DEVELOPING A LONG-TERM PROTECTION PLAN FOR THE McCLOUD RIVER, CALIFORNIA[1]

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Abstract.--The McCloud River drainage in northern California hosts the Dolly Varden char (Salvelinus confluentus), Shasta rainbow trout (Salmo gairdneri), redband trout (S. campi), Shasta salamander (Hydromantes shastae), and Shasta eupatory (Eupatorium shastense). These species and numerous others with rare or threatened status have until recently been indirectly protected by a history of private ownership and inaccessibility of large parts of the drainage. Dam construction, water diversion, road construction, timber harvest, angling pressure, and limestone quarrying now threaten the drainage and have encouraged intensive planning efforts to lessen their impacts. However, integrated planning using a system-wide approach has been complicated by multiple ownership and agency involvement in the drainage. The Nature Conservancy through the McCloud River Preserve is seeking to resolve this problem with its McCloud River Protection Plan. The tentative components of this plan are presented in detail.

INTRODUCTION

Environmental planning has come into its own as a discipline in the last few years. Aiding in this evolution have been various governmental mandates; most notably the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). We are finally seeing proposed actions with potential environmental impact being preceded by thorough studies of the affected system. However, the preservation of the integrity of a whole system as an end in itself is rarely the direct object of planning efforts. Achieving such an end is often complicated by multiple ownership and agency involvement. Such is the case on the McCloud River in northern California, where The Nature Conservancy (TNC) owns the McCloud River Preserve (the Preserve).

Ownership in the McCloud drainage includes private individuals, fishing clubs, and timber companies as well as Pacific Gas and Electric Company, USDA Forest Service (FS), and TNC. The California Department of Fish and Game (DFG) is also deeply involved with the wild trout fishery there. Each entity has its own recognized values of the drainage, its own goals, and its own planning program to achieve these goals. TNC, through its involvement with the Preserve, is in the position of being able to work towards the preservation of the integrity of the McCloud River drainage as its primary goal. With such a goal, the system will come first; the challenge will be to integrate the activities of the other entities involved and direct them towards this goal.

Work has only just begun on this planning effort, known as the McCloud River Protection Plan. The details behind this plan are presented at this incomplete stage so that they will be available at an earlier date to other planners dealing with whole systems. The author hopes this timing will also generate suggestions which may improve the planning efforts of TNC in the McCloud River drainage.

DESCRIPTION OF THE SYSTEM

The McCloud River drainage is located in Shasta and Siskiyou counties in northern California, in a region where the Sierra Nevada, the Cascades, and the Klamath Mountains intersect (fig. 1). The McCloud River originates in the relatively flat volcanic region southeast of Mt. Shasta. From there it flows westward through extensive yellow pine (Pinus ponderosa) forest for about 40.2 km. (25 mi.) as a large stream.

[1]Paper presented at the California Riparian Systems Conference. [University of California, Davis, September 17-19, 1981].

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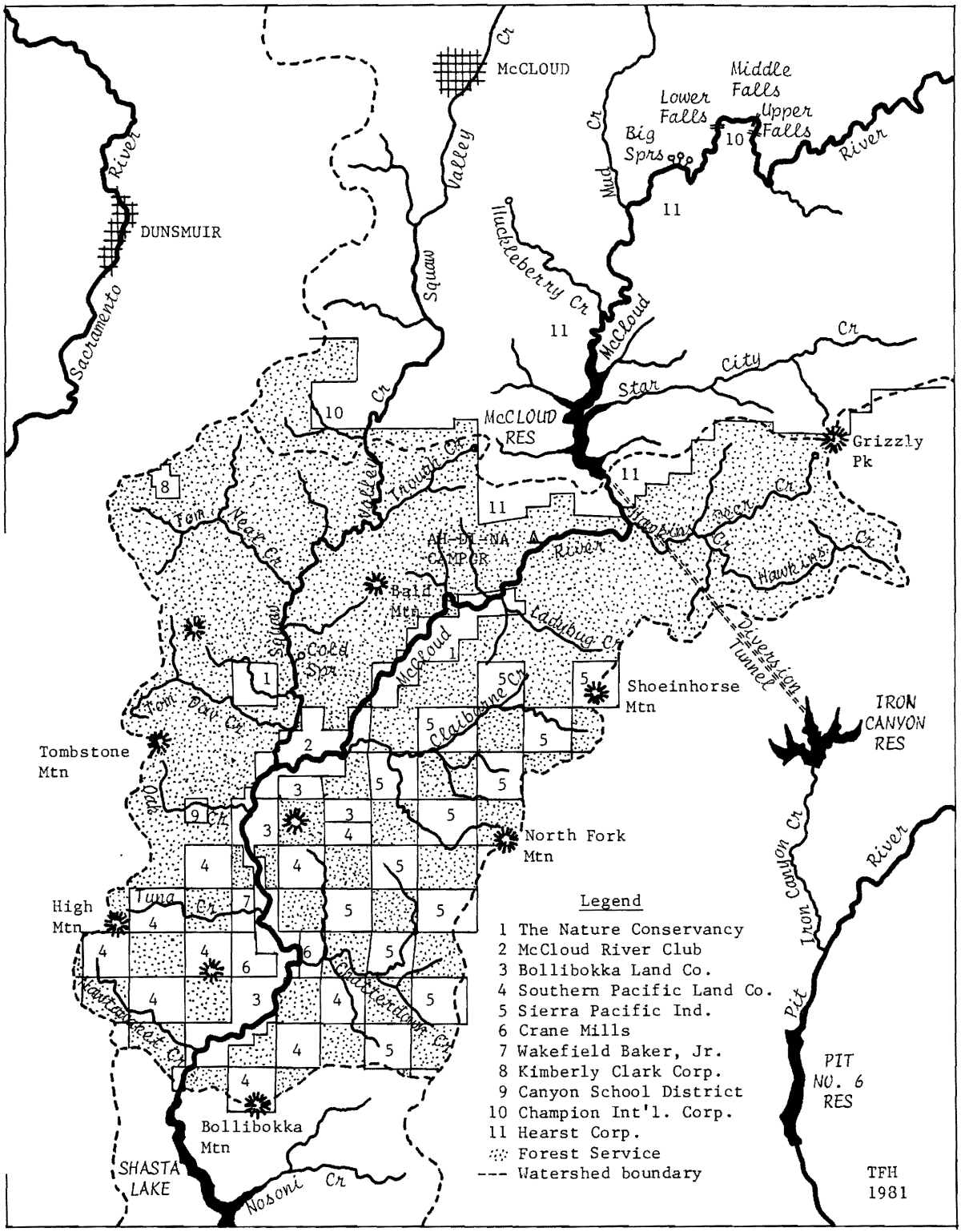

Figure 1.--Map of the portion of the McCloud River drainage being evaluated in the McCloud River Protection Plan, showing significant geographic features and property ownership.

Shortly after descending three large waterfalls, the lowermost being the historic barrier to upstream fish migration, the McCloud greatly enlarges in size due to input from several large springs. These springs, thought to emerge from the collapsed terminus of a lava tube, are a constant 43°F (6.1°C) and have a summer peak flow, in contrast to winter and spring peak flows of the upper McCloud River. The downstream result is a relatively constant flow and large volume of very cold water year-round.[3]

Mud Creek enters the McCloud River about 3.2 km. (2 mi.) below Big Springs, carrying a heavy load of very fine glacial silt and volcanic ash from Mt. Shasta. This imparts a turquoise-gray turbidity to the river. Below Mud Creek, the McCloud River enters a rugged mountainous region of actively uplifting sedimentary and metamorphic rock, considered to be part of the Klamath Mountain geomorphic province.[4] Prior to dam construction, the lower McCloud flowed swiftly through its steep canyon for about 80.5 km. (50 mi.) before joining the Pit River and then, a few miles downstream, merging with the Sacramento River.

Chinook salmon (Oncorhyrchus tshawytscha), silver salmon (O. kisutch), and steelhead trout (Salmo gairdneri) migrated yearly up the McCloud River as far as Lower Falls to spawn. The eggs, young, and carcasses of these species plus the stable large flow of cold water and habitat complexity provided by numerous boulders and deep pools are thought to explain why the interior Dolly Varden char (Salvelinus confluentus) has persisted in the McCloud River as a relict species. The McCloud is the southern limit of its range and the only river in California where the Dolly Varden occurs. The McCloud River strain of rainbow trout, also called the Shasta rainbow (Salmo gairdneri), may be genetically unique and has gained recognition among trout hatcheries and anglers worldwide (Sturgess and Moyle 1978).

Flanking much of the lower McCloud River are large limestone outcrops of the Baird Formation. This limestone formation has gained recognition in scientific circles for the numerous extinct mammal bones found in several of its caves and for two species endemic to both its outcrops and those of the nearby Hosselkus Formation, the Shasta eupatory (Eupatorium shastense) and the Shasta salamander (Hydromantes shastae).

Downstream from Big Springs, the river is joined by numerous tributaries with high channel gradient and cool water shaded by dense riparian vegetation and steep canyons. Squaw Valley Creek is the largest of these and ranks in size among small rivers. This stream originates near Mud Creek on Mt. Shasta and, similar to the upper McCloud, flows through the relatively flat volcanic region around the town of McCloud before entering steep, mountainous terrain and joining the lower McCloud River. Haskins Creek is a large tributary to the lower McCloud which may now play the role of the functional headwaters of the river due to its position as the most upstream tributary below a major diversion dam.

The riparian zones of the McCloud River drainage form a complex assemblage of strips along headwater and tributary streams, vertical borders of waterfalls, lush growth around springs (both volcanic and limestone), oasis-like seeps often high on slopes, "dry" lakes and sinks, and large streamside flats interspersed with narrow gorges along the main river and lower Squaw Valley Creek. These large flats host numerous Wintu Indian archeological sites.

Researchers on the Preserve have noticed a much higher number of plant, avian, and mammalian species in these areas than elsewhere.[5,6,7] Some plant species (e.g., Abies concolor) exhibit a southern range extension here, apparently due to cold air drainage associated with the cold water and steep canyons. Numerous heavily used animal trails link riparian areas to the uplands via the spines of ridges. On the Preserve, the riparian zone along the river has recently been the site for numerous deer kills by mountain lions.

HISTORY OF THE SYSTEM

The Wintu Indians were the original inhabitants of the lower McCloud drainage, relying in part on the anadromous fishery for sustenance. While adjacent drainages were being altered by transportation routes and the search for gold in the late 1800s, the McCloud remained intact.

Central Pacific Railroad acquired the first ownership in the drainage, consisting of a river corridor and surrounding checkerboard ownership of sections. However, construction of a railway along the river never came to pass. By this time the fame of the McCloud River's wild trout fishery had spread to San Francisco, and the river corridor property was quickly bought up by pri-

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[3] Data on file at the USDI Geologic Survey, Redding, Calif.

[4] Haskins, D.M. 1981. Slope stability hazards and water quality effects: proposed Ah-Di-Na timber sale. Unpublished report. Shasta-Trinity National Forest, Redding, Calif.

[5] Patterson, C. 1975. Vegetation survey: McCloud River Preserve. Unpublished report. The Nature Conservancy, San Francisco, Calif.

[6] Hayes, M. 1975. Report on the avifuana and herpetofauna: McCloud River Preserve. Unpublished report. The Nature Conservancy, San Francisco, Calif.

[7] Hayes, M., and P. Kraai. 1975. Report on the mammals of the McCloud River Preserve. Unpublished report. The Nature Conservancy, San Francisco, Calif.

vate individuals and fly-fishing clubs. Land ownership is shown in figure 1. An egg-taking station was installed a few miles up from the confluence with the Pit River, and the McCloud River rainbow trout was introduced to streams around the world.

The first major change to the McCloud drainage came in the form of Shasta Dam, completed in 1945, which blocked anadromous fish migration and inundated about 24.1 km. (15 mi.) of the lower river. Upstream, the impact was more ecological than visual; the pristine qualities of the McCloud River drainage remained unaltered until its downfall in the early 1960s. At that time Pacific Gas and Electric Company built a reservoir to divert most of the McCloud's flow to the Pit River drainage for hydroelectric production. An extensive system of roads was constructed, and much of the land around the reservoir was logged. The FS subsequently acquired about 8.0 km. (5 mi.) of riverfront property below the reservoir and installed a campground. The new road system and public ownership along the river brought a drastic increase in angling pressure to which DFG responded by stocking the river with hatchery trout. The Dolly Varden char population rapidly declined until it was thought to be extinct in the McCloud River.

Impacts on the riparian zone of the river were substantial. Aside from inundating 8.0 km. (5 mi.) more of river, McCloud Reservoir drastically reduced the annual flow downstream. Most Douglas fir (Pseudotsuga menziesii) and western red cedar (Thuja plicata) trees growing within the riparian zone died, supposedly due to a root rot epidemic.[8] Alders and willows colonized the banks and gravelbars previously scoured by annual floods. The exotic black locust (Robinia pseudoacacia), first introduced at a homesite upstream, likewise responded to this available habitat and spread downstream. The streamside plant Peltiphyllum peltatum began blooming in April instead of June. Beavers began to lodge along the river where they had probably probably been excluded by regular floods in the past.

To complicate this situation, extensive logging and associated road-building increased sediment input. Fortunately, the soils in the McCloud drainage are fairly resistant to mass failure, and the problems found on the Trinity River and Redwood Creek have not yet developed there. However, due to a relatively low channel gradient and reduced flows, the river may not be able to flush out the sediment. This in time could lead to streambed aggradation with associated bank erosion (Seidelman 1980). Fine sediments cloud the river during large rainstorms; this may affect spawning gravels and aquatic invertebrates.

This was the state of affairs when TNC acquired the Preserve in 1973. The McCloud River Club, one of the large private owners, donated 943 ha. (2,330 ac.) of their land, including 10.5 km. (6.5 mi.) of river. The gift was gladly accepted by TNC, which was well aware of the recent and rapid decline in riverine systems throughout the state.

CRITICAL ELEMENTS

Natural diversity may be thought of in terms of the units that comprise it. These are here called "elements" of natural diversity, the building blocks of uniqueness in any natural systems. Many of the elements found in the McCloud River drainage are now considered to be critically threatened. Table 1 lists those critical elements that have been identified to date. Many of these elements do not depend solely on the McCloud region for their continued survival, but since they have been recognized as worthy of concern, they are listed here for the sake of completeness. TNC is primarily concerned with those taxa of proven or potential genetic uniqueness which are restricted in distribution to the McCloud region, as well as those of such critically threatened status as to have received state and/or federal legal recognition.

CURRENT AND POTENTIAL THREATS TO CRITICAL ELEMENTS

Current and potential threats to the critical elements of the McCloud River drainage include dams, timber harvest, public-use pressure, limestone quarrying, and ignorance. Dams are by far the greatest threat. As mentioned above, these have already resulted in inundation, streamflow and temperature regime alterations, blockage of spawning runs, and to the riparian zone. In the future they may result in stream channel aggradation. The Bureau of Reclamation (BR) and the California Department of Water Resources (DWR) have begun a joint feasibility study to evaluate the proposed enlargement of Shasta Lake's water storage capacity. One proposal is to raise the existing lake by 61 m. (200 ft.). This would inundate 9.7 km. (6 mi.) more of the McCloud River. An alternative to this may be to construct more dams upstream from Shasta Lake, which could involve both the lower McCloud River and lower Squaw Valley Creek.

Timber sales on FS lands in the drainage continue to be planned, and some involve large expanses of old-growth forest adjacent to or near the Preserve. The greatest threat is new road construction which may lead to increased sedimentation, habitat disruption, and undesirable public access. Existing roads in the drainage, especially those adjacent to streams, are already contributing a considerable amount of sediment to the river during storms.

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[8] Kunkel, G. 1975. Cryptograms of the McCloud River Preserve: a floristic study. Unpublished report. Department of Botany, University of California, Davis.

Table 1.--Critical elements of the McCloud River drainage. Status: CE--California Endangered; CR--California Rare; FE--federal Endangered; DB3--California Natural Diversity Data Base Priority 3;[1] L-#--California Native Plant Society List-# (plus R.E.V.D. Code); DFG--California Department of Fish and Game partial protection. (Note: all animal species listed here as CE, CR, or FE are also listed by the California Natural Diversity Data Base as Priority 1.)

Element Type	Common Name	Scientific Name	Status
		Aquatic Environment	
Fish	Interior Dolly Varden char	Salvelinus confluentus	CE
	McCloud rainbow trout	Salmo gairdneri	DFG
	Redband trout	S. campi	DB3
	(Not found on the Preserve and currently not found in the lower drainage, but proposed to be introduced into Deer Creek by DFG)		
General	Unique hydrology of the McCloud River		
Invertebrates	Possibility of unique species/assemblages		
	(Aquatic invertebrates need much more study, but preliminary studies indicate some uniqueness)		
		Riparian Environment	
Plants	Howell's lewisia	Lewisia cotyledon howellii	L-2 2-2-2-2
	Cantelow's lewisia	L. cantelowii	L-2 2-2-2-3
	Purdy's sedum	Sedum spathulifolium purdyi	L-Append.
	(These three grow primarily on partially shaded rock outcrops immediately along the river and some tributaries since this is the most likely place to find such outcrops, but it also grows well away from the riparian zone on suitable outcrops)		
Birds	Bank Swallow	Riparia riparia	DB3
	Yellow Warbler	Dendroica petechia	DB3
	Yellow-breasted Chat	Icteria virens	DB3
	Bald Eagle	Haliaeetus leucocephalus	FE,CE
	Osprey	Pandion haliaetus	DB3
	Wood Duck	Aix sponsa	DB3
	Great Blue Heron	Ardea herodias	DB3
	(Yellow-breasted Chat, Bald Eagle, Osprey, Wood Duck, and Great Blue Heron have not been observed to breed on the Preserve, but breed elsewhere in the drainage)		
Mammals	River otter	Lutra canadensis	DB3
Prehistory	Numerous sites on streamside flats		
	(Sites have significant bearing on FS timber sale planning)		
		Old-growth Forest Environment	
Birds	Spotted Owl	Strix occidentalis	DB3
	(Not observed breeding on the Preserve, but breeds elsewhere in the drainage; has significant bearing on FS timber sale planning--its nests are given about 1,000 acres of old-growth forest buffer; were located in upper drainages of Ladybug and Hawkins creeks in 1981 by FS personel)		
	Goshawk	Accipiter gentilis	DB3
	(Not observed breeding on the Preserve, but breeds elsewhere in the drainage; has significant bearing on FS timber sale planning)		
	Pileated Woodpecker	Dryocopus pileatus	DB3

[1]California Natural Diversity Data Base. 1981. Element list. Unpublished report, California Natural Diversity Data Base, Sacramento, Calif.

Table 1.--Continued.

Element Type	Common Name	Scientific Name	Status
Mammals	Wolverine	Gulo gulo	CR
	(Sighting was made downstream of the Preserve near Chatterdown Creek by FS personel in 1980)		
	Fisher	Martes pennanti	DB3
		Baird Formation	
Plants	Shasta eupatory	Eupatorium shastense	L-3 1-1-1-3
	(Has not been found on the Preserve but occurs nearby)		
Amphi-bians	Shasta salamander	Hydromantes shastae	CR
Mammals	Ringtail	Bassariscus astutas	DB3
Inverte-bates	Cave spiders, pseudo-scorpions, etc.		
	(Cave spiders were observed but not identified in Ringtail Cave; pseudoscorpions were studied in Samwell Cave. Both groups are endemic at the species level to the cave system they are found in.)		
Prehistory	Artifacts found in caves		
	(Cave artifacts include human bone fragments, obsidian chips, freshwater clam shells, marine fossils, and many mammal bones including remains of numerous extinct species.)		
General	Hydrology and geology of the cave system		
		General	
Plants	Siskiyou corn lily	Veratrum insolitum	L-4 1-1-1-1
	(Not yet observed on the Preserve, but abundant on Fisher Ridge and Skunk Hill.)		
Reptiles	Mountain king snake	Lampropeltis zonata	DFG
Birds	Sharp-shinned Hawk	Accipiter striatus	DB3
	Golden Eagle	Aquila chrysaetos	DB3
	(Not observed to breed on the Preserve but breeds elsewhere in the drainage.)		
	Ruffed Grouse	Bonasa umbellus	DB3
	Screech owl	Otus asio	DB3
Mammals	Ringtail	Bassariscus astutas	DB3
	Mountain lion	Felis concolor	DFG

The FS has made significant attempts to minimize logging impacts by placing roads high on slopes and ridges, using cable logging on steep slopes, and establishing wide buffer strips along streams and inner gorges. The FS has also been very receptive to TNC concerns and to public input, and is willing to approach timber sale planning as a cooperative effort. Nevertheless, timber values are still ranked higher than ecological and recreational values in the drainage, which makes attempts to establish a sizeable special management area along the river very difficult. One sale has just been approved, another is on the verge of approval, and three more are being planned. One of these latter sales, the Beetle-Dee Sale, could involve up to 48.3 km. (30 mi.) of new roads and the harvest of 50 million board-feet of old-growth timber near the Preserve.

Related to this is the progress of the second FS Roadless Area Review and Evaluation (RARE II). Two large roadless areas were identified along the lower McCloud River, and both have been recommended by the FS for non-Wilderness status. One of the areas, which includes all of lower Squaw Valley Creek drainage, was included in a recent California Resources Agency lawsuit against the FS. This effectively stalled planning on two timber sales, but neither roadless area has been included in any of the pending Congressional wilderness bills.

Timber harvest on private lands has occurred recently both on ridges just upstream from the Preserve and near the river a few miles upstream from Shasta Lake. New roads have been completed for harvesting in two large tributary drainages below the Preserve. Timber harvest plans must be filed with the DFG, but the public review period is both brief and poorly advertised.

Public-use pressure comes mainly from anglers. Impacts on the fishery were significantly reduced between McCloud Dam and the lower boundary of the Preserve by recent inclusion of this section in the state's Wild Trout Stream program. The remaining sections of river between Lower Falls and Shasta Lake are on private land where

angling pressure is minimal. Tributaries are not included in the existing Wild Trout Stream section, of which Hawkins Creek and lower Squaw Valley Creek are the main concerns. The former has easy public access and may function as an important spawning area due to McCloud Dam; the latter stream is on FS land where vehicular access may soon become possible. Other forms of public-use pressure include hunting, camping, and hiking (notably along the Pacific Crest Trail which crosses both the lower McCloud River and lower Squaw Valley Creek).

Riparian zones receive the brunt of the traffic from this public use. Wild Trout Stream designation did not alleviate this problem since its regulations only apply to the fishery. On the Preserve, impacts are minimized by limiting the number of visitors to the Preserve at any one time, maintaining well-marked trails, and prohibiting camping.

Limestone is being quarried by the Flintkote Company at the southern tip of the Baird Formation. The Shasta salamander occurs there, and the company has set aside a portion[9] of its land for the salamander's preservation. Flintkote does not anticipate running out of limestone at their present site for many years, but the threat of new mining claims remains.

A very serious threat to the McCloud River drainage is the relative lack of scientific investigation and public knowledge. The Shasta salamander was described in 1953 and the Shasta eupatory in 1958; both dates relatively recent when compared to[6] investigations elsewhere in California. Hayes indicated that an undescribed species of slimy salamander may exist on the Preserve, and Moyle (1976)[10] feels that the taxonomic status of the McCloud strain of rainbow trout is still uncertain. Range extensions for the Shasta salamander and Shasta eupatory have recently been made, and a documented sighting of a wolverine was made in 1980.[11]

Recreational and aesthetic qualities of the drainage, beyond the angling experience, are virtually unknown to most of the public; 70% of the Preserve visitors come to fish and many of the rest are just "tagging along." However, although the drainage is being exploited for its timber and water without much resistance because of this scientific and public ignorance, it stands to suffer the impacts of increased public use should more people learn of its biological and recreational qualities. The latter situation would seem to be the lesser of two evils.

INITIAL PLANNING REPORTS

In the early years of TNC, critically threatened areas were considered protected once they were acquired. Extensive stewardship programs including both restoration and long-term preservation strategies were not developed. Furthermore, no attempt was made to identify and protect whole systems. As the ecological health of many preserves continued to decline from unchecked consumptive public use, lack of restoration, and impacts from surrounding land uses, TNC began to place a greater emphasis on stewardship. This is reflected in the evolution of preserve planning efforts.

The Preserve was acquired at a time when the value of stewardship planning was finally beginning to be recognized. As a result, the first step after acquisition was to make an extensive inventory of the Preserve to determine the presence and status of critical elements and recommend management strategies. Initial action was taken in the form of implementing protective fishing regulations, and a management program including limited public use was begun in 1976. The results of the inventories and inititial management experiences were incorporated into a master plan in 1978, which included a brief introduction to the region, summaries of research findings,[12] and recommendations regarding management.

The management recommendations of the master plan were subsequently implemented, but beyond this the plan had no further practical value. In fact, its title was a misnomer. The need still existed for a long-term, drainage-wide comprehensive plan which described the critical elements and their threats in detail and then proposed specific stewardship strategies which addressed: 1) the protection of the critical elements beyond the existing preserve boundaries; 2) restoration and long-term preservation of these elements on the Preserve; 3) the need for scientific research, baseline studies, and monitoring of long-term changes in the critical elements; 4) public use and education; 5) administrative concerns; and 6) financial support. This need was met by the nation-wide development of preserve preservation plans (PPPs), which were to be renewed on a five-year basis. The 1984 PPP for the[13] McCloud River Preserve was completed in 1979. Each year applicable strategies are taken from this document and included in an annual plan which is the day-to-day guiding tool of preserve management on the McCloud River.

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[9] Besecker, R.L. 1979. Personal conversation. Flintkote Company, Calaveras Cement Division, Redding, Calif.

[10] Moyle, P. 1976. McCloud River Preserve: biology and management. Unpublished report. Department of Wildlife and Fisheries Biology, University of California, Davis.

[11] Bacon, M. Personal conversation. USDA Forest Service, Shasta Lake Ranger District Office, Mountain Gate, Calif.

[12] Sheppard, J. 1978. McCloud River Preserve master plan. Unpublished report. The Nature Conservancy, San Francisco, Calif.

[13] Hesseldenz, T., and S. Gordon. 1979. 1984 preserve preservation plan for the McCloud River Preserve. Unpublished report. The Nature Conservancy, San Francisco, Calif.

On the brink of becoming buried under a heap of planning documents, one last plan was found necessary. The 1984 PPP could not adequately address the subject of protection because of lack of sufficient data. The importance and complexity of this subject warranted the development of a separate protection plan for the McCloud River drainage.

THE McCLOUD RIVER PROTECTION PLAN

Although various ideas for protecting the McCloud River drainage have been floating around for several years, actual work on a protection plan was just begun this year. As such, much of what is discussed below is still tentative; it is presented to illustrate the approach being taken. A draft of the plan will be ready for circulation to concerned agencies, clubs, and individuals in mid-1982, and their responses will be incorporated into a final draft by the end of that year.

The McCloud River Protection Plan will consist of three phases: identification, prescription, and implementation. The identification phase, which has already begun, initially involved the establishment of tentative boundaries. In the case of the McCloud River, watershed boundaries from the McCloud Dam to Shasta Lake were initially used to define the major area of concern. The dividing line between logged-over publicly accessible lands and old-growth gated lands roughly coincides with the transition from gentle volcanic to rugged uplifted topography, and provides a useful boundary between lower Squaw Valley Creek and the rest of the drainage, which extends all the way to Mt. Shasta.

The lands around and upstream from McCloud Reservoir have been severely logged, yet the river from Upper Falls to the head of the reservoir is of major concern. Dolly Varden char may extend upstream as far as Lower Falls, and the stretch of river from Big Springs to the reservoir represents the only remaining segment of large unaltered flows. Here the tentative boundary lines define a corridor along and including the river. Gentle topography, extensive logging, limited recreational potential, and lack of many critical elements of the McCloud River above Upper Falls suggest that consideration there be limited to protection of water quality and the redband trout.

Having established tentative boundaries, the pattern of ownership was determined (fig. 1). The majority of the land is owned by the FS. Most of the riverfront property is private. In addition, many sections of land below McCloud Dam are privately owned by large timber companies in a checkboard pattern. Upstream from the dam, most of the land is owned by the Hearst Corporation. Information on private lands obtained at the Shasta County Tax Assessor's Office includes parcel size and location, ownership, assessed value, and ownership of timber or mineral rights. This is the current level of progress made on development of the protection plan. The next step will be to gather information on each parcel regarding past alterations, presence and status of any critical elements, current and potential threats, and the owner's plans for the property and receptivity to TNC objectives. Similar information will be assembled regarding FS lands.

Once all pertinent information has been gathered in the identification phase, private parcels will be assigned priorities, and alternative protection techniques will be prescribed. Priority will be determined by location, ownership, critical elements, and threats. Parcels closer to the river will probably have higher priority, and those along the river and closest to the existing Preserve will have highest priority. Parcels of land in major tributary drainages will probably rank higher than those along ridgetops away from stream channels. Those parcels strategically located to either maintain the integrity of a large area of native environment or provide a buffer between such an area and disruptive activities will have a higher priority. The distributions of critical elements will play a vital role in establishing priority.

TNC has developed many successful methods of protecting private land. In the McCloud drainage the methods being considered are acquisition by either purchase or donation, conservation easements, management agreements or negotiations, land exchanges, inclusion within protective governmental systems, and no action. Acquisition may in some cases involve mineral or timber rights where the owners of these rights are different than the landowners. In the event that an owner does not wish to sell, an arrangement, termed "rights of first refusal" may be agreed upon, by which TNC is given the opportunity to match any offer made if the owner decides to sell at a later date. A conservation easement is attached to a deed and may apply only to a particular portion of a parcel, such as a river corridor.

A less permanent method of protection is a management agreement, which is made with the present owner and remains in effect until the land changes ownership. If all else fails, specific negotiations can be made regarding land-use activities as they arise. In the case of a timber harvest on private land, the owner must file a timber harvest plan with the state; the plan is then made available for public comment.

From the point of view of the FS, private inholdings, especially those in a checkerboard pattern, present serious management problems. In response, the FS has been exchanging equal or better land on the fringes of national forests with these inholdings. Such land exchanges can be beneficial to TNC as well, by maximizing land-use planning based on ecological/geographic units rather than on often ecologically meaningless property boundaries. TNC may negotiate for direct land exchanges between private owners and the FS or may acquire land and subsequently transfer it to the FS.

Land stewardship philosophy varies sufficiently between TNC and the FS to warrant retention of ownership of the existing Preserve, but in less critical parts of the drainage (e.g., away from the river), the two agencies may be able to negotiate successfully. It is to the advantage of TNC to retain ownership over as little land as possible in order to allow the most efficient use of its limited resources.

Several governmental land status designations could influence activities on private lands and thereby serve as protective methods. Wilderness Area designation would prohibit timber sales and dam construction, but would also drastically increase public-use pressure. The same is true for Wild and Scenic River designation. Furthermore, this status only involves a 0.8-km. (0.5-mi.) wide corridor along the river. Wild Trout Stream status protects the river itself, but has no bearing on the surrounding lands other than requiring angling access. The FS is being actively encouraged to establish a special management area along the river, but this will probably only be a corridor and will only apply to public lands. Of all possibilities preliminarily studied, Research Natural Area (RNA) or Special Interest Area (SIA) designation seem to be the most desirable for appropriate public lands in the drainage.

In cases where timber values, public-use pressures, and/or priority ranking are low, it may prove best to take no action at all. Such areas are under what might be called de facto protection.

After prescribing preferred protection methods for each parcel of private land and evaluating protective land status designations for adjacent public lands, program options must be developed which unify these separate methods into overall strategy options. Development of a protection plan is in itself a unifying force, having one objective and involving one drainage, but when seeking public and government agency support, offering optional "package deals" will help ensure success of the plan. A similar approach was used in developing TNC's California Critical Areas Program; support for the individual critical areas would have been hard to come by without the unifying theme represented by the program. Each alternative package for the McCloud drainage will describe a desired ultimate land ownership pattern, zones of varying degrees of protected status with specific restrictions given (including applicable legal designations), and the costs and time frames necessary to accomplish each alternative. Within the theme of protection for the drainage, the alternatives will range from the "environmentalist's ideal" to the "limits of compromise", such that each one will be viable should it ultimately be the one supported by the public, governmental agencies, and TNC.

As an example, one alternative might be to recommend a university- or Conservancy-operated research field station along the river, surrounded by a RNA. The lower McCloud drainage is ideal for field studies involving fisheries biology, aquatic entomology, old growth forest-related wildlife biology, and studies of the endemic species and artifacts of the Baird Limestone Formation, to name a few. The existing upper portion of the Preserve would continue to be managed under the current public-use system, which could be located on the edge of the RNA and serve as a buffer.

Part of lower Squaw Valley Creek could be included in the RNA and added to the state's Wild Trout Stream system with the upper part being open to reduced-limit fishing as another buffer. Thus, the core of the RNA would be closed to fishing and adequately buffered to ensure undisturbed conditions for ecological protection and scientific study. Since the program would be closely tied with maintaining a high-quality angling stream, substantial financial support on a continuing basis could most likely be achieved from the angling public.

Once options have been developed, the draft protection plan will be circulated among appropriate agencies, clubs, and individuals to determine which alternative is most agreeable to everyone concerned. Once this is completed, TNC will have a fairly accurate idea of how to proceed with implementation of the protection plan.

During the implementation phase, the two most obvious needs will be financial and agency support. TNC has funds for acquisition, but in order to keep these funds available for the most critical of threatened areas, a local fund-raising campaign is initiated for every new project. The McCloud is fortunate in having the tremendous support of fly-fishing individuals and clubs across the western United States. Good trout streams are becoming quite rare, and at the same time the sport of fly-fishing is continuing to grow. A new consciousness has been developing along with the sport--an awareness of, and deep concern for, the ecological factors involved in a healthy stream and its surrounding environment. This is what has led to the success of the catch-and-release concept and the continued strong support of the existing Preserve.

Agency support will be much more difficult to achieve. Timber and water values rank very high in the drainage; Warner (1979) indicated that by the year 2000 35% more timber will be required and agricultural and urban uses of water will increase by more than 50%. The federal government is showing a declining interest in environmental concerns. Educational institutions must be convinced of the drainage's scientific value and of a dependable source of continued funding should a research field station be proposed. The "not invented here" attitude towards progressive and aggressive planning efforts could hinder progress with both other agencies and

fly-fishing clubs. The solution to this latter problem will be to include all concerned agencies, clubs, and individuals throughout the planning process, such that the protection plan is a product of cooperative effort, as it should be.

OTHER PLANNING EFFORTS

Beyond the in-house reasons for TNC's development of a McCloud River Protection Plan, such a plan is necessary to more effectively coordinate TNC involvement in the planning processes of other agencies in the drainage. To date, interactions with FS and DFG have been on a piecemeal basis, in response to specific threats. Both of these agencies are currently developing management plans affecting the McCloud River drainage.

Involvement in FS planning began in 1975 with the routing of the Pacific Crest Trail through the drainage. Subsequently, as specific timber sales in the drainage were planned, TNC has played an increasingly greater role in seeking minimal harvests, protective techniques, and thorough study of sensitive species and potential water quality impacts. Most recently, TNC has been involved in the development of the Shasta-Trinity National Forest Land and Resource Management Plan in which, it is hoped, a special management area will be established in the drainage and both timber harvest quotas and potential harvest-site suitability ratings will be more realistic. At present, the entire drainage is zoned for timber harvest. Two major drawbacks of this plan, with respect to the McCloud River drainage, are that it will address the whole Shasta-Trinity National Forest, of which the McCloud is only a small part, and it will only deal with public lands in the drainage.

Recent DFG involvement in the drainage began with Wild Trout Stream designation in late 1975, which included the establishment of a Dolly Varden Char Sanctuary within the Preserve. During 1977 and 1978, the river was surveyed from Lower Falls to Shasta Lake with the hope of finding Dolly Varden, and no confirmed sightings were made. It is suspected that the McCloud River population of Dolly Varden char may be geneticall-ly distinct, but the lack of sufficient sampling has prevented any progress on this subject, although the DFG is now referring to the population as the California bull trout. At this point the prospect for a rehabilitation project is uncertain, but protective management will nevertheless be encouraged. The most recent efforts to this end have been in the development of a lower McCloud River Wild Trout Area Management Plan. A preliminary position statement was released by DFG early in 1981 for consideration by the FS in their planning efforts.[14]

[14]Naylor, A.E. 1981. The lower McCloud River wild trout management area. Position Paper, California Department of Fish and Game, Region 1, Redding, Calif.

These other planning efforts indicate that TNC is in the best position to develop a protection plan for the drainage. However, it must rely upon the support of the users of the drainage (mainly anglers), because the range of values in the drainage extends beyond the strict limits of concern of TNC. To be successful, TNC must focus its limited resources upon the most critical of areas in the nation. With the goal of preserving biological diversity, TNC attempts to identify and protect those species and habitats which are the most threatened and scarce, or as they say, "the last of the least and the best of the rest."

Many of the McCloud's critical elements are represented elsewhere, such that their continued survival is not dependent solely upon this region. Exceptions to this are the possibly genetically distinct McCloud populations of Dolly Varden char and rainbow trout, and the Shasta salamander and eupatory. A very large part of the McCloud River Protection Plan will involve recreational/aesthetic values as well as habitats and species threatened to a lesser extent than those just mentioned. The plan will also address protection of the "essence" of the McCloud River drainage: the product of the river, forests, limestone, etc., which imparts a uniqueness to the region. For these reasons, the public will play a vital role in the development and support of the plan.

CONCLUSION

The ecological/scientific and recreational/aesthetic values of the McCloud River drainage possess enough significance and uniqueness to warrant their protection. The industrial values of the drainage are also significant and, until recently, have greatly outweighed other values. Multiple ownership, multiple agency involvement, and the preoccupation with industrial values have resulted in uncoordinated patterns of resource management and exploitation which are blind to the maintenance of ecological integrity of the system.

The McCloud River drainage is in need of long-term, system-wide, integrated planning. Local planning for national forests now occurs at the individual forest level; the McCloud River drainage is only a small part of the Shasta-Trinity National Forest and as such will probably not receive adequate attention in the soon-to-be-completed Land and Resource Management Plan for the forest. The FS is also not in a comfortable position to emphasize non-consumptive values in the drainage nor to deal with the various private ownerships. The DFG has become increasingly supportive of wild trout programs and would like to develop a plan for this program in the McCloud drainage; however, its approach would be focused on the fishery. TNC has come to recognize the need for appropriate planning in the drainage to both direct its future activities there and to attempt to integrate the activities of other

owners and agencies. As such, TNC seems to be the most likely candidate to develop a protection plan for the whole drainage, although it too, in the strict sense, has focused interests.

Recent evolution in TNC's planning efforts has led to the initiation of the McCloud River Protection Plan. By identifying critical elements, threats, ownership patterns, and alternative techniques for protecting land; by prescribing appropriate protection techniques to each geographical unit in the drainage, based upon ownership, critical elements, and threats; by developing viable alternative packaged protection programs ranging from the "environmentalists' ideal" to the "limits of compromise"; by securing public involvement and feedback throughout the planning process, with the goal of discovering the most widely acceptable protection program; and finally by implementing this program through the support of all owners, agencies, organizations, and individuals involved in the McCloud River drainage, TNC's hope is that the McCloud River Protection Plan will satisfy the need for a proper planning perspective here.

Work on the plan has only just begun. As with any environmental planning, it will involve finding a viable path of compromise through the jungle of conflicting interests in the drainage. But without some form of comprehensive planning, a piecemeal approach to protection will continue, jeopardizing the integrity of the magnificent system of the McCloud River.

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