Native Inland Trout Restoration on National Forests in the Western United States: Time for Improvement?

ABSTRACT

The piscicides rotenone and antimycin are integral to successful restoration of native inland trout populations on public lands in the western United States by removing nonnative fishes that compete and hybridize with 13 species and subspecies of native trout. The U.S. Forest Service administers the greatest portion of native inland trout habitat on public lands. Piscicide use by state and federal agencies on national forests has become encumbered by redundant processes, uneven and irregular application of policies and regulations, and overlapping authorities. This has culminated in project delays and cancellations, placing native trout at continued, if not heightened, extinction risks. We reviewed the status of native trout restoration efforts on national forests in the western United States and considered issues associated with piscicide use. Central to the issue is whether piscicide applications by states require a permit from the Forest Service; those that required a permit usually invoked a redundant, federal environmental review process that precipitated the project delays. Based upon this review, we recommend that the Forest Service proceed with their proposal for a uniform standard for piscicide use by responsible government agencies on Forest Service administered lands. Doing so would streamline bureaucracy, speed future restoration efforts, and improve the status of imperiled native inland trouts without affecting environmental safeguards.

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Introduction

On 22 August 2003, just days before a planned chemical treatment to remove nonnative trout and restore habitat for the federally-listed threatened Paiute cutthroat trout (*Oncorhynchus clarki seleniris*), the Center for Biological Diversity filed a complaint in the U.S. District Court for the Eastern District of California against USDA Forest Service (USFS) to block the project. The complaint cited compliance issues with the National Environmental Policy Act (NEPA) and Administrative Procedures Act (APA), challenging the USFS decision to allow California Department of Fish and Game (CDFG) to use rotenone to remove nonnative trout from Silver King Creek, Carson-Iceberg Wilderness, Humboldt-Toiyabe National Forest, as part of the Paiute cutthroat trout habitat restoration project (CDFG 2002). Paiute cutthroat trout, one of the rarest species of trout in the world with a historical range of a single drainage, is threatened by hybridization with rainbow trout (*O. mykiss*). Because USFS opted not to challenge the complaint and because of the narrow window of logistics, water temperature, and weather, the project was cancelled for the year. Previously, CDFG had attempted to execute this project in 2002, but was delayed because USFS was unable to complete NEPA requirements. Cancellation of the treatment placed a federally-listed threatened species at continued risk due to potential hybridization, and failure to improve security of the species may warrant its federal listing being upgraded to endangered.

Elsewhere across the western United States, considerable resources are devoted to conservation of the 13 species and subspecies of native inland trouts (Figure 1). Several species and subspecies, such as bull trout (*Salvelinus confluentus*), Gila trout (*O. gilae*), and greenback cutthroat trout (*O. clarki stomias*), are listed as "threatened" or "endangered" by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA). Others are protected or receive special management attention by states and cooperating federal and tribal agencies (Table 1). Much of this effort occurs on public lands and USFS administers a substantial portion of the lands having habitat capable of supporting trout (Figure 2). A common and critical element of native inland trout conservation is removal of nonnative fishes from native trout habitats with piscicides.

Conflicting directions and policies contained in laws, regulations, manuals, and agreements affect the use of piscicides in national forests. In California,

Figure 1. The 13 species and subspecies of the western United States inland native trouts (illustrations credit Joseph Tomelleri).

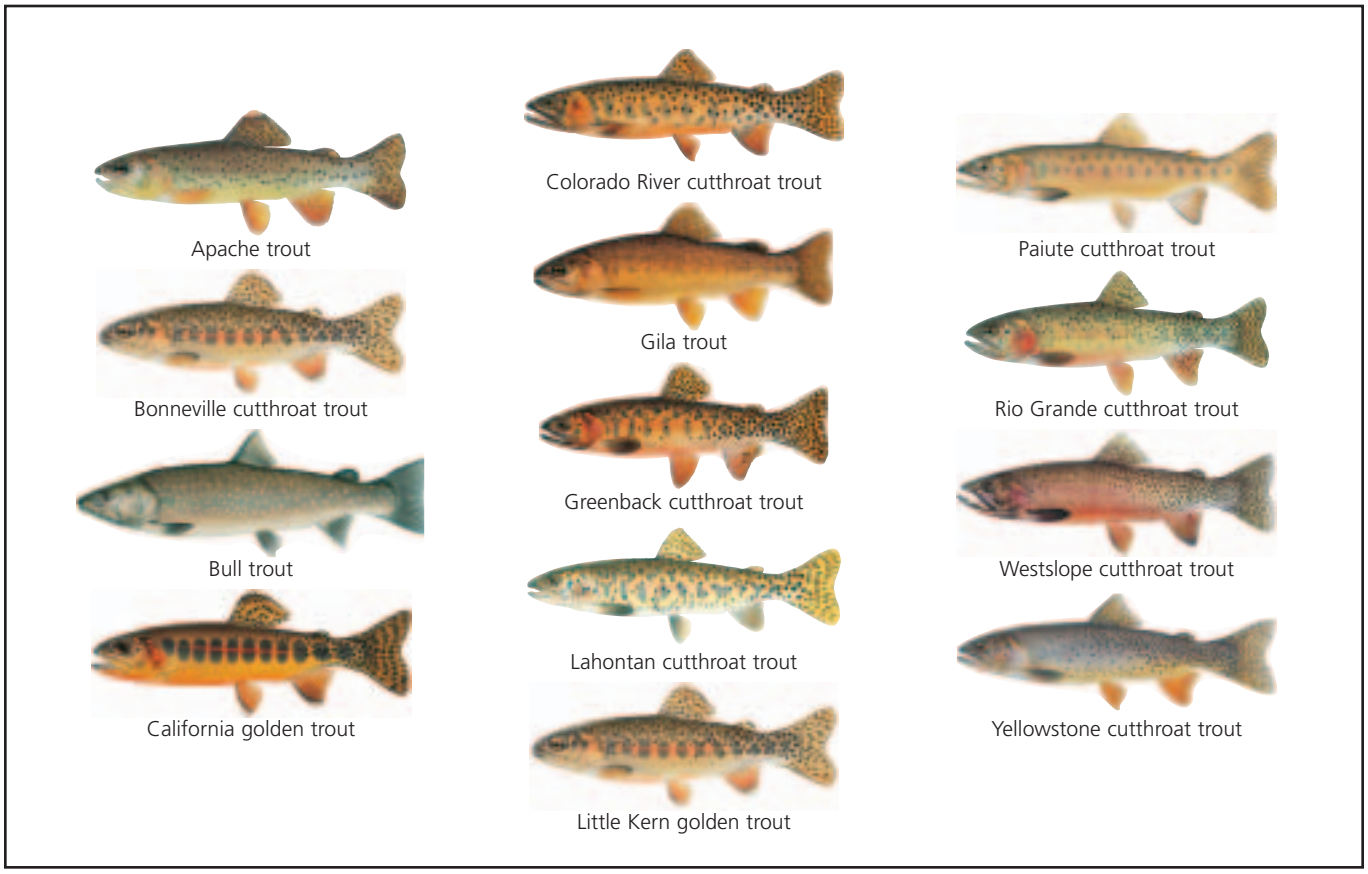
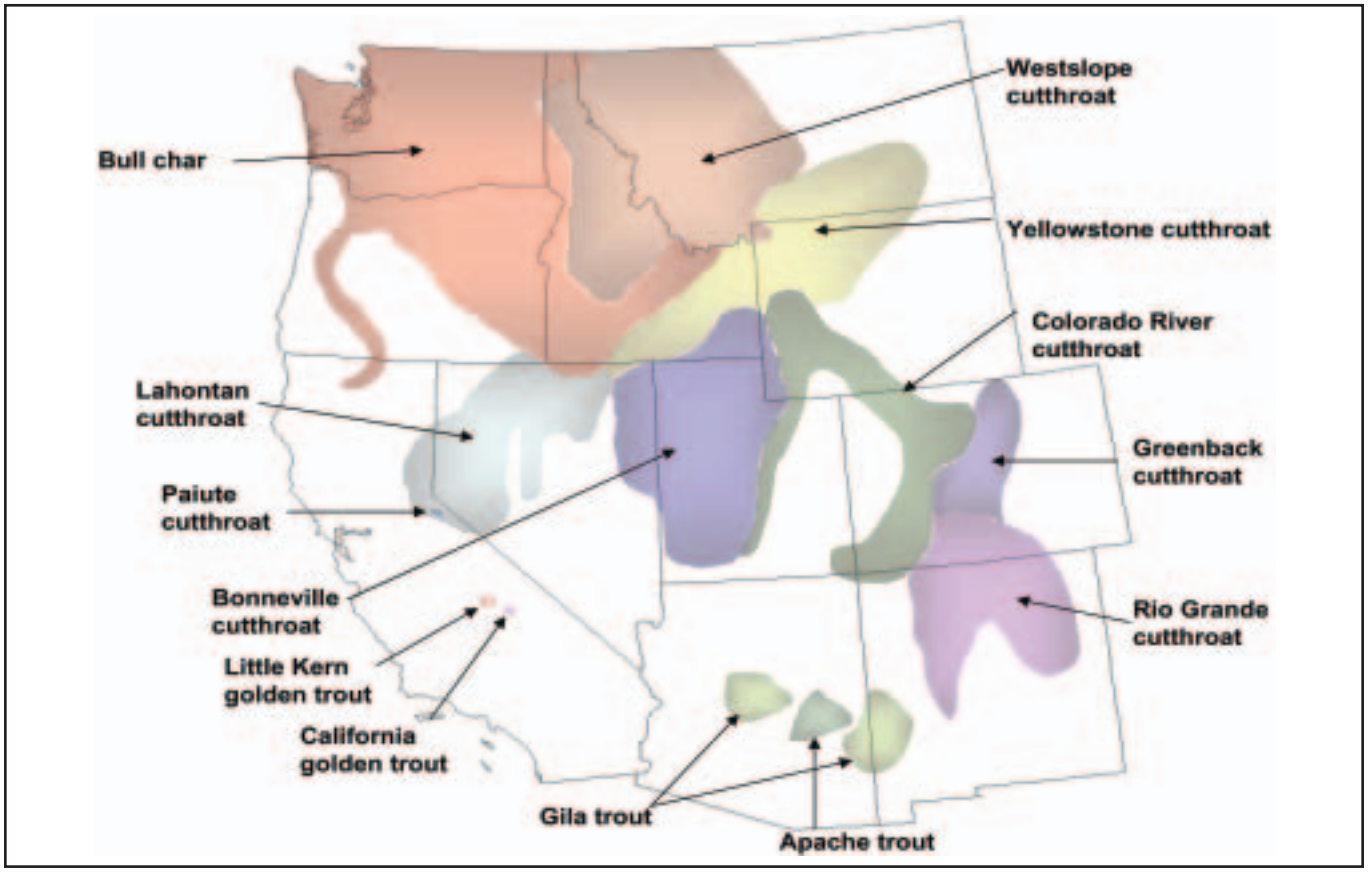


Figure 2. Distribution of 13 species and subspecies of native trouts (*Oncorhynchus*) and char (*Salvelinus*) of the western United States (adapted from Benke 1992).



the legal challenge to the rotenone treatment arose from changes in USFS NEPA compliance strategy for the Paiute cutthroat trout restoration project. Unfortunately, confusion over NEPA requirements and compliance for piscicide treatments by state agencies on national forests is not confined to California. Throughout the western United States, USFS has taken different NEPA-related actions on similar projects, sometimes in the same national forest, or in the case of the Humboldt-Toiyabe, changing the action. If there is a federal nexus, such management activities require review as set forth in NEPA. Responsibility for NEPA compliance traditionally has rested, though not always, with the federal agency administering the land upon which a conservation action is to occur. The untimely interruption of the Paiute cutthroat trout project is illustrative of a problem throughout western national forests that compromises conservation and recovery of all native inland trout. The objectives of this article are to investigate the causes of the problem, identify what actions are technically and legally necessary for projects using piscicides to proceed, and assess the USFS's proposal for streamlining bureaucracy and speeding recovery efforts.

Interaction of Native and Nonnative Trout

Native inland trout populations in the western United States are naive to introduced nonnative trouts and have been greatly impacted by competition, predation, and hybridization (Behnke 2002). Many watersheds have been routinely stocked for more than 50 years with nonnative rainbow, cutthroat, brook (*Salvelinus fontinalis*), and brown (*Salmo trutta*) trouts (Fuller et al. 1999). Nonnative fishes can be successful when introduced into new environments (Courtenay and Stauffer 1984; Dill and Cordone 1997).

Introduction of nonnative salmonid species has contributed to the decline of most, if not all, inland native trouts (Griffith 1988; Gerstung 1988; USFWS 2003a). Colorado River (*O. c. pleuriticus*; Peterson and Fausch 2002; De Staso and Rahel 1994), greenback (Wang and White 1994), and Lahontan (*O. c. henshawi*); (Dunham et al. 1999) cutthroat trouts are impacted by competitive interactions with brook and brown trouts. Lake trout (*Salvelinus namaycush*) introduced into Lake Tahoe have become established in the niche that the top native predator, Lahontan cutthroat trout, formerly occupied (Zanden et al. 2003). Gerstung (1988) noted that introduced rainbow, brook, and brown trouts had displaced populations of Lahontan cutthroat trout in many locations throughout their historical range. California golden trout (*O. aquabonita aquabonita*) have been impacted through compe-

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Photo 1. Biologist with the Arizona Fish and Game Department measures antimycin into a drip can for restoration of Apache trout in Snake Creek in the Apache-Sitgreaves National Forest in Arizona.

BRIAN FINLAYSON CALIFORNIA DEPARTMENT OF FISH AND GAME

Photo 2. California Department of Fish and Game uses a drip can to treat Silver Creek with rotenone for restoration of Lahontan cutthroat trout in the Humboldt-Toiybae National Forest in California.

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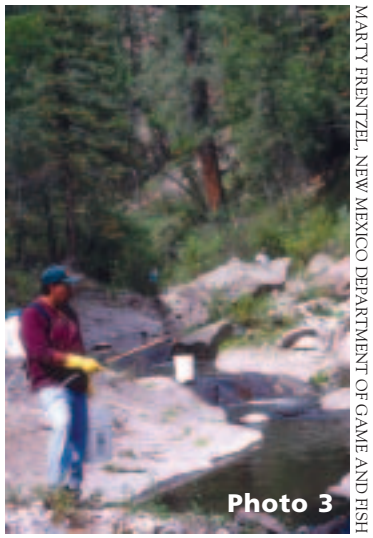

Photo 3. Treatment of West Fork Gila River in the Gila National Forest in New Mexico with antimycin using a drip can and backpack sprayer.

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Photo 4. Rotenone was applied to Wolf Creek Lake in the Humboldt-Toiyabe National Forest in California using a helicopter.

WILLIAM SOMMER, CALIFORNIA DEPARTMENT OF FISH AND GAME

Photo 5. Biologist with California Department of Fish and Game releases Pauite cutthroat trout into a restored section of Silver King Creek in the Humboldt-Toiyabe National Forest in California.

tition and predation by brown trout introduced into the South Fork Kern River (Pister 1991).

Although brown trout compromised some Gila trout populations, the greatest threat to persistence of the species was, and remains, hybridization with nonnative rainbow trout (Propst et al. 1992). Rainbow trout readily breed with golden and cutthroat trouts, as well as Apache (*O. g. apache*) and Gila trouts, leading to hybridized populations. Rainbow trout introduced into the historical range of California and Little Kern golden trouts (*O. a. whitei*) have hybridized, resulting, along with other factors, in these fish nearing extinction (Pister 1991). A single stocking of 5,000 rainbow trout fingerlings in Silver King Creek, California, in 1949 had largely eliminated the Paiute cutthroat trout population through hybridization by 1963 (Ryan and Nicola 1976). Hybridization with introduced rainbow trout caused the extinction of Alford cutthroat trout (*O. c. alvordensis*; Jones et al. 1998). Greenback cutthroat trout readily hybridize with rainbow trout, and establishment of nonnative salmonids was one of the major factors contributing to its decline (USFWS 1998a; Harig et al. 2000). Hybridization of Yellowstone cutthroat trout (*O. c. bouvieri*) with rainbow trout was discussed recently by Henderson et al. (2000), and Kruse et al. (2000) indicated that this species cannot be considered secure. Threats posed by genetic mixing are so severe that Allendorf and Leary (1988) stated: "The greatest danger to the conservation of the cutthroat trout is introgressive hybridization among subspecies and with rainbow trout."

Restoration Techniques and Associated Impacts

Restoration Techniques

The piscicides rotenone (McClay 2000; McClay 2002) and antimycin (Finlayson et al. 2002) are tools often used to restore native fish by enabling eradication of nonnative fishes with minimum impact to non-target wildlife (Rinne and Turner 1991). Typically, each stream targeted for native trout restoration is first inventoried to determine population size-structure and density of fishes present, characterize the macroinvertebrate community, and assess the habitats present. Although procedures vary with on-site considerations and species targeted for removal, the general approach is to chemically treat a stream reach isolated by barriers, either natural or artificial, and subsequently stock the stream with native fish from extant wild or hatchery populations. In stream renovations, piscicide is normally dispensed from drip cans (Photos 1 and 2) and backpack sprayers (Photo 3). Lakes are treated using boats, and sometimes helicopters (Photo 4). The system is generally considered fishless and ready for reintroduction of native fish when a subsequent treatment or survey fails to find target fish; the former is always more definitive. Stream reaches, lakes, and fish populations are then connected, working downstream with successive chemical treatments. Restored

Table 1. Current status of protected inland native trouts in the western United States.

Species	Federal status [1]	Conservation agreement/recovery plan [2]	State(s)
Apache trout	Threatened (USFWS 1975a)	Recovery plan (USFWS 1983)	AZ
Bonneville cutthroat trout	Petitioned (USFWS 2001a)	Conservation agreement & strategy (Lentsch et al. 2000)	UT, ID, NV, WY
Bull trout	Threatened (USFWS 1998a; 1999)	In development	WA, OR, NV, MT, ID
California golden trout	Petitioned (USFWS 2002a)	In development	CA
Colorado River cutthroat trout	Petitioned (USFWS 2004a)	Conservation agreement & strategy (Colorado River Cutthroat Trout Task Force 2001)	CO, WY, UT, NM[3]
Gila trout	Endangered (USFWS 1975b)	Recovery plan (USFWS 2003b)	AZ & NM
Greenback cutthroat trout	Threatened (USFWS 1978a)	Recovery plan (USFWS 1998a)	CO & WY
Lahontan cutthroat trout	Threatened (USFWS 1975a)	Recovery plan (USFWS 1995; 2003a; 2003c)	NV, CA, OR
Little Kern golden trout	Threatened (USFWS 1978b)	State management plan (Christenson 1984)	CA
Paiute cutthroat trout	Threatened (USFWS 1975a)	Recovery plan (USFWS 2004b)	CA
Rio Grande cut throat trout	Petitioned (USFWS 2002b)	Conservation agreement (Anonymous 2003)	NM, CO
Westslope cutthroat trout	Petitioned (USFWS 2003d)	In development	MT, ID, WA, OR
Yellowstone cutthroat trout	Petitioned (USFWS 2001b)	In development	WY, MT, ID, NV

[1] All petitioned species have been given not warranted decisions by the USFWS except for California golden trout (pending); reference to listing or petition finding.
[2] Reference to current conservation agreement or recovery plan.
[3] Extirpated from the San Juan and Navajo rivers in New Mexico circa 1900.

systems may be supplementally stocked until the population is self-sustaining (Photo 5).

Although other approaches, such as electrofishing and gill netting, are useful in controlling fish populations, these are generally incapable of eradicating fish (Finlayson et al. 2000; Shepard in press). Meronek et. al. (1996) reviewed fish control projects and found that success rates for physical removal methods (nets, traps, seines, electrofishing, drawdown, and combinations of physical treatments) ranged from 33 to 57%, where success was defined as a specific fish population attribute met or the desired benefit accrued to the fishery. For example, annual electrofishing the headwaters of the Truckee River in California since 1996 to protect a population of Lahontan cutthroat trout by removal of nonnative brook trout has suppressed, but not eliminated, brook trout. Electrofishing has been used to suppress brook trout numbers in three small streams in Wyoming (Thompson and Rahel 1996). Repeated electrofishing, however, may be cost prohibitive, impose unacceptable stress on non-target organisms, and have unintended environmental consequences (Snyder 2003).

Shepard (in press) also reviewed removal/suppression of nonnative fishes with explosives, nets, redd destruction, and biological control measures and found that these were generally ineffective in eradication, but possibly useful in control. However, Parker et al. (2001) removed brook trout from Bighorn Lake in Banff National Park, Canada, by gill netting (10,000 net nights) and suggested it as a viable technique for small alpine lakes less than 10 surface ha and less than 10 m deep. Knapp and Matthews (1998) removed all nonnative trout from a small subalpine lake in the Sierra Nevada, California, using gill nets and concluded that it was a viable alternative, under limited conditions.

Environmental Impacts and Tradeoffs of Piscicides

Use of piscicides for recovery of native trout populations could have direct environmental impacts on aesthetics (i.e., sight of dead fish), air quality (i.e., smell of solvents), biological resources (i.e., invertebrates, amphibians, and fish), hydrology and water quality (i.e., violation of water quality standards and introduction of piscicide diluents and surfactants), hazards and hazardous materials (i.e., potential spill of piscicides), and recreation (i.e., loss of angling opportunity). The magnitude of these impacts is often dependent on piscicide used, treatment rate, project size, and site-specific variables. Typically, these impacts are short duration, can be mitigated to a level of insignificance, and are likely more than off-set by long-term benefits resulting from recovery of a listed species (CDFG 1994; AFS 2000). Recovery of federally-listed trout populations that require protection could also have ancillary impacts on livestock grazing (i.e., closure of a grazing allotment or livestock exclusion from riparian areas), fishing (i.e., closure of an area), and other consumptive uses. To appraise interested parties of options and consequences of individual projects, agencies must improve communication of project objectives and environmental choices necessary to achieve native trout conservations (McClay 2000; Finlayson et al. 2002). Until this improves, misinformation and misconceptions will continue to frustrate native trout conservation and recovery.

Native Inland Trout Protection and Restoration

Endangered Species Act

Although not all native inland trouts receive federal protection as "threatened" or "endangered" under ESA, USFWS has an essential role in their conservation and management. A species is considered for listing under Section 4 of ESA either by USFWS or by a petition from an interested party. The USFWS bases its determination on five factors: (1) inadequacy of the present or threatened destruction, modification, or curtailment of its habitat or range; (2) over-utilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) existing regulatory mechanisms; and (5) other natural or man-made factors affecting its continued existence. At the end of a 12-month review, USFWS determines that listing is either warranted or not warranted. Of the 12 western native subspecies and species of *Oncorhynchus*, 6 taxa are federally protected and the other 6 have been petitioned by interested parties for federal listing; one species of *Salvelinus* (bull trout) is federally-threatened (Table 1).

Federal and State Coordination

Section 7 of ESA, which protects federally-listed species from activities authorized, funded, or carried out by federal agencies, applies when USFS permits a state piscicide project, creating a federal nexus, on national forest lands. If a federal nexus exists, USFS conducts a biological assessment to determine if the project will "likely affect" the species in question. USFS must initiate formal consultation with the USFWS if the species is likely to be adversely affected by the project.

The USFWS is authorized to enter into cooperative agreements with states that establish and maintain an adequate and active program for the conservation of threatened and endangered species (Section 6(c) of ESA). The USFWS may provide federal funds to states to assist in development of programs for the conservation of threatened and endangered species or to monitor the status of candidate or recovered species (Section 6(d) of ESA). Under Section 4(d) of ESA, authorization for take, including incidental take during piscicide treatments, may also be regulated by the states. This provision has also been successfully utilized to establish sportfishing opportunities for Apache trout and greenback, Lahontan, and Paiute cutthroat trouts.

Native Inland Trout

The earliest federal protection for native trout was provided in 1967 when Gila trout, Paiute cutthroat, greenback cutthroat, and Apache trouts were listed as endangered (USFWS 1967). Since then, all 13 species and subspecies of native trouts in the Western United States (Figure 1) have declined to the point where they are either federally protected or have been petitioned for federal listing (Table 1). National forests in the western United States have historical habitat for all federally-listed or petitioned trout species (Figure 2), and conservation of these species will occur largely on national forests. Recovery plans and conservation agreements for hundreds of western native trout populations will likely involve projects incorporating thousands of stream kilometers and hundreds of lake hectares over the next decade (Table 1). Often, conservation programs for several species are proceeding concurrently in individual states, and all of these efforts utilize piscicides.

Legal Requirements on Federal Lands

International Association of Fish and Wildlife Agencies/ Federal Memorandum of Understanding

In 1986, the International Association of Fish and Wildlife Agencies (IAFWA) signed an memorandum of understanding (MOU) with the USFS and Bureau of Land Management (BLM) for fish and wildlife management in wilderness areas in accordance with the Wilderness Act of 1964 (16 UCS 1131-1136). Section 4 (d) (7) of the Wilderness Act stipulates that "Nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the several states with respect to wildlife and fish in National Forests." The MOU specifically addresses "threatened" and "endangered" species and chemical treatments for restoration and recovery of indigenous or federally protected species. The MOU requires that wilderness areas be managed to protect and aid in the recovery of "threatened" and "endangered" species and recognizes that chemical treatments may be necessary to prepare waters for the restoration of indigenous species. The MOU requires that only registered pesticides be used in accordance with label instructions, and that treatments be done during periods of low human use, if possible. The MOU does not address the need for approval by the federal agencies, only that both state and federal agencies are to cooperate and foster mutual understanding in the management of fish and wildlife in the wilderness. In addition to the IAFWA MOU, each state fish and wildlife agency has a separate MOU with the national forests in their state to address lands both inside and outside of wilderness areas. The content of these individual MOUs vary considerably; USFS approval for piscicide use may be required in one state but not in another. However, it is current USFS national policy that piscicide use in wilderness areas requires regional forester approval.

State Agency Environmental Compliance

In many states, use of piscicides requires public notification; consultation with federal land management agencies, other land owners, and interested state and local agencies; an environmental analysis; review by the state fish and wildlife agency; and review and possibly approval by a state agricultural or environmental agency (Table 2). For example in Wyoming, the project leader completes a chemical rehabilitation form that is reviewed and approved by the Wyoming Game and Fish Department and then approved by the Department of Environmental Quality. A similar procedure is used in California and Colorado except that the application requires information analogous to a full environmental analysis. This analysis includes specification of chemical application and neutralization procedures, scope of the project, notification of other governmental entities, public notification, and disposal of dead fish. In Arizona, a 12-step department review is required for restoration of federally-listed wildlife. Piscicide treatments by the state require a department environmental analysis if no federal analysis has been completed. However, Arizona state code provides Arizona and USFWS a dispensation from water quality standards for fisheries management purposes.

In California and Colorado, after the proposed restoration project has been reviewed internally and approved by the fish and wildlife management agency, public meetings are held to inform the public on status of the species and receive input. Then a draft environmental analysis is completed and submitted for statewide public review and comment, and a final environmental analysis is approved prior to beginning the project. Notification of interested parties includes water quality, agricultural, and health agencies, water purveyors, and landowners. The environmental analyses focus on management need, public acceptance, potential for success, and project impacts and address feasible alternatives and mitigation measures.

In New Mexico, the State Water Quality Control Commission requires a variance to state surface water quality standards for each restoration using piscicides, and a National Pollutant Discharge Elimination System (NPDES) permit is currently required prior to piscicide application to surface water in California. Only piscicides that are registered with the U.S. Environmental Protection Agency can be applied, and the application of piscicides in all states must be under the direct supervision and control of a state certified applicator.

Forest Service Environmental Compliance

Pesticide Use Policy—USFS has recognized the shared responsibilities with states in management of fish resources on national forests, and this relationship is supported in the Forest Service Manual. The Forest Service Manual includes reference to the agreement (MOU) on the management of fish among USFS, IAFWA, and BLM. USFS has negotiated MOUs with several states concurring with their claim that piscicide application is a fish management tool under state jurisdiction. However, current USFS policy and regulation language found in the Code of Federal Regulations (CFR), Forest Service Manual, and USFS Handbook systems were developed for insecticide and herbicide use by USFS on USFS lands and did not consider the use of piscicides by the states. Current USFS policy requires USFS line officer approval for pesticide use on USFS lands by USFS personnel. As a result, there is confusion within USFS about the approval necessary for use of piscicides in state projects on USFS lands.

Application of NEPA—In many states, a NEPA environmental analysis, often duplicative of the state environmental analysis, is required for all piscicide projects on national forest lands, and the NEPA analysis may be completed by the state lead agency. For example in Arizona, the USFS has typically assumed lead responsibility for conducting NEPA analysis for native trout projects; however, some future projects call for USFWS and U.S. Bureau of Reclamation to complete the analysis, then have USFS adopt the NEPA analysis and issue a decision. Historically in Nevada, NEPA review by USFS was primarily limited to those projects located in wilderness areas; projects conducted on BLM and USFS non-wilder-

ness lands have not gone through NEPA review because they were considered state actions. Other activities that are closely tied to treatment projects and utilize USFS or BLM funding (including construction of temporary and permanent fish barriers) have undergone NEPA review. In Arizona, recent recovery actions have required two separate but concurrent NEPA decisions because some streams flow through wilderness and non-wilderness portions of a national forest. For stream restorations in New Mexico, USFS has assumed lead responsibility for NEPA compliance by completing environmental assessments for Gila trout restorations, but the state and USFWS have taken lead responsibility for Rio Grande cutthroat trout activities. In Wyoming, NEPA is not required for piscicide treatments as these are not considered federal actions. However, issues pertaining to piscicide treatments have been identified during scoping of fish movement barriers. These issues were not disclosed in NEPA but instead were tiered to the Decision Notice and Finding of No Significant Impacts. In addition to NEPA review and gaining relevant state authorizations, a USFS pesticide use permit must be obtained. Involvement of USFS in a 2003 treatment project in Nevada was limited to issuing its own pesticide use permit, even though it was not involved in the actual treatment. The permitting (approval) of a state piscicide project on federal land may invoke consultation with USFWS under Section 7 of ESA, even though the states may be covered under Sections 4(d) and 6(c) of ESA. When USFS is undergoing formal consultation with the USFWS under Section 7 of ESA, NEPA may also be invoked.

Table 2. Environmental compliance for piscicide use by state (S) and federal (F) fish and wildlife (F/WL) agencies.

	ENVIRONMENTAL ANALYSIS		WATER QUALITY REQUIREMENTS		PESTICIDE REGULATION	
State	**S/F**	**Law**	**S/F**	**Type**	**Use authorization**	**Certified applicator**
Arizona	S	F/WL agency environmental analysis (EA) checklist	S	N/A[1]	Signed EA checklist	State certified
	F	Treatments on USFS lands require National Environmental Policy Act (NEPA)	F	N/A	Pesticide use permit and decision notice	USDA certification[2]
California	S	F/WL agency EA	S	NPDES[3]	Pesticide use recommendation	State certified
	F	Most treatments on USFS lands require NEPA	F	N/A	Pesticide use permit and decision notice	N/A
Colorado	S	F/WL agency EA	S	Exempted under CWA by USEPA[4]	F/WL agency approval; state health and water quality agencies consult	State certified
	F	Treatments on federal lands screened through EA under NEPA at discretion of federal agency affected	F	N/A	None; agency consult	N/A
Idaho	S	Short-term activity exemption issued by state environmental agency	S	Exempted under CWA by USEPA[5]	State environmental and agricultural agencies approval	State certified
	F	NEPA required when federal funds used	F	N/A	Pesticide use permit and decision notice	N/A
Montana	S	F/WL agency EA checklist and public notice	S	Permit authorizing exemption for standard	None	State certified
	F	NEPA required for wilderness areas	F	401 certification if federal permit is issued	Pesticide use permit	State certified
New Mexico	S	State water quality agency approval	S	Exempted under CWA by USEPA[6]	State water quality agency	State certified
	F	Most treatments on USFS lands require NEPA	F	N/A	Pesticide use permit and decision notice	USDA certification[2]
Nevada	S	Not required for most treatments	S	Exempted under CWA by USEPA[5]	State environmental agency permit	State certified
	F	NEPA required only for wilderness areas	F	N/A	None	N/A
Utah	S	F/WL agency submits propjets to statewide clearinghouse as an information item	S	Exempted under CWA by USEPA[5]	F/WL agency approval	State certified
	F	Most treatments on USFS lands require NEPA	F	N/A	Pesticide use permit and decision notice	N/A
Wyoming	S	F/WL agency approves projects with state environmental agency	S	Exempted under CWA by USEPA[5]	F/WL agency approval	State certified
	F	NEPA not required	F	N/A	N/A	N/A

1 AZ Administrative Code R18-11-116 provides AGFD/USFWS a dispensation from water quality standards for fisheries management purposes.

2 FSM 2100, Region 3 Supplement requires a certified applicator to be present or available when applying restricted-use pesticides; also FSM 2151.04b states that a Forest Supervisor must have a Forest Pesticide-Use Specialist trained and certified under USDA Certification Plan, but no such certification process exists.

3 National Pollution Discharge Ellimination System (NPDESs) permit.

4 USEPA has exempted fish toxicants for management purposes from the Clean Water Act (CWA), but Colorado has a free-Mn standard that may be applicable when using potassium permanganate for neutralization.

5 USEPA has exempted fish toxicants for management purposes from the CWA.

6 USEPA has exempted fish toxicants for management purposes from the CWA, but New Mexico has discharge requirements for acetone and phthalates.

Inconsistent Process—Overlapping and redundant authorities between states and USFS for approval and environmental analyses for application of piscicides have resulted in confusion and inconsistencies among and within USFS regions. On some national forests, states are able to proceed in implementing piscicide projects with only concurrence from USFS, while on other national forests, USFS line officer approval is required based on accompanying NEPA analysis, even when the state has completed a separate environmental analysis. On national forests that require USFS line officer approval, state fisheries management actions and projects critical to native fish restoration and conservation are delayed or not implemented because of different interpretations of USFS regulations. Across the western United States these problems have resulted in unnecessary delays of critical projects, have not improved environmental safeguards, and have generally increased cost and time for project implementation for no positive effect, especially for the fishes at risk.

Process Resolution—For at least the past 15 years, USFS and various states have attempted to improve coordination and streamline the process for piscicide approval and application. All attempts to date have resulted in minimal improvement in specific local areas because the efforts failed to address the underlying core issue. Simply stated, the current USFS policies and regulations identify state piscicide applications as both a federal and state action which results in confusion and redundancy related to analysis and approval. USFS has recognized their conflicting policies and regulations and have made a recent, bold attempt to correct the core problem. In late November 2003, USFS and state fisheries biologists, USFS pesticide coordinators, and a federal attorney (Office of General Council) met in Salt Lake City, Utah, to discuss piscicide-use issues and formulate a proposal for resolution. This group formulated a two-tiered approach that has been elevated to the USFS Washington office for consideration. The first tier would pursue changes in the CFR and associated Forest Service Manual and USFS Handbook to clarify actual authorities for piscicide use on USFS lands. Changes to 36 CFR 251.50 would add a provision to create a narrowly-defined exception from the general requirement for USFS authorization for use and occupancy and would clarify that no USFS authorization is required for application of piscicides by state fish and wildlife, tribal, USFWS, or National Marine Fisheries Service authorities for fisheries management purposes. In 36 CFR 261.9(f), language would be added to state that prohibition on pesticide use does not apply to application of piscicides by state fish and wildlife, tribal, USFWS, or National Marine Fisheries Service authorities for fisheries management purposes. The preamble (explanatory notes that appear in the *Federal Register* when a rule change is adopted) to any changes to the CFRs would make clear that the USFS retains authority under 36 CFR 261 Subpart B to issue closure orders that either prohibit the use of piscicides in certain areas and certain conditions, or to impose permit requirements for piscicide use in specific areas. Following CFR changes, all USFS manuals and handbooks would be modified to reflect those CFR changes. In the second part of the proposal, a new, overarching MOU with the IAFWA for piscicide use followed by individual MOUs with states that tier to the IAFWA MOU would be developed to accommodate CFR changes and clearly articulate roles and responsibilities of the agencies and define the expectation for cooperation, communication, and coordination. This USFS proposal has the support of the regional foresters in all nine USFS regions and is awaiting implementation by the USFS Washington office.

Conclusions and Recommendations

The decline of native inland trouts in the western United States was caused by numerous factors, most importantly by nonnative salmonids that compete and hybridize with native trouts. Aside from improved land management practices, removal of nonnative salmonids is the most critical need for conservation and restoration of depleted native trout stocks. Without active programs to eliminate nonnative trouts, several currently extant forms of native trouts likely would be extinct. Various methods of removing nonnative trouts from streams and lakes have been used with varying success and expense, but none is as practical or effective, in most situations, as piscicides. Use of piscicides requires complying with a broad array of state and federal directives and regulations that are intended to ensure safe and effective application of piscicides. The use of piscicides by state, tribal, and federal fish and wildlife agencies to restore, conserve, and recover native trouts on national forests has become overly encumbered by redundant processes, uneven and irregular application of USFS policies, and overlapping authorities. As a consequence, native trout restoration projects have been unnecessarily delayed or cancelled, placing these organisms at continued, if not heightened, extinction risks. The authors support and applaud the USFS proposal to revise the Code of Federal Regulations (36 CFR 251.50 and 36 CFR 261.9 (f)) to create a narrowly defined exception for application of piscicides on national forest lands for responsible government agencies conducting fisheries management activities. Trout restoration projects that occur in wilderness may require approval for use of mechanized equipment. We suggest that approval specifically cover aspects of the mechanized equipment, and not be linked to the use of the piscicide. Finally, we recommend creation of an overarching MOU with IAFWA for piscicide use with tiered individual state MOUs to more clearly articulate roles and responsibilities.

Acknowledgements

Bill Horton, resident anadromous fisheries coordinator at Idaho Game and Fish, provided valuable assistance with information on bull trout and Idaho's regulatory process. Don Duff, retired aquatic ecologist with the Forest Service, and Jim Harvey, forest fisheries biologist with the Humboldt-Toiyabe National Forest, provided information regarding Forest Service procedures and policies. Stan Stephens, senior fisheries biologist at the California Department of Fish and Game, provided background information on the Little Kern and California golden trouts. Bob Snyder, native species coordinator at the Montana Department of Fish Wildlife and Parks, provided information on westslope and Yellowstone cutthroat trouts. Bruce May, inland cutthroat coordinator of the Forest Service Region 4, and Rosalie Schnick, chair of the American Fisheries Society Task Force on Fishery Chemicals, provided useful comments on the manuscript.

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