



Pacific Rivers Council

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August 31, 2005

Ryan Broderick, Director
California Department of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

RE: Improving efficiency of California's fish hatchery system

Dear Director Broderick:

On behalf of the Pacific Rivers Council, we are writing to express our concerns about the state's fish hatchery and stocking system and to recommend needed changes that will ensure that the system does not negatively impact California's native biological diversity.

Fish hatcheries and the stocking of fish into lakes and streams cause numerous measurable, significant environmental effects on California ecosystems. Based on these impacts, numerous policy changes are needed to ensure that the Department of Fish and Game's ("DFG") operation of the state's hatchery and stocking program do not adversely affect California's environment. Further, as currently operated, the state's hatchery and stocking program do not comply with the California Environmental Quality Act, Administrative Procedures Act, California Endangered Species Act, and federal Endangered Species Act.

The impacts to California's environment, and needed policy changes to bring the state's hatchery and stocking program into compliance with applicable state and federal laws, are described below.

I. FISH STOCKING NEGATIVELY IMPACTS CALIFORNIA'S NATIVE SALMONIDS, INCLUDING THREATENED AND ENDANGERED SPECIES

Introduced salmonids negatively impact native salmonids in a variety of ways. Moyle, *et. al.* (1996) notes that "Introduction of non-native fish species has also been the single biggest factor associated with fish declines in the Sierra Nevada." Moyle also notes that introduced species are contributing to the decline of 18 species of native Sierra Nevada fish species, and are a major factor in the decline of eight of those species. Moyle adds that with the exception of two species, "the native trout of the Sierra Nevada

have declined in the face of competition, predation, and hybridization from non-native trout.”

Among the most important impacts of fish introduction on wild California fish species are:

- Hatchery-raised salmonids hybridize with native salmonids, thus weakening the genetic stock of native fish. Hatchery-raised salmonids are inferior to wild salmonids in a variety of ways, including demonstrating lower fitness, reduced ability to respond to environmental changes, and decreased breeding success than their wild counterparts. (See Fleming and Gross 1992; Ford 2002; Gale *et. al.* 2004; Green 1964; Horak 1972; Lynch and O’ Hely 2001; Miller *et. al.* 1959; Miller *et. al.* 2004; McLean *et. al.* 2005;

When introduced into water bodies that contain wild fish, hatchery-raised salmonids hybridize with wild salmonids, thus reducing the overall genetic fitness of the wild fish. The resulting hybrid is less adapted to its environment, less able to survive environmental changes, and more susceptible to disease, predation, and other environmental factors that genetically pure wild fish. (See Allendorf *et. al.* 2001; Allendorf *et. al.* 2004; Docker *et. al.* 2001; Hayes *et. al.* 1996; Hayes *et. al.* 2004; Hitt *et. al.* 2003; Krueger and May 1991; Levin and Williams 2002; Leary *et. al.* 2003; Lynch and O’ Hely 2001; Meffe 2002; Wang and Ryman 2001; Witty and Cramer 2001).

- Introduced fish compete with native fish for food and holding, spawning and rearing habitat. These effects can significantly impact populations and range of native fish populations. (See Bohlin *et. al.* 2002; Clark and Rose 1997; Cunjak and Green 1984; Cunjak and Green 1986; De Staso and Rahel 1994; Dewald and Wilzbach 1992; Einum and Fleming 2001; Fausch and White 1981; Fausch and White 1986; Fausch 1988; Flick and Webster 1992; Garcia-Marin *et. al.* 1998; Glova 1986; Griffith 1988; Harvey and Nakamoto 1996; Hearn 1987; Herbold and Moyle 1986; Kruse 1998; Larson and Moore 1985; Lohr and West 1992; Magnan 1988; Magoulick 1994; Magoulick and Wilzbach 1998; Marchand and Boisclair 1998; McMichael *et. al.* 2000; Nagel 1991; Nakano *et. al.* 1998; Rodriguez 1995; Rose 1986; Ross 1991; Schroeter 1998; Strach and Bjornn 1989; Strange and Habera 1998; Taylor *et. al.* 1984; Thomas 1996; Waters 1983; Weiss and Schmutz 2003).
- Introduced fish can introduce diseases to wild salmonids. The spread of whirling disease is only one example of the potentially disastrous impacts of introducing hatchery-raised fish into the wild. Whirling disease was first found in a California hatchery in 1965 and has since spread to two state hatcheries and three private hatcheries. Dispersal of hatchery-raised fish is a major factor in the spread of the whirling disease parasite to at least 15 watersheds across the state. (See Modin

1998). While it has not yet severely impacted California wild trout populations, whirling disease has led to devastating results in other regions. Colorado faced a devastating outbreak that severely damaged biological resources. California hatcheries have already been forced to destroy over 165 million tons of hatchery-raised fish to prevent the disease from spreading.

California hatcheries continue to be plagued with disease and Moyle and Morford (1991) suggest that diseases from hatchery-raised fish are probable causes of endangerment of coho salmon and summer steelhead.

Among the imperiled species in California that have been affected by fish stocking are:

- **Lahontan cutthroat trout**—The Lahontan cutthroat trout is a federally threatened species. The United States Fish and Wildlife Service recognizes the introduction of non-native fish species as a major impact to Lahontan cutthroat trout habitat and abundance. USFWS 1995.
- **Paiute cutthroat trout**—The Paiute cutthroat trout is a federally threatened species. Early introductions of rainbow trout and Lahontan cutthroat trout is a primary factor that led to the endangerment of the Paiute cutthroat trout. USFWS 2004.
- **Little Kern golden trout**—The Little Kern golden trout is a federally threatened species and the California state fish. Past introduction of rainbow trout into the Little Kern River system is a factor leading to the endangerment of the Little Kern golden trout. USFWS 1978.
- **Coho salmon**—Coho salmon are a state and federally threatened species. DFG's recovery plan for the California coho identifies impacts from hatchery-introduced salmonids, including introduction of disease and reduction, reduction of productivity, and lowering of genetic diversity, as factors leading to the endangerment of coho salmon in California. DFG 2004. Disease from hatchery fish may also be a factor in the coho salmon's decline. Moyle and Morford 1991.
- **Summer steelhead**—Moyle and Morford (1991) point to disease from hatchery fish as a probable cause of the catastrophic decline of summer steelhead in California.
- **Chinook salmon**—PWA (1994) describes numerous potential impacts to fall and spring run Chinook salmon in the South Fork Trinity watershed. These impacts include disease, reduced fitness, competition, and weakening of the genetic stock through hybridization. Low returns of wild salmon in the Klamath River have been attributed to increased stocking levels from the Iron Gate Hatchery. PFMC 1994.

II. FISH STOCKING NEGATIVELY IMPACTS CALIFORNIA'S NATIVE FAUNA, INCLUDING THREATENED AND ENDANGERED SPECIES

A. Direct effects of fish introduction on native fauna

Non-native trout prey upon amphibian tadpoles, leading to severe declines in populations. Non-native fish also limit amphibian dispersal, thus isolating remaining populations. The introduction of fish into historically fishless waters has led to severe declines in amphibian populations across the state.

Knapp (2005) found strong evidence that introduced trout have “profoundly altered the distribution of two of the four native aquatic-breeding amphibians and both of the widely distributed garter snake species” in Yosemite National Park. Fisher and Shaffer (1996) suggest that introduced predators (which include fish and bullfrogs) are the primary threat to amphibians in the Central Valley. Drost and Fellers (1996) implicate fish stocking as a primary cause of the collapse of the regional frog fauna in Yosemite National Park. Jennings (1996) points to fish introduction as a primary factor in the decline of Sierra Nevada amphibians, 43% of which are extinct or threatened with extinction. Fish introductions are a significant factor leading to the endangerment of two federally protected species, the mountain yellow-legged frog, and California red-legged frog. Leyse documents the effects of fish introductions on an array of native amphibians.

Fish introduction has been specifically implicated in the decline of the following California species:

- **Mountain yellow-legged frog.** Mountain yellow-legged frogs are listed as endangered under the federal Endangered Species Act. Nonetheless, numerous studies have documented that fish introduction into traditionally fishless habitats in the Sierra Nevada lead to devastating consequences for mountain yellow-legged frogs. (See Bradford 1989; Bradford *et. al.* 1993; Bradford *et. al.* 1998; Drost and Fellers 1996; Jennings 1996; Knapp, *et. al.* 2005; Knapp *et. al.* 2001; Knapp and Matthews 2000; Knapp 1996).
- **California red-legged frog.** California red-legged frogs are listed as threatened under the federal Endangered Species Act. Introduced fish are negatively affecting California red-legged frogs throughout much of its range in California. (See Drost and Fellers 1996; Fisher and Shaffer 1996; Graber 1996; Kiesecker and Blaustein 1998).
- **Cascades frog.** Fellers and Drost (1993) noted a precipitous decline in Cascades frogs throughout the southern portion of its range, and cited the presence of non-native, predatory fish as a factor in this decline. The study also noted a decline of long-toed salamanders.
- **Pacific treefrog.** (See Drost and Fellers 1996; Knapp 2005; Matthews *et. al.* 2001).

- **Yosemite toad.** (*See* Drost and Fellers 1996).
- **Foothill yellow-legged frog.** (*See* Drost and Fellers 1996).

B. Indirect effects of fish introduction on native fauna

Introduced trout can spread disease to native fauna, thus causing further impacts. Blaustein, *et. al.* (1994) found that pathogens, such as *Saprolegnia*, which are introduced by hatchery trout into native ecosystems may be an important factor in the demise of native amphibians. These findings were confirmed by Kiesecker, *et. al.* (2001), who notes that western toad populations have suffered mass-mortality due to disease outbreaks, which may be associated with *Saprolegnia* from introduced trout.

Matthews *et. al.* (2002) found that amphibian declines caused by trout introductions have diminished mountain garter snake populations within the Sierra Nevada. These findings were confirmed by Knapp (2005), who found that by limiting the amphibian prey base of two species of Sierra Nevada garter snakes, trout introductions were negatively impacting these species.

III. FISH HATCHERIES NEGATIVELY AFFECT CALIFORNIA'S ENVIRONMENT

In addition to the adverse effects of stocking fish in native waters, fish hatcheries themselves may have significant effects on the environment. These effects include alterations in water quality and quantity, habitat destruction, and interference with spawning patterns. (*See* White, Karr, and Nelson 1995). California hatcheries have been shown to have significant environmental effects. (*See* Ellis and Cook 1998; Schafer 1968). These effects continue to this day.

IV. FISH STOCKING CAUSES SIGNIFICANT EFFECTS ON CALIFORNIA ECOSYSTEMS

Introducing new species into native ecosystems and causing the removal of high level predators has important effects on aquatic ecosystems. Fish stocking has been shown to reduce or eliminate native zooplankton communities. (*See* Bradford *et. al.* 1994; Bradford *et. al.* 1998; Carpenter, *et. al.* 1985; Carpenter *et. al.* 1987; Goldman, *et. al.* 1979; Knapp 1996; Richards *et. al.* 1975; Stoddard 1987). At least one species, the phantom midge, may have been extirpated from the Sierra Nevada by introduced trout. (*See* Knapp 1996; Stoddard 1987). Introduced fish can also have negative effects on macroinvertebrates including mayflies, beetles, caddisflies, and other insects. (*See* Knapp 1996). These organisms are critical to maintaining healthy, functioning ecosystems and their removal effects negatively effects ecosystem processes and productivity. (*See* Brett *et. al.* 1994; Elser *et. al.* 1995; Knapp 1996).

Matthews *et. al.* (2002) found that introduced trout can have “serious effects” on predator populations with whom they compete for prey, and that “fish introductions are further disrupting the high-elevation ecosystems of the Sierra Nevada by also affecting amphibian predators.”

After surveying Sierra Nevada lakes, Bradford *et. al.* (1994) concluded that “the most profound human impacts on aquatic communities in the High Sierra appear to be related to historical and on-going stocking of exotic fish species into High Sierra waters.”

V. FISH STOCKING HAS ADDITIONAL EFFECTS ON CALIFORNIA’S ENVIRONMENT

Recovery of native salmonids often involves use of piscicides that cause adverse effects to the California environment. The DFG is increasingly utilizing piscicides such as rotenone and antimycin to restore waters that have been impacted by fish stocking to their pre-stocking conditions. The fiasco at Lake Davis is only one example of the negative adverse effects of piscicide use.

Recovery of endangered fish species that are threatened because of fish introduction is extremely costly.

VI. DFG’S OPERATION OF THE STATE’S HATCHERY AND FISH STOCKING PROGRAM DOES NOT COMPLY WITH THE CALIFORNIA ENVIRONMENTAL QUALITY ACT

The California Environmental Quality Act (CEQA) was established to ensure that actions by public agencies do not adversely effect California’s environment. The provisions of CEQA apply to any discretionary actions carried out by public agencies unless those actions are specifically exempted from the law’s provisions. P.R.C. §21080(a). For any actions that are not exempt, where there is “substantial evidence” that the action “*may* have a significant effect on the environment.” P.R.C. §21080(d). Substantial evidence “includes fact, a reasonable assumption predicated upon fact, or expert opinion supported by fact.” P.R.C. §21080(e)(1).

Section 21084 of CEQA requires the development of “a list of classes of projects which have been determined not to have a significant effect on the environment.” P.R.C. §21084(a). These classes are exempt from the provisions of CEQA. *Id.* The Secretary of Resources must find that the listed classes do not have a significant effect on the environment. *Id.* The Secretary of Resources must certify and adopt the guidelines every two years. P.R.C. §21083(f).

The guidelines for implementing CEQA (“CEQA guidelines”) provide an exemption for the operation and repair of existing facilities. C.C.R. §15301. Fish stocking is identified as an example of such an activity. C.C.R. §15301(j).

However, the guidelines also make specific exceptions to the classes of activities that are exempt from CEQA. C.C.R. §15300.2. If an activity meets the criteria of the §15300.2 exceptions, that activity no longer qualifies for a CEQA exemption. Under section 15300.2, “All exemptions for these classes are inapplicable when the cumulative impact of successive projects of the same type in the same place, over time is significant.” C.C.R. §15300.2(b). Further, “A categorical exemption shall not be used for an activity where there is *a reasonable possibility that the activity will have a significant effect on the environment* due to unusual circumstances.” C.C.R. §15300.2(c) (emphasis added).

“Significant effects” have been defined by statute and case law. The CEQA guidelines defines a significant effect as a “substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance.” C.C.R. §15382. *Mountain Lion Foundation v. Fish and Game Commission*, 16 Cal.4th 105 (1997); *Wildlife Alive v. Chickering*, 18 Cal.3d 190 (1976). Projects that may negatively impact imperiled species are defined as having significant effects under the CEQA guidelines. C.C.R. §15065.

As described above, fish hatcheries have numerous effects on the California environment. Fish hatcheries and stocking has, and continues to effect, California’s imperiled species of fish and wildlife. Fish stocking has cumulative effects on native fish and fauna. There are numerous instances where unusual circumstances, such as the presence of imperiled amphibians, native fish, or sensitive, formerly fishless ecosystems create a reasonable possibility that fish introduction will create significant impacts on the environment. And there are numerous, well-documented cases where fish introduction has already caused significant effects on California’s environment.

Despite this overwhelming evidence, DFG has never complied with CEQA’s requirements that public agencies analyze the effects of their actions, and mitigate any actions that may adversely effect California’s environment. This failure places DFG’s fish hatchery and stocking program squarely in violation of CEQA.

VII. DFG’S OPERATION OF THE STATE’S HATCHERY AND FISH STOCKING PROGRAM VIOLATES OTHER STATE AND FEDERAL LAWS

A. The hatchery and fish stocking program violates the California Administrative Procedures Act

The California Administrative Procedures Act (APA), “No state agency shall issue utilize, enforce, or attempt to enforce any guideline, criterion, bulletin, manual, instruction, order, standard of general application, or other rule, which is a regulation...” that has not been adopted as a regulation and filed with the Secretary of State. C.G.C.

§11340.5. The APA defines regulation as “every rule, regulation, order, or standard of general application or the amendment, supplement or revision of any rule, regulation, order, or standard adopted by any state agency to implement, interpret, or make specific the law enforced or administered by it, or to govern its procedure.” C.G.C. §11342.600.

Despite this clear prohibition, and despite the issuance of numerous policy directives and guidelines, DFG has not completed the required rulemaking to guide its fish hatchery and stocking program.

In 2003, DFG developed its Strategic Plan for Trout Management. This plan aims to “identify key issues relative to trout resources and fisheries, and to develop goals and strategies that will address these issues during the next 10 to 15 years.” DFG 2003. The plan describes 32 strategies relating to DFG’s fish stocking program. *Id.* The plan further recommends that DFG update its existing guidelines for the use of hatchery trout by fisheries managers. *Id.* Neither the strategic plan, nor the existing guidelines referenced by the plan have been legally adopted as a regulation, as required by the CAPA.

B. The hatchery and fish stocking program violates the California Endangered Species Act

Northern and central California coho salmon, and winter and spring run Chinook salmon are protected under the California Endangered Species Act (CESA). DFG 2005. The Joint Hatchery Review Committee found that DFG anadromous hatcheries directly or incidentally take salmonids that are protected under both the federal and state endangered species acts. DFG/NFMS 2001. In addition, there is evidence that fish introduction is negatively affecting salamanders that are protected under the California Endangered Species Act.

C. The hatchery and fish stocking program violates the federal Endangered Species Act

The federal Endangered Species Act (ESA) prohibits “take” of any endangered species within the United States. 16 U.S.C. §1538(a)(1)(B). Under the ESA, “take” means to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” 16 U.S.C. §1532(19). Section 4(d) of the ESA allows the Secretary of Interior to extend similar protections to threatened species. 16 U.S.C. §1533(d).

As described above, fish introduction has numerous, well-documented adverse effects on several of California’s threatened and endangered species. Under the ESA, continued stocking in waters where such stocking has been shown to negatively impact protected species is considered a “take” of those species. Despite this, the DFG continues to stock fish into waters that contain, or may contain, protected species of fish and amphibians. Further, the DFG has not received an incidental take permit to carry out

such activities. Thus DFG's hatchery and stocking program continues to "take" federally protected species.

The Joint Hatchery Review Committee, which includes DFG and the National Marine Fisheries Service, concluded in 2001 that "Most DFG anadromous hatcheries directly or incidentally "take" salmonids that are listed under the ESA." DFG/NMFS 2001. The review recommends that the DFG implement numerous policy changes and recommends interim guidelines until new hatchery management plans can be developed. It is not clear that DFG has either adopted the interim regulations or implemented the policies recommended by the report.

VIII. POLICY CHANGES ARE NEEDED TO BRING THE STATE HATCHERY AND FISH STOCKING PROGRAM INTO COMPLIANCE WITH STATE AND FEDERAL LAWS

As described above, DFG's operation of the state's hatchery and fish stocking program is causing significant effects to California's environment, and is does not comply with state or federal environmental laws. In order to bring the program into compliance with these laws, and to minimize the effects on California's environment, we recommend that DFG immediate undertake the following actions and policy changes:

1. Complete an environmental impact report, as required by the California Environmental Quality Act, on the state's hatchery and fish stocking program. This document should describe the environmental affects of the program, detail possible policy options, and develop mitigation measures, as needed. The document should be completed as soon as possible.
2. Immediately cease all hatchery and stocking operations that negatively affect California's state-listed and federally recognized threatened or endangered species.
3. Place an immediate moratorium, pending the results of the CEQA analysis, on all hatchery and stocking operations that have been shown, or have the potential, to have significant effects on California's environment. These effects include impacts to native fauna, salmonids, water quality or quantity, and ecosystems.
4. Immediately cease introducing fish into naturally fishless waters, wilderness areas, and other areas of high biological importance.
5. Immediately cease introducing fish into waters that contain valuable strains of native, wild fish.

IX. CONCLUSION

Fish introduction has contributed to the decline of many of California's native aquatic species – a downward trend that continues to this day. Despite the growing body of scientific literature on this topic, the Department continues to manage fish and wildlife resources without considering the broader ecosystem context in which that management takes place. Until the Department embraces a more holistic ecosystem management approach, conflict will continue. The Department is in the unique position to spearhead a new, ecosystem-based approach to fish and wildlife management; a good place to start is by reforming its fish hatchery and stocking practices for the benefits of California's native species, streams and rivers, and ecosystems.

Based on these important issues, we believe that the significant effects of California's fish hatchery and stocking program warrants serious consideration and revision.

If you have questions or comments, please do not hesitate to contact Paul Spitler or Debbie Sivas at (650)-725-8571. Thank you for your consideration.

Sincerely,

Deborah Sivas
Director

Paul Spitler
Legal intern

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