wildlife, and landscapes, artist George Catlin wrote that preservation efforts would require a "great protecting policy of government... in a magnificent park... A nation's park, containing man and beast, in all the wild and freshness of their natures' beauty." In 1864 Frederick Law Olmsted was appointed by President Abraham Lincoln to oversee the land acquisition of what was to eventually become Yosemite National Park. Olmsted, a landscape architect, helped promote the idea of "contrast to our daily existence" and a philosophy of "public use and recreation" thus linking government action to these ideas. Later, in 1872 President Grant signed legislation creating Yellowstone National Park and what became the first U.S. government managed public wilderness preserve.

By the early 20th Century, the U.S. population was exploding and the growing abuse of the land and it's abundance that many had feared years earlier gave birth to a new ideology; conservation. The ideas and actions of author George Perkins Marsh, Sierra Club founder John Muir, explorer Judge James Wickersham, and future NPS Director Stephen T. Mather, to name a few, became central to the implementation and evolution of the NPS as a conservation, preservation, and education based government agency. In 1906 President Theodore Roosevelt established the Antiquities Act that gave the government the power to designate "historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest." Later, due to forestry harvest abuses and the unchecked slaughter of elk in the Olympic Mountains region of Washington State, Roosevelt stepped in to create Mt. Olympus National Monument in 1909. This formally marked the beginning of the long, arduous battle between timber interests within the Forest Service and the preservation/conservation interests of the NPS to create Olympic National Park. Finally, in 1938, with the help of the local people of Clallam County, the Izaak Walton League, and members of the Emergency Conservation Committee, President Franklin D. Roosevelt signed legislation creating Olympic National Park.

Olympic National Park and the Queets River

Historically, the rivers of the Olympic Peninsula have produced and maintained some of the healthiest wild

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steelhead populations in the Northwest. But like the elk herds of the region in the early 1900's, this is rapidly changing for the worse as wild steelhead runs are currently declining while sport harvest rates and angling pressure are rising.

Many of the rivers of the Olympic Peninsula have their origins deep inside the park, and the Queets is no exception. However, the mainstem of the Queets River is unique among all the rivers of Olympic National Park — all but the last few miles of its nearly 50-mile journey from origin to ocean lie within the park's boundaries. The last few miles of the Queets pass through the Quinault Indian Reservation, where tribal fishermen concentrate their time and treaty honored fishing traditions before the river reaches the Pacific Ocean just south of Kalaloch Beach.

Scientific data and information regarding fisheries management (habitat, migration, water quality, catch records, hatchery productions, etc.) within the park are gathered and shared among the state (Washington Department of Fish and Wildlife), federal (NPS) and tribal interests. However, it is the responsibility of the NPS to set and enforce the rules pertaining to the sport fishery opportunities inside the park. Virtually thousands of native species of wildlife are protected from hunting or harm within the boundaries and conservation regulations of Olympic National Park. So why aren't wild steelhead protected by the same boundaries and regulations? According to former head park biologist John Meyer (now retired), boundaries and conservation principles have little to do with it. The bottom line is 'forgone opportunity' as it pertains to the Boldt decision, according to Meyer. "If we [non-Indians] do not harvest our quota of the fish resource, the tribes have told us they will harvest our quota of the fish for us. We consider Olympic National Park to be a stronghold for steelhead, and the wild steelhead populations here to be among the healthiest in the lower 48," said Meyer.

[*Editor's Note: In 1974, federal judge George Boldt ruled, in United States v Washington, that Indian tribes were entitled to take up to 50 percent of harvestable fish populations on their 'usual and accustomed' fishing places.*]

Urgent Challenges

There are a number of urgent and current challenges facing wild steelhead of the Queets River. Prior to the 2003-2004 sport fishing season, the Queets lacked an established catch and release, selective gear regulation fishery. This represents a major inconsistency in wild steelhead fishing regulations within Olympic National Park. While prohibited in most park waters, wild steelhead retention, bait and the use of treble hooks are still legal on much of the Queets during the peak of the winter steelhead migration (Oct. 1 through April 15), despite the risks to juvenile salmonids and protected bull trout species. The 2003 - 2004 catch-and- release, selective gear area will be upstream of Streater Crossing.

The Olympic Peninsula is one of the last places left in the lower 48 where wild steelhead are legally harvested by sport anglers. This, along with pre-season closures to many of the Puget Sound's most notable winter steelhead rivers and below average seasonal precipitation, has resulted in dramatic increases in angling pressure and wild fish harvest rates over the last four years. Arguably, nowhere has this been more evident on the entire peninsula than on the Queets in Olympic National Park and on the Hoh River.

Wild fish returns to the Queets have diminished by as much as 50 percent since the early 1990's, with escapement goals either barely being reached or not reached at all. Currently, there are efforts being made by tribal and harvest minded sport fishing interests to lower present escapement goals on the Queets by as much as 40 percent. If those efforts are successful, the present winter run escapement goal of 4,200 wild steelhead could be lowered to between 2,500 and 3,500 wild fish.

Of the 140,000 plus hatchery steelhead smolts released annually into the Queets, only five to 10 percent are either tagged or adipose fin clipped. Any steelhead with a dorsal fin height of less than 2 1/8 inches is considered to be of hatchery origin. This identification method may represent a significant risk to wild juvenile steelhead.

Wild steelhead poaching and rule violations are unfortunate realities on the Olympic Peninsula, due to the vastness of the area and the lack of law enforcement manpower. The Queets has one full-time park ranger on duty to enforce and patrol this entire portion of the park.

Perspectives and Summary

The words "wild, preservation, and conservation" echo throughout the philosophical evolutionary process and governing mandates of the National Park Service. Because of the complexities of the present day society in which we live, the implementation of those mandates and ideals must be a staggering challenge to be sure. While the addition of a catch and release, selective gear regulation fishery to the Queets River for the 2003 / 2004 winter season is a very positive shift in wild steelhead protection, this still leaves about 15 miles of the most accessible portions of the Queets and its wild steelhead subject to a lethally prolific harvest sport fishery.

Many believe that wild steelhead and salmon populations inside the park deserve the same protection, preservation and conservation mandates that are consistently provided to the rest of the native wildlife here. The focus on quality and the wild experience for both fish and visitor should be proportionate to the quality of the wild habitat as it is preserved in Olympic National Park, rather than focus on harvest quantity or quota allocations. Author and National Park biographer Freeman Tilden once wrote to George B. Hartzog Jr., NPS Director from 1964 to 1972, reflecting " I have always thought of our Service as an institution, more than any other bureau, engaged in a field essentially of morality — the aim of man to rise above himself, and to choose the option of quality rather than material superfluity."

In the recent words of Congress, management activities of the NPS, "...shall be conducted in light of the high public value and integrity of the National Park Service and shall not be exercised in derogation of the values and purposes for which these various areas have been established."

Indeed, where is there a more ideal place to ensure the survival and proliferation of wild fish populations for future generations than in our national parks?

Survival on the Edge: The Plight of San Mateo Creek Steelhead

by Tim E. Hovey

— California Department of Fish and Game —

In the January 2001 issue of The Osprey*, we reported on the discovery of a population of suspected steelhead trout — long thought to have been extinct — in San Mateo Creek in San Diego County, California.*

Since that time, those fish have been confirmed to be the remains of what was once a substantial population of wild southern steelhead.

In the following article, Tim E. Hovey, California Department of Fish and Game associate fisheries biologist, gives us an update.

He can be reached at thovey@dfg.ca.gov.

Introduction

For the past four years, the California Department of Fish and Game (Department) has been continually monitoring a small population of southern steelhead trout in San Mateo Creek in northern San Diego County. Discovered in the spring of 1999, this population represented the first confirmed presence of southern steelhead trout on the drainage in more than fifty years. This was a noteworthy discovery due to the assumption that southern steelhead trout had been extirpated from most southern California streams due to increased pressure on groundwater systems and the presence of nonnative fish species. Due to the rarity and importance of this occurrence, the Department initiated a monitoring program to track the status of the steelhead/rainbow trout population on San Mateo Creek immediately following the 1999 discovery. This newly discovered population of steelhead currently represents the southernmost population of southern steelhead trout in California. What follows is a description of the monitoring efforts that have occurred on the drainage since the discovery.

This beautiful 15-inch rainbow trout was discovered in Devil Canyon in December 2003. Photo by Tim E. Hovey.

The History

San Mateo Creek stretches approximately 21 miles from its headwaters in southern Riverside County on the Cleveland National Forest to northern San Diego County on Marine Base Camp Pendleton property. The creek is an ephemeral drainage that is separated from the Pacific Ocean for most of the year by about 100 meters (329 feet) of sand.

In its time San Mateo Creek was a popular sport fishing spot for the adventurous angler who wished to sample the seasonal steelhead run. Not only were the steelhead routinely abundant during the early 1900s, the San Mateo Creek steelhead were also found to attain a larger size than their relatives to the north, with many fish achieving weights between six and 15 pounds. Consistent, and in many cases large, steelhead trout runs were reported for San Mateo Creek in the early part of the twentieth century. However, trout sightings dropped off in the 1940s and consistent trout abundance has not been present within the creek for nearly 50 years.

The drainage has undergone a drastic change in this relatively short period. Increased development has placed demands on the groundwater, and the concurrent urban and agricultural growth has overtaxed the available resources and completely changed the stream morphology. Couple this with the natural dry cycles and it becomes clear why fishery experts have considered southern steelhead extinct from this creek.

The discovery of a single fish caught by an angler near the mouth of San Mateo Creek in 1999 confirmed what many trout enthusiasts believed about the tenacious steelhead trout; give them a chance and they'll come back.

Research conducted on specimens collected in 1999, indicated that the newly discovered trout were indeed the offspring of anadromous females that entered the drainage sometime in 1997-98 to spawn. This established the age of the trout at approximately two to two-and-a-half years at the time of discovery. The first of two genetic analyses on fin clips collected in 1999 showed that the fish possessed the mitochondrial DNA (mtDNA) haplotype MYS5, which is considered unique to wild southern steelhead populations. Several of the trout, which ranged in size from 150 to 220 mm (5.91 to 8.66 inches), were also

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observed in the smoltification stage, indicating they were likely emigrating out of San Mateo Creek when they were discovered.

As Department monitoring continued through 1999, we documented only a handful of resident trout still remaining in the upper portion of San Mateo Creek. Due to inconsistent water levels, these individuals were unable to complete their emigration out of the drainage and became stranded in small ephemeral pools. To further imperil trout survival, the pools were also occupied by largemouth bass, green sunfish, bluegill and black bullhead, certain competitors and known predators of salmonids.

While the future looked bleak for the San Mateo trout at the close of the 1999 monitoring season, not all the news was bad. Surveys further up Devil Canyon Creek, a tributary to San Mateo Creek, revealed several trout of the same size-class. This provided an uninterrupted link of resident trout presence between the two drainages. While San Mateo Creek is heavily loaded with exotic fish species, a substantial barrier at the confluence precludes exotic fish migration into Devil Canyon.

With the presence of trout on both San Mateo and Devil Canyon, we concluded that the original emigrating group began their journey to the ocean from deep within the confines of Devil Canyon Creek in 1999. The first fish was actually discovered a short one-half mile from the ocean and the size-class and genetic analysis linked it to the individuals in the upper drainage. While several trout were observed near the lagoon mouth, there is no way of knowing if any of them actually succeeded in reaching the ocean.

In the spring and summer of 2000, we began to document the disappearance of the San Mateo trout. No appreciable rainfall had been recorded in the 12 months prior, and the once overflowing pools had now been reduced to overheated sumps; an environment that strongly favored the nonnative fish and negatively impacted the resident trout. During repeated snorkel surveys, the few trout that remained appeared in a severely emaciated condition, schooling with large groups of black bullhead. It was clear that those trout that had not been consumed by the non-natives were now being out-competed or were succumbing to the elevated water temperatures within the pools. In fact, documented temperatures of up to 30 degrees Celsius (86 degrees Fahrenheit) within the pools sealed the fate of the San Mateo trout and the last recorded observation was made in August of 2000.

This population was the first confirmed presence of southern steelhead on the drainage in more than fifty years.

The Devil Canyon trout fared far better during this time. Temperature probes deployed in both drainages during the summer of 2000 recorded more suitable and stable temperatures for salmonids in trout occupied pools within Devil Canyon. The lack of competitive and predatory nonnative fish pressures allowed trout to prosper. Conditions were so favorable in the drainage that two separate groups of juvenile trout were observed on Devil Canyon during the 2000 monitoring season. This discovery indicated that the presence of southern steelhead trout on the drainage was not just a one-time event, and that successful resident reproduction was occurring within Devil Canyon. The juvenile observations documented by the Department on Devil Canyon became instrumental in providing the NOAA Fisheries with enough critical information to re-evaluate the recently designated geographic boundary of the Evolutionarily Significant Unit (ESU) for this species. Subsequently, the ESU boundary for southern steelhead was extended to include the San Mateo Creek drainage in 2002.

As the 2000 monitoring season

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A juvenile steelhead captured in the lower portion of Devil Canyon in the summer of 2000. Photo by Tim E. Hovey.

A California Fish and Game fishery biologist is pictured above while conducting a snorkeling survey in trout pools in Devil Canyon, August 2000. Photo by Darrin Bergen

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came to a close, the drought conditions became severe. While the lower portion of Devil Canyon ran dry, its interior pools maintained levels adequate for trout survival. The narrow creek walls and extensive over-growth protected the pools from direct sunlight for most of the day, slowing evaporation. The temperature probes also indicated that the larger pools were still being fed by sub-terrainian flow, maintaining a thermocline aiding trout survival.

Through 2001 and into the spring of 2002, we monitored the few fish on Devil Canyon Creek. The pools were separated now and it became easy to identify specific individuals. As we monitored the size class of these trout, we were convinced that these were the survivors of the juvenile cohorts we had encountered in 2000. They appeared healthy in their ever-shrinking pools, content to stay close to the bottom, where the cooler, groundwater fed the pools. Despite the poor conditions, we continued to search for juvenile trout on the drainage. Extensive snorkel surveys and passive shore observations revealed no new recruits for 2001.

While it appeared that the severe conditions on the creek had contributed to the lack of reproductive success for 2001, we did observe behavior that would suggest the contrary. On two occasions in the summer of 2001, we observed spawning behavior in a pool that was occupied by the highest number of trout on Devil Canyon Creek. Individuals were observed staging around a central boulder and conducting reproductive posturing over a sandy area located in the center of the pool. This type of reproductive behavior had not been previously observed on either creek. Despite these encouraging observations, no actual spawning was ever documented and no juvenile trout were detected for 2001 and into the spring of 2002 on Devil Canyon.

In the summer of 2002, we began to document the decline of trout on Devil Canyon Creek. Holdover pools that would routinely survive the summer began to disappear as a result of the two-year drought. By August of 2002, we could confirm the presence of only two adults along the survey area. A month prior, we had collected a single dead, adult female trout in a pool that had a morning water temperature of 28° C (82.4 F). The fish was found to contain partially hydrated eggs that made up over ten percent of her body weight, a condition that would have certainly enabled her to spawn in life if given the opportunity. The age of the fish was found to be two-plus years, confirming that she was indeed a cohort of the juveniles discovered in 2000. Unfortunately, the conditions continued to worsen and the last trout was observed on Devil Canyon Creek at the end of August 2002.

The population was so small that two of the juveniles were directly descended from one of the original 1999 trout analyzed during the first genetic run.

At the end of 2002, we had concluded that the severe drought conditions had strongly contributed to the decline and the eventual extirpation of resident trout on San Mateo and Devil Canyon Creek. While more extensive surveys were difficult to perform on the interior of Devil Canyon due to the remote location, we felt that chances were slim that trout survived the 2001-2002 drought. With a lack of water on the drainage, we concluded that the end of the 2002 monitoring season also marked the end of trout presence on Devil Canyon Creek.

A second genetic analysis on fin clips collected from the 2000 juveniles and the 2002 dead adult confirmed that all analyzed fish were indeed offspring of the group discovered in 1999. In fact, to illustrate how small the population was, two of the juveniles were found to be directly descended from one of the

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Fishery biologist electro-fishes a pool in Devil Canyon while surveying for exotic warmwater fish, which have moved in over the years and compete with the dwindling native rainbow trout and steelhead population. Photo by Jenny O'Brien.

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original 1999 trout analyzed during the first genetic run.

At the beginning of 2003, the Department began to scale back the amount of survey time allotted for San Mateo and Devil Canyon Creek. With the poor conditions and the documented decline of resident trout, the possibilities for new discoveries were low. The lagoon had remained closed for most of the four-year monitoring period and the opportunity for immigration or emigration at the right time of year had not occurred. The San Mateo and Devil Canyon trout had managed to hold on and survive in the drainage in the worst conditions imaginable for the previous four years.

Despite the poor conditions on the drainage, there was promise. On the last day of December 2002 an angler caught and released a 20-inch female, sea run steelhead trout in Dana Point harbor, only a few miles north of the mouth of San Mateo Creek. This meant that the fish were in the area and at the right time of year. The size of the captured fish was also of interest. Twenty-inches is well within the growth rate of a three-year old, sea- run steelhead trout; a trout that may have entered the ocean system from San Mateo Creek in 1999. This strongly suggested that during the original discovery in 1999, some of the fish may have actually made it to the ocean and were now returning to the Creek to spawn.

While we were intrigued with the discovery, the presence of fish had no impact on the stream if they could not access it. For the last four years, the 100 meters (329 feet) of sand had stood as a sentinel to the ocean, precluding both entrance and exit. And even though a few rainstorms in January of 2003 had drenched the area, it provided nowhere near the amount of water capable of blowing out the sand berm. Three weeks later, that would change.

By February and heading into March a succession of large storms hit southern California. Record amounts of rainfall were reported in the short four-week period and on February 25th, 2003 the swollen creek pushed through the sand block and provided access to and from the ocean. While migration access was only available for three days, two follow-up storms continued to fill the aquifer and provided additional access to the creek for 30 days during the prime spawning period for southern steelhead trout.

Visual surveys were conducted by volunteers and Marine Base Camp Pendleton biologist, Walt Wilson, in the hopes that adult steelhead trout would be observed migrating up the recently accessible San Mateo Creek. Despite countless hours of observations, no anadromous adults were observed.

This, however, did little to dampen the enthusiasm of those interested in

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Fishery biologists from the California Department of Fish and Game (above) electro-fish San Mateo Creek to remove exotic species. Photo by Darrin Bergen. Tim E. Hovey (bottom photo) holds a 13.5-inch trout discovered in Devil Canyon in December 2003. Photo by Walt Wilson.

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the southern steelhead trout. Swollen streams, the limited number of observers and muddy waters could easily preclude any notable observation, and plans were quickly made to once again focus on both San Mateo Creek and Devil Canyon Creek for trout presence.

In the summer of 2003, several snorkel surveys failed to detect either adults or juveniles within San Mateo Creek. With evidence that the anadromous adults may have spawned in Devil Canyon and not San Mateo Creek in 1997, the survey focus shifted to the tributary in the hopes of detecting offspring.

In December of 2003, a focused survey was conducted on Devil Canyon to determine trout presence. We speculated that if adults did enter the drainage during the high water period earlier in the year and spawned in Devil Canyon, the juveniles would be of a detectable size during this time. Despite a thorough survey up the Devil drainage, no trout were detected in the lower reach. However, a thorough search of one of the larger pools where trout had been present in the past revealed a discovery that surprised all involved. A large adult trout was collected in the pool at the very end of the survey. This pool and all downstream of it had gone dry during the 2002 season. The resident fish measured 340 mm (13.39 inches) and was in exceptional condition. A genetic sample was collected and the fish was quickly released back into the pool. With the size of this fish and the observance of slightly smaller resident fish in the pool prior to it drying, we concluded that this fish was a mature holdover individual and a cohort of the 2000 juveniles discovered in the lower portion of the drainage. This would place the age of this resident, holdover trout at approximately 3 and one-half years of age.

The discovery of the holdover adult in Devil Canyon Creek establishes an uninterrupted trout presence on the drainage from the time the anadromous adults entered San Mateo Creek in 1997 to spawn to the present. It also illustrates the need for additional focused surveys in the remote interior of Devil Canyon Creek. Larger pools that may have survived the drought period and may provide refuge for resident trout have been documented further upstream within the tributary. Currently plans are being made to conduct focused, snorkel surveys of every piece of available water upstream of the recent discovery.

The size of the fish was of interest. At 20 inches it was well within the growth rate of a sea-run steelhead trout.

More Work Ahead

Being involved in most of the monitoring process from the beginning, I am continually surprised by the tenacity of this species. While most perished due to the lack of water and the exotic species present in the main stem of San Mateo Creek, the holdovers that found refuge in Devil Canyon expressed their desire for survival by hanging on in the worst conditions imaginable. The discovery of a single holdover fish in December 2003 also opens the door for additional discoveries within the remote interior of Devil Canyon Creek.

As the 2003-2004 monitoring season draws near, the excitement of new discoveries awaits both biologist and volunteers in the remote Devil Canyon Creek interior. Each new sighting extends the established trout presence on the drainage and further illustrates their tenacity. With every series of diverse conditions presented to the population, they find a way to survive. I guess we shouldn't be completely surprised, since they have been doing this for a quite awhile. However, I have to admit, on more than one occasion, I have ended a survey on San Mateo Creek shaking my head and expounding the same simple statement, "that's one tough fish!"

Incredible as it seems, the resident and anadromous rainbow trout of San Mateo Creek are still there despite the odds. Photo by T.E. Hovey.

Another View Of Skagit River Steelhead

by Curt Kraemer

— Washington Department of Fish and Wildlife —

Bill McMillan, well-known Pacific Northwest wild fish advocate, writer and part-time field biologist for Washington Trout, contributed an article to the September 2003 issue of The Osprey *titled "Skagit River Winter Steelhead, Their Past, Present and Future."*

In the following essay, Curt Kraemer, Washington Department of Fish and Wildlife Region 4 freshwater program manager, responds to McMillan's paper.

He may be reached at Washington Department of Fish and Wildlife, 16018 Mill Creek Blvd., Mill Creek, WA 98012, (425) 775-1311 ext 101 or by e-mail at Kraemcrk@dfw.wa.gov.

I feel compelled to provide some clarification to the "Skagit River Winter Steelhead their Past, Present and Future" by Bill McMillan in the last issue of the Osprey. While the article attempted to provide an overview of the Skagit steelhead and the management of that resource, I found that some of the information presented was either incomplete or misleading. I firmly believe that debate and constructive discussions are critical to our collective understanding of the complexities of the management of the resource that we all share a deep passion. The best hope for the future of that resource is having passionate users that are as well informed as possible. Based on that belief I have provided the following comments.

Regarding Historical Run Sizes

DeShazo (Dept. of Game) in 1985 reported that the early wild run size of winter steelhead in the Skagit River had been estimated to have likely been more than 20,000 adults. In McMillan's attempt to develop an estimate of the potential wild run size using the punch card catch estimate from the winter of 1953/1954 he repeated the same mistake that the State did following the Boldt decision in 1974. When the previous average catches were used to set harvest allocations between tribal and sport fisheries the managers quickly discovered that the tribe, by virtue of fishing in front of the sport fishery were catching real fish and the sport anglers were left with the task of catching their allocation from a run that was mainly "paper fish." What was discovered was that steelhead punch card catches consistently overestimate the sport catch by about 40 percent (successful anglers were more likely to return a card than an unsuccessful angler).

When those corrections are made for the calculations in estimating the potential historical wild run size based on the 1953/54 sport catch estimate, the result is a run of 19,200 instead of 32,000. This is virtually the same as that reported by DeShazo. There are additional early punch card catch estimates available for the Skagit, with those in my files going back to the winter of 1947/48. If one were to duplicate the article's method for the decade from 1947/48 to 1956/57 I found quite an array of estimates of run sizes. They range from a low of 4,600 (1947/48) to the 24,300 fish returning in 1955/56. The parent run sizes (escapements one-half of the run size?) that contributed most of the fish to the 1953/54 run were 8,700 in 1949/50 and 6,500 in 1948/49. A couple of observations from this exercise: 1) steelhead returns to the Skagit system, while potentially quite large, have always been highly variable; and 2) under the survival conditions found 50 years ago, low escapements were capable of producing run sizes well in excess of 10,000.

Steelhead returns to the Skagit system, while potentially quite large, have always been highly variable.

Escapement "Shell Game"

The discussion of the recent change in Skagit winter steelhead escapement goal omitted some germane information. For much of the 1990s the Skagit steelhead had been managed with a 16 percent cap on the exploitation or harvest rate for the wild fish. This is within the range of the repeat spawner rate seen on the Skagit and was a strategy to allow a majority of females to spawn at least once — a strategy that has been successful in rebuilding the Skagit bull trout and sea-run cutthroat populations. In addition, it provided access to the hatchery fish as well as consistent and predictable fisheries. With the decline in apparent survival of winter steelhead throughout Puget Sound it was deemed necessary that additional protection be provided to the resource. Thus the co-managers agreed to an escapement floor (goal) of 6,000 while maintaining the 16 percent cap on exploitation. The combination of the escapement floor and exploitation cap should provide additional protection for small runs (the full 16 percent could not be realized at run sizes less than 7,150). In addition it would continue to put a significant portion (84 percent) of the larger run sizes on the spawning grounds. It should be noted that estimates of the Maximum Sustainable Yield (MSY) escapement levels for the Skagit using Skagit specific data range from 2,800 to 4,800 adults. In a review of the Skagit data in "A Bayesian Decision Theory Approach to Harvest Management of Salmon and Steelhead," September 1997, Lorraine B. Reed prepared for Washington Trout," it was found that "if we want to maximize harvest, then the best strategy would be an escapement level of 4,000 spawners, because this maximizes the expected harvest for all hypotheses." It should be noted that this was not Reed's recommended goal, rather just the findings of

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Chair's Corner,
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should be included in ESU's for ESA listing purposes.

These opposing sets of petitions led to the NOAA decision to review and update the role of hatchery fish in ESA listings. NOAA's updated hatchery policy is due to be released for public comment in the first half of 2004.

A group of Central Valley California irrigators upped the ante on listing challenges by suing NOAA to de-list Threatened Central Valley California steelhead based on two arguments: (1) the presence of good numbers of hatchery steelhead; (2) the presence of significant numbers of resident rainbow trout, which are the same species (Onchorynchus Mykiss) as steelhead. In this case, the Federation of Fly Fishers, Trout Unlimited, and several other organizations intervened on the side of the defendant, NOAA. NOAA has responded to the suit by initiating a review of the role of resident rainbow trout in steelhead ESA listings. This case is moving toward a decision by the judge in 2004.

In another ESA based law suit, the Federation of Fly Fishers and 15 other organizations won the first round of their action against NOAA requesting rewrite and strengthening of the Columbia/Snake River Biological Opinion (BiOp)/Recovery Plan for eight ESA listed steelhead and salmon ESU's in the Columbia Basin. In May 2003 the judge ruled for the plaintiffs, sending the BiOp back to NOAA for redo by June 2004. The content of the rewritten BiOp will be critically important to Columbia system steelhead and salmon.

In addition to these legal actions, the Endangered Species Act has become an enormous political football, as demonstrated at a recent endangered species conference, where one speaker described the ESA as "broken," and another said there is "nothing wrong with the Endangered Species Act. It works."

Policy Statement

The Endangered Species Act, although imperfect, is an effective regulatory tool for use in protecting and recovering depressed runs of steelhead and Pacific salmon. ESA listing of severely depressed stocks, as well as enforcement of its provisions, can reduce the harmful impacts of man's activities on these fish. Sport fishing and environmental organizations support the ESA as law and encourage its use in wild fish protection efforts, even to the point of using the courts, if necessary, to ensure that it is implemented, enforced, and obeyed.

A pair of wild winter steelhead spawn in a small Oregon Cascade Mountains stream. Without protections provided by the ESA, scenes like this would eventually vanish. Photo by Jim Yuskavitch

The intent of the ESA is to protect and recover wild populations, so with rare exceptions for ESU's on the immediate verge of extirpation such as Snake River sockeye salmon, the ESA should afford protection only to wild steelhead and salmon populations. Therefore, wild fish should be classified in separate Evolutionarily Significant Units from hatchery fish, and only wild fish ESU's should be considered for listing as Endangered or Threatened.

The ESA provides for listing below the species or sub-species level, describing smaller candidates for listing as "distinct population segments." We support the designation of wild steelhead and salmon ESU's separate from hatchery fish in every group of stocks as consistent with the meaning of "distinct population segments." This separation is justified by the many ways in which hatchery fish are inferior to wild fish, including behavioral, physiological, ecological, reproductive, and evolutionary shortcomings.

The relationships between seagoing steelhead and resident rainbow trout (both species O. Mykiss) in the same watershed are more complex than wild and hatchery steelhead. Wild steelhead have no need for hatchery fish in sustaining the species; indeed the evidence increasingly is that hatchery fish harm wild populations. However, there is increasing evidence that seagoing and resident wild rainbows carry out spawning interactions occasionally and that both the seagoing and the resident forms can be critical to the long term health of the stocks in some watersheds. For instance, a catastrophic natural or man-caused event (e.g., Mt. St. Helens eruption) can wipe out an entire searun or resident population, but the surviving population can repopulate both the searun and resident strains over time. Therefore, both the searun and resident strains must be designated as "distinct population segments," each vitally important to the long term viability of the species in the watershed. Depressed levels of either seagoing or resident strains should be considered for ESA listing.

We strongly oppose any attempt by NOAA Fisheries to de-list wild steelhead and salmon ESU's based on the presence of substantial numbers of their hatchery counterparts. We also oppose de-listing of wild steelhead ESU's based on the presence of wild or hatchery resident rainbow trout. The ESA is a friend of the angler/conservationist, and 2004 is shaping up to be a very important year for the future of these magnificent fish.

Skagit Views,
Continued from page 17

several management options presented (the recommendation was for a goal of between 8,000 to 9,000 spawners with the upper number being the estimate of the average carrying capacity). It should be further noted however that the escapement floor of 6,000 is 150 percent of Washington Trout's consultant's best estimate of MSY, clearly a strategy not designed to wring every last harvestable fish from the population.

Restoration Strategy

The article chides the Washington Department of Fish and Wildlife (WDFW) for not investing in the time, money, and energy in approaches similar to that of Seattle City Light (SCL). This falls into the category of using WDFW for a scapegoat for the failings of Washington citizens. WDFW has not been given either the authority or the resources to unilaterally implement such plans.

Lets look more closely at the so-called "SCL model" and its success. First a bit of history: Several decades ago it was recognized that the mode of operation of SCL's hydro-electric dams on the upper Skagit (Ross, Diablo, and Gorge) was having a significant negative impact on the anadromous salmonid resource downstream. The most apparent of these impacts were the stranding of young fry during down ramping events (lowering of the river level as the water through the turbines was being turned off) and the de-watering of redds. After more than a decade of study and intense negotiation between SCL and various state and federal resource agencies and local tribes, modifications of the operating procedures were agreed to. This included maintaining more favorable flows for redd protection (to limit de-watering) and limits on the rate of down ramping (to reduce stranding of the fry). As McMillan pointed out, this has been successful in achieving those goals resulting in increased abundances of Chinook, pink and chum salmon spawning in the upper reaches of the Skagit. However, there has not been any corresponding increase in steelhead usage in the reach of the river. In fact the density of steelhead redds in that upper 15 miles of river is the lowest of any mainstem spawning areas found in the Skagit or Sauk. This model has not been a success for winter steelhead. The reason for lack of success with the steelhead remains unclear.

Regarding the Baker River projects, the various state and federal resource agencies and tribal co-managers are well aware of the significant fishery issues there. That is why they have devoted a substantial effort on those projects spanning several decades and are intensively involved in addressing those issues through the Federal Regulatory Commission relicensing process. WDFW's commitment in that regard is not in any way connected, compromised, or influenced by Grandy Creek hatchery initiatives.

In summary the Skagit case clearly illustrates that steelhead populations are highly dynamic with abundances changing dramatically (often in a cyclic fashion) both within the population as well in relation to the salmon populations. Additionally the whole ecosystem is dynamic and changes or enhancement efforts for one component may or may not benefit another. The trick is for both the users and managers to recognize these dynamic processes and adjust our expectations while insuring that management schemes are responsive to those changes.

In the interest of being brief I have limited my input to the above issues and purposely limited the supporting data and discussion. If any of the readers have an interest in additional details, questions or wish a further exchange of ideas, please feel free to contact me directly.

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The Osprey wishes to thank the dedicated people and organizations who gave their financial support in 2003. Our readers are our primary source of funding. It's pretty remarkable that our home-grown journal, which only comes out three times a year, has developed such a generous following. Don't think we're not grateful, and a bit humbled.

We have always skated on thin financial ice, and will continue to do so. But without your support we fold up. The usual donation envelope is provided. Whatever you can afford will be much appreciated (and used wisely).

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