ENCLOSURE 4

07-0375

Comment Letter 1

COUNTY OF ALPINE
Board of Supervisors

March 5, 2010

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By BW

California Regional Water Quality Control Board
Lahontan Region
2501 Lake Tahoe Boulevard
South Lake Tahoe, CA 96150

RE: Comment Letter Regarding the Paiute Cutthroat Restoration Project

Thank you for the opportunity to comment on the California Department of Fish and Game Paiute Cutthroat Trout Restoration Project. At the March 2, 2010 Alpine County Board of Supervisors meeting, the Board discussed numerous concerns with the Paiute Cutthroat Project, and respectfully requests that the following comments be considered by the Lahontan Board as part of the permit approval process.

Foremost of these concerns is the application of rotenone and the harmful impacts to invertebrates. The Board of Supervisors would encourage the Lahontan Board to request that the California Department of Fish and Game utilize the methods which were implemented on the Upper Truckee River Project. 1

Another primary concern is the adverse economic impacts. As economic challenges persistent for the local, State, and Federal governments, the costs of the project are excessive and prohibitive 2 without demonstrating that the benefits of the project outweigh the costs. There is conflicting information between the United States Forest Service and the US Fish and Wildlife reports as 3 to whether or not there is a need for the project. With that said, the adverse impacts to the local economy brought on by a decrease of angling tourism present a very real and potentially catatrophic threat to Alpine County during a time when finances are already stretched thin.

Thank you again for the opportunity to provide input for this very important decision. Please do not hesitiate to contact us if you have any questions regarding these comments.

Sincerely,

Donald M. Jardine
Chair

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Comment Letter 2

From: "Nancy A. Erman" <naerman@ucdavis.edu>
To: <bwarden@waterboards.ca.gov>
CC: Singer Harold <hsinger@waterboards.ca.gov>, <lkemper@waterboards.ca.gov>...
Date: 3/18/2010 1:03 PM
Subject: Re: Silver King Creek poisoning project
Attachments: FWS Draft Plan-Comments-04.pdf; Part.002; FWS:DFG letter001.pdf; Part.004

March 18, 2010
Bruce,

You probably are aware that the Final EIR/S for the poisoning of Silver King Creek was just released to the public on Tuesday, March 16, 2010. The short time span between the release of the Final and your deadline for comments on the NPDES permit (March 22, 2010) is unreasonable and contrary to a letter that the Department of Fish and Game and the U.S. Fish and Wildlife Service (the Agencies or FWS) sent out last June (see attached below). The letter stated as follows: "Once a final environmental document has been completed by the Department [CDFG], the Regional Water Board will circulate a proposed NPDES permit for a 30-day public comment period prior to consideration of the permit at a public hearing of the Regional Water Board anticipated for January 2010." 1

The Final EIR/S has revealed information that was not in any previous documents over the past 10 years this project has been under review. It will take us some time to compare the Final with the NPDES permit. We, therefore, are asking the Lahontan Board to direct the staff to postpone the hearing now scheduled for April 14-15 to the next meeting in South Lake Tahoe in June, 2010. This NPDES hearing has been scheduled and postponed by the Agencies three times since last summer. One further postponement to give the public a fair chance to review and compare documents in this controversial project should not be a problem.

I am also attaching a document that should already be in your Lahontan files, but I want to bring it to your attention specifically. It is the detailed response Don Erman and I filed on the FWS Revised Recovery Plan for the Paiute cutthroat trout on March 20, 2004. We note that the draft NPDES permit still contains misinformation regarding the project. 2

I also have a question, for my own information. Is the Lahontan staff under some obligation to prepare a draft NPDES permit and hold a hearing for a project that is in violation of the Basin Plan and Clean Water Act? Or does the staff have the authority to deny preparation of a draft NPDES permit at the outset of such a project? 3

Thank you for your attention to these details.

Nancy Erman

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March 20, 2004

Re: Comments on the Draft Revised Recovery Plan for the Paiute Cutthroat Trout (*Oncorynchus clarki seleniris*).

We are filing these comments on this Draft Revised Recovery Plan (Draft Plan) as private citizens, in the public interest.

We have reviewed and one of us (NAE) has filed comments on the CDFG Negative Declaration for the Silver King rotenone project, on the first aborted 2002 Forest Service Environmental Assessment (EA) for the rotenone project, and on the second on-going 2004 Forest Service EA. We have also reviewed extensive correspondence and agreements between the staff of the Lahontan Regional Water Quality Control Board and the California Department of Fish and Game (CDFG) regarding this proposed project and other similar, past projects. These staggered, piecemeal environmental reviews on a large, controversial stream and lake poisoning project in a Wilderness Area are unacceptable and make it extremely difficult for the public to get all the relevant information. All state and federal agencies involved in this project should prepare a joint EIS/EIR under NEPA.

This Draft Plan represents a major change in management direction of the Paiute cutthroat trout (PCT) in Silver King Creek from the 1985 Recovery Plan. The 1985 Plan assumed that the native habitat of the PCT was above Llewellyn Falls in Silver King Creek because that is the type locality for the subspecies, i.e., that location where the subspecies was first collected and subsequently described by Snyder in 1933.

The 1985 Plan, currently in effect, says on the first page "1. At what point or condition can the species be considered recovered? The question posed is then answered as follows: "When a pure population of Paiute cutthroat trout has been reestablished in Silver King Creek **above** Llewellyn Falls, and the integrity of the habitats in Silver King Creek, Cottonwood Creek, and Stairway Creek has been secured and maintained over a consecutive five-year period with stable or increasing overwintering populations of 500 or more adult fish in each of these streams" (Our emphasis added). Those conditions have been met.

The Draft Plan claims that four pieces of new information and completed tasks have made this revised plan necessary (p. 2). The four issues are illogical and contradictory as presented. The Draft Plan is an attempt to justify another large stream poisoning project in a Wilderness Area for the purpose of establishing a monospecific sportfishery for PCT that will be part of a CDFG angling contest for "heritage" trout. The Draft Plan fails to show why poisoning 11 miles of streams, springs, and a lake would benefit either the PCT or the many other non-target species that would be affected and endangered by this project. Nor do the poisoning plan and re-stocking and the subsequent sport fishery offer any new protections for the PCT.

Fundamental to the Draft Plan is a claim, now, that the historic habitat of the PCT is Silver King Creek **below** Llewellyn Falls. The evidence for this highly speculative claim is based on hearsay and anecdote. The evidence is also variable and contradictory in the original sources (Ryan and Nicola 1976, Vestal 1947) and the CDFG and FWS seem to have picked and chosen the stories they want to use to match their hypothesis. We have explored these sources in some detail. Great stock has been put on the recollections and stories of a sheep rancher named Connell while equally plausible stories have been discounted. There is no new evidence regarding the historic range of the PCT. More importantly, there were no scientific studies or fish sampling to determine where fish were in Silver King Creek prior to loggers and sheep herders moving fish of one kind and another around the basin at the end of the 1800s and the beginning of the 1900s.

There is no reason and no new scientific information to alter the conclusion given in the 1985 Recovery Plan that stated "The issue of what constitutes the native range is complicated by the paucity of early collection records and the conflicting recollections of early observers." (1985 Recovery Plan, p.7). Therefore, the type locality above Llewellyn Falls must be accepted as the historic range of the PCT.

Fish barriers

The first of the four pieces of "new information" is said to be the discovery of fish barriers downstream of Llewellyn Falls (Draft Plan, p.2, para 3). No explanation is given for why these barriers were not "discovered" before the 1985 Plan was written. But even assuming that no field work was conducted prior to writing that plan, and barriers really have been discovered recently, the information only raises more questions about the proposal. These barriers, so crucial to the story being told in this Draft Plan, are described as a "series of falls" upstream of Snodgrass Creek (Draft Plan, p. 29) and also as "six **potential** fish barriers" in the Silver King Canyon, the two highest being 8 and 10 feet in two separate channels (p. 12) (Our emphasis added). Eight and ten feet are not especially high barriers to fish migration under high water flow. In addition, on p. 49 it says "Reinvasion of Paiute cutthroat trout habitat by non-native trout should be prevented by monitoring or establishing instream barriers..." (Draft Plan, B. Recovery Strategy p. 49, para. 1) and on p. 58, item 4.3.3, "...inspect all fish barriers in the Silver King drainage to ascertain their effectiveness in preventing other fish species from invading Paiute cutthroat trout habitats."

Either there are barriers to fish migration or there are not. Permanent barriers of some kind would have been necessary for the genetic isolation of the precursor of the PCT. Once isolated, the PCT evolved. The barriers in Silver King Canyon are apparently not large enough for this original isolation or the FWS would not be recommending that they be inspected and reinforced to prevent upstream migration of other non-native fish. From the information given, we must assume that there are not barriers to fish migration below Llewellyn Falls, in which case the stream section below Llewellyn Falls is likely not the historic habitat of the PCT. Further, attempts to isolate PCT in the lower section of Silver King Creek would require major construction in a Wilderness Area stream.

Threats to PCT populations

The second objective from the four pieces of "new information and completed tasks" is a goal to eliminate and reduce threats to existing populations (Draft Plan, p.2, para 3). Three points are raised for the reasons why removal of fish and restocking is required. The first, and "primary", is that the population of Paiute cutthroat now occupies "an extremely limited range." In fact, the fish now occupies more range than it is believed ever to have occupied before documented disturbance. The Draft Plan claims that because of this "limited range" existing populations are vulnerable to extinction because of "catastrophic events" which may occur within any of the five drainages. Raising the threat of "catastrophy" is currently a popular method of using some unknown, unspecified terrible thing that could happen if the action wanted is not taken. Catastrophy, however, flies in the face of what the Draft Plan concludes is the history of the fish. How could the PCT have existed in such a limited length of stream for perhaps thousands of years; but now, occupying twice as much stream and in five times as many drainages, it is at risk from catastrophic events?

The second point to justify action below Llewellyn Falls is the loss of genetic distinctiveness from introgression. This risk is and always will be present regardless of Paiute introduction into the reach below Llewellyn Falls. One can more convincingly make the argument that by bringing more anglers to the easily fished areas of Lower Fish Valley, the risks for "unauthorized" salmonid introductions would increase. The only known mechanism of entry of unwanted fish into the Silver King drainage has always been human action. Later in the Plan, it is clear that increasing the attraction of a basin or stimulating too much fishing is a clear risk ("Directing large numbers of recreation users to North Fork of Cottonwood Creek would inevitably stimulate unauthorized angling for Paiute cutthroat trout" Draft Plan, p. 54, Sec. 3.2.4.) If it is clear that this problem exists for Cottonwood Creek, the same logic must apply to all populations. The Plan then argues the issue the other way by suggesting an "opportunity for a highly regulated and special designated fishery **above** Llewellyn Falls should be explored..."(p. 57, Sec. 4.2) The FWS is well aware that CDFG has already embarked upon a program (The California Heritage Trout Challenge—www.dfg.ca.gov/fishing) intended to stimulate and even reward fishing for PCT "in its native range".

Opening the stream above Llewellyn Falls to angling, now closed, will increase the risk to the PCT of hybridization. PCT exist now in the stream section below Llewellyn Falls because some fish go over the falls and the barrier on Coyote Valley Creek and Corral Valley Creek and are available for anglers to catch in the lower section of Silver King Creek below Llewellyn Falls which is presently open to angling. The unique experience of catching Paiute cutthroat trout in their native drainage is provided currently.

As the Draft Plan discusses, PCT are less wary than other trouts making them highly vulnerable to angling. "Significant population declines have been noted in waters that are exposed to moderate or even light fishing pressure." (Draft Plan, p. 11). Does the FWS see no contradiction in recommending fishing above Llewellyn Falls where the population is claimed to be finally secured?

In addition, if the stream reach below Llewellyn Falls is converted to a monospecific population of PCT, it will always be at risk of introductions of non-native fish into any of the tributaries above Llewellyn Falls or into Corral Valley or CoyoteValley Creeks anyway. There is no reason to assume that non-native fish could only be introduced into the most accessible area.

The third reason in the Draft Plan for action below Llewellyn Falls is the risk of genetic bottlenecks. These bottlenecks in PCT populations are already present. Analyses of PCT genetic markers all concluded that bottlenecks are present in the remaining populations (Israel et al. 2002, Nielsen and Sage 2002).

There is confusion in the Draft Plan about hybrid crosses between PCT and rainbow trout versus PCT and Lahontan CT. On p. 45 of the Draft Plan it says

"...genetic analysis indicates that Corral Valley Creek now contains pure Paiute cutthroat trout." The statement is credited to Israel et al., 2002. But the Israel et al., 2002, report says: "None of the loci screened showed fixed differences between Paiute and Lahontan cutthroat trout." And in the Summary of the Israel et al., report we read: "Additionally, molecular markers that can distinguish Lahontan and Paiute cutthroat trout would provide another tool for determining this important relationship." Clearly the Israel et al., 2002, study did not separate Lahontan CT from PCT.

And, further, the Israel et al., 2002, study even casts doubt on the genetic separation of PCT from rainbow trout: "Upon examination of the SCN evidence it does not appear that any population has undergone recent hybridization with rainbow trout; however, introgression from past hybridization events may be difficult to detect when relying on a single genetic marker."

The Draft Plan concludes that reintroduction to "native habitat" (below Llewellyn Falls) will somehow "substantially reduce these extinction threats." This reasoning is flawed and is constructed merely to justify another poisoning project in Silver King Creek for other purposes. Reducing future bottlenecks, as the Draft Plan acknowledges (and Israel et al. 2002 have recommended), will require purposeful mixing of stocks from among the many, isolated locations.

Life history and Population Sizes

The third objective from the four pieces of "new information and completed tasks" is a goal to develop increased knowledge about PCT population dynamics based on long-term trend data (Draft Plan, p.2, para 3). We feel this work should have been accomplished decades ago. It seems odd, given the concern the agencies profess for this subspecies, that they have never conducted or commissioned a study on the biology of the PCT in its native range. The only life history studies completed were on the introduced population in the North Fork Cottonwood Creek, Mono County, CA. Such basic information as how long individuals live in their native drainage is unknown. In spite of all the PCT that have been caught, collected, moved or poisoned in the Silver King drainage over 70 some years, no age and growth study based on fish scales has been done on pure PCT. One limited report of 40 trout collected in 1956 in Silver King looked at age based on fish scales, but those may have been hybrid trout (Ryan and Nicola 1976).

The discussion of fish abundance in Upper Fish Valley is confusing (and mostly redundant with a later section). The section (Draft Plan, p. 3) should be clarified so that a reader knows whether numbers apply to a section, a reach of stream, a unit length of stream, one year or the average for all observations. Reference to fish "observed" and "estimated" as given, are confusing. If the FWS is implying that estimates have variability ("may be as high as"), then data should be given somewhere with the error terms or confidence levels for the estimates. Data are more consistently presented for other streams than for Upper Fish Valley. The concluding sentence of this section — that adding the reach of Silver King Creek below Llewellyn Falls would double the stream length of occupied habitat — is unconnected to this passage or to the need for this expansion of habitat.

If the purpose of citing the various numbers of fish is to build a case for some "needed" number of fish, then the values presented are misleading. The Draft Plan leaves it to the reader to add up miles of stream, numbers of fish per mile, mean number of fish, and locations. Much later (p. 49), the Draft Plan presents the goal of recovery in terms of an "effective population", which is defined as 1) a population that is stable or increasing in size, 2) a population that has at least 3 age classes (and survives for at least 5 years), and 3) a population of at least 2,500 fish >75 mm (p. 49).

We examined these issues in order as follows:

1) A stable or increasing population.

The data for Upper Fish Valley and Four Mile Creek are of long duration and show how populations fluctuate. In particular, the Draft Plan (p. 19) notes for Four Mile Creek that juvenile fish numbers are quite variable. Comparison of Figures 4 and 5 in the Draft Plan show that juveniles have been just as variable for Upper Fish Valley. Several reasons for variation in fish abundance are implied or found scattered throughout the draft including a) beaver presence, beaver removal, then dam obliteration, then habitat modifications, b) periodic poisoning (approximately 7 or 8 times?—numbers vary among government documents), then restocking with small numbers of new fish, c) selective removal of suspect hybrid fish (Ryan and Nicola 1976, p. 39), d) intensive poaching, and e) fluctuations in juvenile recruitment in response to floods.

We can partially examine one of these sources of variability—variation in juvenile abundance in response to floods—a well-known and natural phenomenon for stream salmonids. The Draft Plan, Figure 4, Upper Fish Valley, includes a note (W. Somer, unpubl. data) that 1982, 1986, and 1998 were years of heavy runoff. Is this statement based on stream discharge measurements for Silver King Creek or just personal observation of high water? The closest USGS gage with a long-term record (86 years) is for West Fork Carson River near Woodfords. The record shows that floods of 1982, 1986, and 1998 were among the ten highest peak discharge events. This stream probably tracks at least the peak flows that would occur in Silver King Creek. We used this gage record to further explore the relationship of peak flow (using the W.F. Carson River as a proxy for Silver King Creek) to Paiute cutthroat populations (Draft Plan, Fig. 4) in Upper Fish Valley. Our analysis showed that juvenile PCT abundance in Upper Fish Valley decreased significantly as peak discharge increased (Figure 1). The regression plot (logarithmic for both axes) is significant (P=0.006) although the amount of variation explained in the abundance estimates is low (~30%), as might be expected, given the other sources of variation listed above for the years of data.

Without criteria for the meaning of "stable", the goal is meaningless. In the case of this fish, with primarily a 2-year life cycle dominated by fluctuations in juvenile abundance, a "stability" goal has little utility. These populations are most probably highly variable naturally and will remain so. And why would the FWS select a goal or assumption that PCT numbers will increase indefinitely? In later sections the Draft Plan states (p. 19) the 2001 estimates of fish in Upper Fish Valley "were within the range of its historical abundance, suggesting that the population may still be expanding." The 2001 estimate shown in Fig. 4 is the second largest of the 28 years that populations were estimated over the time period shown, and it exceeds any value estimated over the 10 years following poisoning in 1964. There are enough data points from these two stream sections to consider, for example, that a population is stable if it is within ±2 standard deviations or the 95% confidence interval of the long-term mean. Based on any reasonable criterion, the existing populations are "stable."

2) A population that has at least 3 age classes.

In spite of the long time the FWS and CDFG have been "managing" fish in the Silver King basin, handling perhaps thousands of PCT, nearly the only reported data on age and growth is from studies done in the N.F. Cottonwood Creek, where the PCT is a non-native, introduced fish. We could not find a single published report even of a size frequency distribution for this fish in Silver King Creek. As previously discussed, the only other reported data on age was from Ryan and Nicola (1976) who reported that PCT in Silver King Creek had much different age-at-length than those in N. F. Cottonwood; and in the sample, they found only two age classes (1+ and 2+). We presume that age 0 (young-of-the-year) were excluded or not collected and would make up the "third" age class. Is that the meaning of the FWS goal? The FWS has failed to provide any useful data to evaluate this 3-age class criterion. It is highly likely that all three age classes (0, 1+, and 2+) exist now in Silver King Creek and its tributaries: the populations have persisted except when poisoned out. The FWS and CDFG have no data on number of age classes, yet the FWS has selected a rule for judging recovery based on age classes.

The FWS has recognized, again, that it is necessary to "monitor abundance and age class composition" (Draft Plan, p. 58, Sec. 4.3.1). The same recommendation was made in the 1985 Recovery Plan (p.29, section 1121). Nineteen years later it has not been accomplished.

3) A population of at least 2,500 fish >75 mm in length.

The definition of this goal is for a size category (>75 mm) which has not been separately reported for any population in Silver King drainage, and no rationale has been presented for its choice. We assume this size is based on the general recommendation in Hilderbrand and Kershner (2000) for cutthroat trout in the Rocky Mountains. As the PCT is thought to be smaller than other cutthroats, a slightly smaller size category might be more appropriate; but in the absence of data, we won't speculate. There are no data in the Draft Plan or in available documents presented on the size distribution of fish in Silver King Creek. To date, beginning with the report of Ryan and Nicola (1976), populations have been segregated as adult and juvenile. An adult fish has been equated with a "catchable" fish that was defined as 150 mm and greater in length, and all others are lumped as juveniles. (Unfortunately, even this consistency is lost, as fish in Stairway Creek (p. 49) are defined as adults if they are 137 mm.) A complete evaluation is difficult for this goal, given the lack of any data on size frequency or ages in Silver King Creek.

It is also difficult to tell if the FWS population goal of at least 2,500 fish applies to the total of the separate populations in the Silver King drainage or to each of the separate populations (Draft Plan, p. 49). Separate populations in Silver King are not defined and appear not to be isolated from each other in some cases. We assume the 2,500 fish goal is for the whole drainage.

But what do the data that are presented in the Draft say that relates to goal 3? According to the Draft Plan, there are "1020 adult fish ... in 6 stream populations" (p. 19) in the Silver King drainage. The estimates given for Upper Fish Valley are apparently only for the test reach ("the population could consist of as many as 424 adult fish, which is the average number of adults for this 1,900-meter...reach."). To examine this question further we prepared the following (Table 1) from data given in the Draft Plan beginning on p. 19.

Table 1. Estimates of mean total fish >150 mm in Silver King Creek and tributaries within the basin.

Stream	Mean Number of "adult" fish/unit length	Total length of stream(km)	Total mean population in stream
Upper Fish Valley	424/1.9 km	4.3	960
Four Mile Ck	133/km	3.0	399
Fly Valley Ck	221/km	1.8	398
Corral Valley Ck	148/km	3.6	533
CoyoteValley-Up -Down	528/km 444/km		
Coyote Valley-All	Mean 502/km	4.9	2457
Total all streams		17.6	4747

Thus, even with a definition of "adult" fish given as 150 mm, the average adult population in the Silver King drainage is nearly twice the size (4,747), on average, needed to meet the goal of an "effective" population. If "juveniles" >75 mm and <150 mm are included in the estimate, then the "effective" population is more likely four times greater than 2,500 fish.

Note also that the actual sum of stream kilometers in Table 1, taken from the data summaries listed in the Draft Plan, p 19–23, is 1 km less than the total given (18.6) on p. 19. Apparently, fish in 1 km of Bull Canyon Creek were not counted, making the average population of fish even greater than we have calculated.

Therefore, the current existing populations of PCT in the Silver King drainage exceed by a wide margin the goal of obtaining an "effective population." Their populations are as stable as can be expected for a species with a short life cycle and high variability in juvenile recruitment, and as much "management" as these populations have had. The number of age classes is probably three because the FWS and others have assumed that reproduction occurs at age two, and populations have grown in size after transplants.

The FWS should declare victory and concentrate on the other elements of improving habitat and protecting the existing populations in order to protect the PCT.

Habitat conditions

The lack of any habitat condition assessment for the last 14 years belies any genuine agency interest in this subspecies. The last assessment showed 12 out of 20 habitat assessment sites of PCT habitat in the Silver King drainage in poor or fair condition (Draft Plan, Table 3, p. 30). The number of sites in the table differ from the number given in the text on p. 29.

Habitat was a key criterion to recovery of the PCT. "Habitat and population trends will be closely monitored" (Management condition #4–Paiute Cutthroat Trout Recovery Plan, USFWS, 1985). But even this critical management goal seems to have been abandoned.

Nor is there any recognition in this Draft Plan that poisoning is a major habitat disturbance that can have long-reaching and permanent effects on non-target species and food supplies which are a component of "habitat."

Impacts on Non-Target Species

The impacts of rotenone on aquatic invertebrates are well known, have been studied for many years and continue to be studied (e.g., Almquist 1959, Binns 1967, Meadows 1973, Helfrich 1978, Chandler 1982, Dudgeon 1990, Mangum and Madrigal 1999, Cerreto et al. 2003). The impacts are variable depending on the sensitivity of each species to rotenone. Some species may be eliminated or greatly reduced while other species are increased after rotenone poisoning. Cosmopolitan or "weedy "colonizer species, relatively insensitive to rotenone, will be expected to replace more sensitive species and the overall species diversity will decrease.

Most of the studies on rotenone impacts to aquatic invertebrates have been short-term. Most have only identified larval aquatic insect forms and, therefore, have not determined the number of species affected or eliminated by rotenone. If a higher taxon than a single species is affected, one can assume that a higher number of species are being affected. For example, when a study reports that a genus, family, or order has disappeared or shown major stream drift, one must assume the taxon represents more than one, and perhaps many, species.

A 5-year study on a river in Utah (Mangum and Madrigal 1999) found that "up to 100% of Ephemeroptera, Plecoptera, and Trichoptera [mayflies, stoneflies and caddisflies] were missing after the second rotenone application. Forty-six percent of the taxa recovered within one year, but 21% of the taxa were still missing after five years. They further found that at least 19 species were still missing five years after the rotenone treatments. (I say "at least" because some taxa were identified only to genus and may have included more than one species).

In a short-term study on a Pennsylvania stream, Helfrich (1978) found that all 4 major orders of macroinvertebrates in the study stream exhibited substantial decreases in numerical abundance 11 days after rotenone treatment. Populations of Plecoptera and Diptera were "nearly exterminated." Trichoptera and Ephemeroptera were reduced to 50% of the pretreatment levels.

The studies currently being conducted by the agencies in California are on immature aquatic insect forms, only, and are not capable of identifying most species, except in rare instances where a genus includes only one or two species, or where a larval form has characteristics so unusual that the species can be determined. Taxonomic insect keys are written primarily for adult males. To date, no study has been conducted in California to determine which endemic and rare invertebrate species are being lost due to the use of rotenone.

The information given on macroinvertebrate sampling in this Draft Plan contains no data and is only one paragraph (Draft Plan. p.31). Thus, we will discuss information given in other agency documents regarding the potential impacts to aquatic macroinvertebrates.

The studies on which the CDFG and FS have relied for impacts from the 1991–93 poisoning in the Silver King drainage (Trumbo et al. 2000), in fact, show long-term effects on aquatic invertebrates and significant changes in composition of macroinvertebrates in the Silver King drainage as a result of past poisoning. These studies provide clear evidence of the potential for significant and long-term impacts to non-target instream communities. A plot of even the crude BCI ratings given for aquatic samples in the Forest Service EA for the proposed rotenone project in the drainage shows that aquatic invertebrates had not recovered to pre-project conditions three years following the last poisoning in 1993 (Figure 2).

We analyzed the only detailed taxa data presented in the Trumbo et al. (2000) report, and it was clear that the stonefly taxa were different in composition, and many stoneflies identified to the genus or species level before the project were not present three years after the project.

We compared the pre-project stoneflies (1990 + pre-1991) at each station with the post project stoneflies (1996) at each station. We compared the sites by how much overlap of taxa below the family level (genus and species) existed pre- and post-project. Because so few stonefly species can be identified at the species level in the immature form, these are primarily common species, not the rarest. The rare species were probably lumped at the family or order level. There was no explanation in the study for the lack of finer identification. We counted only genera unless two species in the same genus were clearly identified.

The results were as follows for the stoneflies:

Site 1 (Control): 3 of the 4 taxa found in 1996 were the same as the 7 taxa found in 90-91. (a loss of 3 of 7 stonefly taxa, 3 were the same taxa as preproject).

Site 2: 2 of 5, 1996, same as 9 found in 90-91 (a loss of 4 of 9 taxa, two were the same taxa as preproject.)

Site 3: 0 of 0, 1996, same as 7 found in 90-91 (a loss of all taxa by post-project.)

Site 6: 1 of 3, 1996, same as 5 found in 90-91 (a loss 2 of 5 taxa, one was the same as preproject.)

Site 7: 2 of 3, 1996, same as 6 found in 90-91 (a loss of half the taxa, two were the same as preproject.)

Site 8: 0 of 3, 1996, same as 10 found in 90-91 (a loss of 7 of 10 taxa, none were the same from pre-project to post-project.)

As can be seen, these results show consistent decreases in taxa in common and number of taxa at the sites between pre- and post-project samples. Recovery had not occurred within the three years between the end of the poisoning and the last data set collected.

Looking at the data another way, we calculated a stonefly index of diversity using the Margalef diversity index, $M_{DIV} = S\text{-}1 / Log_eN$, where S= number of Plecoptera taxa and N is the total number of individuals. These data came from Trumbo et al. (2000), Appendix H and I. We used all numbers and all taxa categories in those tables for 1990 and pre-1991 (before treatment) and 1996 (three years after treatment). We calculated a diversity index for both 1990 and pre-1991 data and then averaged the two indices for the before-treatment values. The control site (C) showed an increase in diversity over that period, as did treatment site 6 (Figure 1, p. 9a). Large decreases in diversity were seen at sites 2, 3, and 8 and a small decrease was evident at site 7 three years following the end of the rotenone applications.

For these analyses we used the data at face value with the recognition that these sites may have been poisoned by rotenone in earlier years, that no real control site existed that was comparable to the treatment sites, that there were odd differences in the way data were presented from the 1990 samples to the end of the project, that there was no explanation for the lumping of taxa groups in the later samples and no explanation for the missing sites 4 and 5.

The Water Quality Control Plan for the Lahontan Basin (Basin Plan) requires that species composition objectives "shall be met for all non-target aquatic organisms within one year following treatment." And the relevant species composition objective states: "Species composition shall not be altered to the extent that such alterations are discernible at the 10 percent significance level" (see Lahontan Basin Plan requirements for the East Fork Carson River Hydrologic Unit). The data indicate that the 1991-1993 poisoning did not meet these objectives, and it is highly unlikely that the proposed project can meet these objectives. In sum, the data from the 1991-93 rotenone project and other published literature indicate that the proposed project would violate the Lahontan Basin Plan's requirements that non-target organisms shall recover within one year following stream poisoning with rotenone.

The taxonomic list provided in the Forest Service EA is low in numbers of invertebrate taxa and represents a highly disturbed watershed, a poorly designed study or negligent analysis or all three. In a drainage of this size in a Wilderness

Area (that should be relatively undisturbed), we might expect somewhere between 200 and 400 species of aquatic invertebrates, or more, and several endemic species (Erman 1996). This drainage however has undergone extreme disturbance in the form of repeated stream poisonings, extensive livestock grazing, and stocking of non-native fish species.

The Sierra Nevada has a high number of endemic, locally distributed aquatic invertebrates of evolutionary importance (Erman 1996). It is unfortunate that agencies that should be concerned about maintaining this biodiversity, particularly in Wilderness Areas, are so focussed on single-species management that they put many other species at risk.

The plans to poison springs, even where fish are not present, make permanent species losses far more likely. Endemic species are often present in springs (Erman and Erman 1990, 1995). Springs are quite dissimilar even within the same stream basin (Erman and Erman 1990). It seems an abuse of the Endangered Species Act and the California Wilderness Act to use methods to restore a single species that put other native species at risk of extinction.

Macroinvertebrate species in general are distributed in rather narrow sections along a stream gradient. Only the most cosmopolitan species could survive downstream from upper reaches, seeps and springs. Species are replaced by other species along a stream gradient.

The great majority of aquatic invertebrates are insects, most of which emerge as adults into the terrestrial environment where they are an abundant and important food source for a wide variety of birds, amphibians, reptiles, mammals, and fish. In addition, size of species is important for food supply of other species. Studies have shown that large-sized organisms are often replaced by small-sized organisms when a disturbance occurs in stream systems (reviewed in Erman 1996).

Impacts to Other Species

Food is an essential component of "habitat." The loss of aquatic macroinvertebrates, emerging aquatic insects and fish over a three-year poisoning cycle in 11 miles of stream, springs and a high mountain lake in one drainage will be a major habitat disturbance for many other species in the food web. Emerging aquatic insects will be significantly reduced for at least four years if this poisoning project is carried out. The great majority of aquatic insects have one-year life cycles, and some species have life cycles of two or more years. Eggs of most species at this high elevation are laid in the late summer and early fall. A late summer–early fall poisoning would significantly reduce species emergence for the following year and would reduce fall emergence for the year of poisoning.

Amphibians like the mountain yellow-legged frog and the Yosemite toad in addition to being in danger of being killed outright by the poison, will lose a major food supply. Birds like the willow flycatcher, the dipper and the yellow warbler will lose a large portion of their food supply, as will bats and fish-eating birds and animals, such as kingfishers and bald eagles. The cascading effects to the food web of a large poisoning project will be extreme and far-reaching. The FWS, the agency responsible for endangered species, should have analyzed these effects to non-target species in this Draft Plan. Instead the Draft Plan is a myopic, single species approach to increasing numbers of one species for sport fishing.

It was never the intent of the Endangered Species Act to conduct recovery projects to increase single species that would put other species at risk of extinction.

Cumulative Impacts

Two major cumulative impacts from poorly conceived fish management have occurred throughout the western U.S. for decades. The first is the stocking of non-native fish by the FWS and state fish and game departments, and the second is the widespread and intentional destruction of life by stream and lake poisoning that has been conducted, particularly in wildlands, to undo the damage of the continuing fish stocking. It is an endless and unanalyzed cycle.

The CDFG has planted most of the fish it later wants to poison (with, we assume, agreement from the FWS). Prior to the 1991 stream poisoning project above Llewellyn Falls, approximately 800 fish were moved below the falls into the area that the FS, CDFG, and FWS now want to poison (Flint et al. 1998). Also in 1991, CDFG planted non-native trout in Tamarack Lake where the agencies now propose poisoning to eliminate unwanted fish. "In 2003, approximately 500 hybridized trout were removed from Silver King Creek and stocked in suitable waters outside the project area" (Forest Service EA, p. 6). The EA is silent about what those "suitable waters" were, but the Trout Unlimited website (www.tucalifornia.org) said the hybrids were moved to high mountain lakes, where they will undoubtedly become a further problem for mountain yellow-legged frogs.

And, of course, the four populations of PCT in other basins are all non-natives in those habitats. Six out of ten recorded PCT transplants to non-native sites have failed (Draft Plan p.16, Table 1). Other non-native locations are being considered (Draft Plan, p. 61). Poisoning precedes most transplants. It is clear that the agencies involved in these management activities do not understand what cumulative impacts are.

In the Sierra and other parts of the West, "trout of concern" are being planted in headwater areas or lakes that were originally fishless and contained many endemic and rare species of invertebrates and some amphibians. These native species are being negatively affected by the introduction of large non-native predators at the top of the food chain (Herbst et al. 2003, Knapp 1996, Knapp and Matthews 2000).

There can be no long-term restoration of native fish as long as fish stocking by Fish and Game agencies and FWS continues in the drainages of concern. These agencies have been educating the public for a very long time that moving fish around is a good idea. In California, the CDFG even does outreach with schools and groups, giving them fish eggs to rear and plant in streams. At this point, it would require a massive, long-term re-education program first of the agencies and then, of the general public, to stop fish introductions wherever people want that fish species.

"The primary threat to the Paiute cutthroat trout is hybridization with nonnative trout..." (Draft Plan, p. 49, para. 1). That threat will remain no matter how large an area the PCT occupies.

Below is a list of just a few of the projects of poisoning and stocking threatened fish into previously fishless waters or waters with other fish that we found. Taken together they represent a small fraction of the cumulative impacts of current fish management on native species from both fish stocking and poisoning. Most of them are in National Parks or Wilderness Areas where we would expect native species of all kinds to be protected.

PCT projects:

1) 1956 Bull Lake poisoned (E.F. Carson drainage, Carson-Iceberg Wilderness) removed Lahontan cutthroat and Tui chubs, both natives species for the drainage, to stock PCT (Ryan and Nicola 1976).
2) 1957 Birchim Lake (Inyo County) poisoned to stock PCT (Ryan and Nicola 1976).
3) 1965 Delaney Cr. Poisoned in Yosemite N.P. to rid it of planted brook trout so exotic Paiute could be stocked (Ryan and Nicola 1976).
4) 1965 Upper and Lower Skelton Lakes poisoned in Yosemite N.P. (headwaters of Delaney Ck) to remove brook and to protect Paiute (unsuccessfully) (Ryan and Nicola 1976).
5) Sharktooth (John Muir Wilderness), Cabin, and Stairway (Ansel Adams Wilderness) all previously fishless (reviewed in FWS Recovery Plan and (Ryan and Nicola 1976).
6) FWS Draft Plan: sec. 4.2, p. 57 "explore additional out-of-basin population locations."

Lahontan Cutthroat Trout projects:

Unknown dates for Lahontan cutthroat trout recovery (from Fishery Management Plan for Lahontan cutthroat trout Salmo clarkii henshawi in California and Western Nevada Waters, 1986. Signed by CDFG, Nevada Dept. Wildlife, FWS, Forest Service Region 5 and Intermountain.

Here are known places around the current Silver King project:

1) Slinkard Creek (poisoned) stocked.
2) Upper Truckee (poisoned) stocked.
3) W.F.Grey Ck. (previously fishless) stocked.
4) Silver Ck. (poisoned) stocked.
5) Mill Cr. (to be poisoned).
6) 1980 upper N. and S. forks of By-Day Ck (E. Walker R.) stocked, previously fishless.

7) 1982 east branch Disaster Ck previously fishless, stocked with LCT.
1984-85 Water Canyon within Carson River drainage, Bodie Ck within Walker River both planted and previously fishless.
Plus, 11 other "substitute sites" for stocking Lahontan CT, all "need" chemical poisoning.

In summary for Lahontan cutthroat: The "limited expansion option" would stock 11 streams of the Lahontan basin, 10 would be chemically poisoned. "Moderate expansion option: all of the 11 in the first option plus 11 other "substitute sites" (mentioned above) all of which would be chemically poisoned. The Plan selected "limited expansion option" but "Option 3 (moderate expansion option) will be considered as a second phase."

Golden Trout projects:

There is a similar pattern of poisoning and restocking for the recovery of golden trout in the Golden Trout Wilderness. The Sequoia National Forest Fishing website reports that since 1975 about 65 miles of streams and 8 lakes have been poisoned and restocked with Golden Trout.

The impacts of all these poisoning and stocking projects on non-target species have been ignored, for the most part, as they are in this FWS Draft Plan. The Draft Plan makes no effort to assess the cumulative impacts to such species as the mountain yellow-legged frog, Yosemite toad, willow flycatcher, the yellow warbler and hundreds of other species of all this poisoning being conducted in other nearby watersheds or of all the past poisoning in the Silver King drainage (7 or 8 times in various parts of the Silver King drainage) or in many other watersheds across the Sierra. Nor does it recognize that a threatened trout species outside its native habitat is a non-native species and as much an impact as any other non-native species.

On the whole, this proposed management plan, far from benefitting native amphibians, will only further deteriorate their habitat in several locations. One of the more misleading statements in this Draft Plan is the sentence on p. 9 that "the long-term effects of removal of nonnative and hybrid fish will be beneficial to native amphibians." We know of no studies that show that PCT are less an impact on amphibians than are other trout.

Role of Non-Governmental Fishing Organizations

While we have had a great deal of difficulty getting information on this project (documented in earlier comments by NAE to the CDFG and FS), some groups, it seems, have been working on the project for years as the following indicates:

"Trout Unlimited continues to spearhead the work on Silver King Creek while relying on the cooperative agencies for scientific and logistical support. We are planning the next phase of the project in conjunction with agencies and will provide an abundance of volunteer labor as well as funding for equipment, materials, and transportation." (Trout Unlimited website regarding PCT in Silver King Creek—www.tucalifornia.org).

A Rotenone Stewardship Program, funded partially by the Foreign Domestic Chemicals Corporation and Prentiss Incorporated, whose products are promoted in the website advice column, is part of the American Fisheries Society Fish Management Chemicals Subcommittee (AFS website).

Summary and Conclusions

The FWS Draft Revised Recovery Plan for the Paiute Cutthroat Trout is a proposal for another large stream and lake poisoning project in a Wilderness Area. It was not the intent of the Wilderness Act to manage Wilderness Areas to expand distribution of a single species beyond its native range. No new information has been presented in this Draft to convince us that this plan is necessary or scientifically supportable. And it is a major risk to non-target species.

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June 15, 2009

Dear Interested Party:

The California Department of Fish and Game (Department) and the U.S. Fish and Wildlife Service (USFWS) have proposed to apply rotenone formulation and potassium permanganate into Silver King Creek and associated tributaries between Snodgrass Creek and Llewellyn Falls to remove non-native trout to restore the native threatened species Paiute cutthroat trout (*Oncorhynchus clarkii seleniris*) to its historical habitat. The Department and the USFWS released a draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR) in March 2009. The Lahontan Regional Water Quality Control Board (Regional Water Board) released a tentative National Pollution Discharge Elimination System (NPDES) permit for the Project in May 2009 (comments due June 5). Because of the time needed to prepare responses to public comments, the Department and USFWS will not finalize the EIS/EIR until late 2009. Therefore, no treatment of Silver King Creek and its tributaries using rotenone will occur this year. However, the Department and USFWS will continue conducting fishery and other aquatic surveys, including gill-netting of Tamarack Lake this year.

Once a final environmental document has been completed by the Department, the Regional Water Board will circulate a proposed NPDES permit for a 30-day public comment period prior to consideration of the permit at a public hearing of the Regional Water Board anticipated for January 2010.

Should you have questions, please contact Mr. Stafford Lehr, Department of Fish and Game, at (916) 358-2939 or Mr. Chad Mellison, U.S. Fish and Wildlife Service, at (775) 861-6300.

Sincerely,

Sandra Morey
Regional Manager
North Central Region

Robert D. Williams
State Supervisor
Nevada Fish and Wildlife Office

Comment Letter 3

From: Laurel Ames <laurel@watershednetwork.org>
To: Bruce Warden <BWarden@waterboards.ca.gov>
Date: 3/22/2010 4:45 PM
Subject: comments on PCT Recovery Project and CDFG website for Heritage TroutChallenge
Attachments: Image1; Harold Singer.doc; Alts comments final 2.doc

Please consider this as my attachment #2. Laurel

California Heritage Trout Challenge 1

Challenge Overview
<http://www.dfg.ca.gov/fish/Fishing/Recognition/HTC/index.asp> |
Requirements
<http://www.dfg.ca.gov/fish/Fishing/Recognition/HTC/HTC_Policy.asp> |
Application Form (.pdf)
<http://www.nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=3421> | Resources
<http://www.dfg.ca.gov/fish/Fishing/Recognition/HTC/HTC_Resources.asp> |
Heritage and Wild Trout
<http://www.dfg.ca.gov/fish/Resources/WildTrout/index.asp> | Other
Awards <http://www.dfg.ca.gov/fish/Fishing/Recognition/index.asp>

Qualifying Trout

Image of Kern River rainbow trout from Upper Kern River, Sequoia National park. Image courtesy of Jeff Weaver, Heritage and Wild Trout Program.California has a large and diverse collection of trout that are native to the state's waters. The state's Legislature recognized the special value of these trout by passage of an act (Fish and Game Code Sections 7260 and 7261) that acknowledges the importance of designating Heritage Trout waters to provide angling for the following forms of California native trout.

These three subspecies of cutthroat trout (/Oncorhynchus clarki/) and eight forms of rainbow trout (/Oncorhynchus mykiss/) are your targets to complete the Challenge.

Catching six different forms of native trout from their historic drainages may take you to varied locations around the state. Some may be caught in roadside waters while others may only be caught in wilderness areas.

Cutthroat Trout (/Oncorhynchus clarki/)

coastal cutthroat trout
<http://www.dfg.ca.gov/fish/Resources/WildTrout/WT_CCutDesc.asp>

Lahontan cutthroat trout
<http://www.dfg.ca.gov/fish/Resources/WildTrout/WT_LahontanDesc.asp>

Paiute cutthroat trout
<http://www.dfg.ca.gov/fish/Resources/WildTrout/WT_Paiute/index.asp>

Rainbow Trout (/Oncorhynchus mykiss/)

coastal rainbow trout
<http://www.dfg.ca.gov/fish/Resources/WildTrout/WT_CRainBowDesc.asp>

Eagle Lake rainbow trout

McCloud River redband trout
<http://www.dfg.ca.gov/fish/Resources/WildTrout/WT_RedbandDesc.asp>

Goose Lake redband trout
<http://www.dfg.ca.gov/fish/Resources/WildTrout/WT_RedbandDesc.asp>

Warner Lakes redband trout
<http://www.dfg.ca.gov/fish/Resources/WildTrout/WT_RedbandDesc.asp>

Kern River rainbow trout
<http://www.dfg.ca.gov/fish/Resources/WildTrout/WT_KernRivRbwDesc.asp> 1

California golden trout
<http://www.dfg.ca.gov/fish/Resources/WildTrout/WT_CaGoldenDesc.asp>

Little Kern golden trout
<http://www.dfg.ca.gov/fish/Resources/WildTrout/WT_LKernGldDesc.asp>

March 22, 2010

Laurel Ames
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Harold Singer, Executive Officer
Lahontan Regional Water Quality Control Board
2501 Lake Tahoe Blvd
So Lake Tahoe, CA 96158

Attn: BWarden@waterboards.ca.gov

RE: Proposed Waste Discharge Requirements and NPDES Permit (Order) for California Department of Fish and Game Paiute Cutthroat Trout Restoration Project, Alpine County.

Attn: Bruce Warden:

Thank you for the opportunity to comments on the proposed NPDES Permit (order) to permit poisoning the high altitude Silver King Creek in the Carson-Iceberg Wilderness. These comments are submitted on behalf of the Friends of Silver King Creek, PO Box 54 Markleeville, CA ,96120 and myself, Laurel Ames, a citizen acting in the public interest.

Public Process and Failure to Receive the EIR/S in a Timely Manner.

I will detail the decisions in the NPDES that rely on the Joint EIR/EIS later in this letter. Unfortunately only the EIR has been certified by OPR, but the NPDES cites the joint USFWS/CDFG, 2010 document, so that the connection, documentation, and certification are completely foggy. There is no explanation of the discrepancy.

Due to the magnitude of this boondoggle, **I request that the hearing in front of the Board be set for the June Lahontan Board meeting in South Lake Tahoe**. That would provide the required amount of time to review the joint document and comment on a complete NPDES without relying on references to the currently unavailable, but important, joint EIR/EIS. 2

Commenting on the NPDES permit without the benefit of the EIR/S that should have been issued before the NPDES, as indicated in the DFG letter of June 15, 2009, is exceedingly difficult, since without the EIR/S whatever new factors that are to be disclosed in that document and influence these comments remain unknown to me.

As of Sunday, March 21, no EIR/S document is available within a one-hour driving distance of South Lake Tahoe, Alpine County Library, the county of the poisoning project, has not yet received the document. As of Saturday, I have not received a document in my mail box.

It appears that in the unexplained rush to get out the NPDES without the information provided in the EIS/R, the public is commanded to obey a comment deadline of March 22, despite the fact that, as of Sunday, March 21, 2010, as a member of the public, I have not yet received a copy of the estimated 3,000 page document. I do not understand the manners or politics of this bizarre calendar. Either Lahontan values public opinion or it doesn't and to give the public no time to review the lengthy document which presumably is the newest defense, newest story, and newest rationale for this project, before commenting on your technical NPDES is unimaginable. It does send a message that the agency is in such a rush to get this project approved in time for F&Gs next poison project 2
that the timetable is deliberately set up on untenable time lines.

As a member of the public I tell you that while it may seem acceptable to you to stiff the public, it is not ethical. At this time, public comments from those in the outer reaches of the state, such as Alpine County, S. Lake Tahoe, Eureka, and commenters in New Mexico, Oregon and Montana are foreclosed from making fully informed comments, and are unclear as to the interpretations in the NPDES permit.

I am very unhappy about these very bad manners, even if they are okay with you. If Lahontan is working closely with the F&G as it has been doing over the past four years, as a partner and not as a regulatory agency, even then surely the two agencies can coordinate their calendars and assure that the comment deadlines, including all the material in its sequential form – first the environmental document, then the technical NPDES permit, can be released in an organized and civilized manner to attain full public input.

Poisoning Project – Same Old, Same Old.

The NPDES Permit proposes to approve the proposed poisoning project t that is almost the exact same poisoning project that was proposed and not approved by this Board in the fall of 2005. The few changes are the 18% increase in the stretch of river to be poisoned (from the NPDES Permit it now is revealed that the poison will be applied to 11 miles vs. the 9.1 miles cited in the NOP), elimination of poisoning of small and shallow fishless Tamarack Lake, the prohibition on poisoning some seeps and springs, and the added information of the names of the five to six miles of tributaries to also be poisoned. As to additional poisoning of streams miles, minus a reduction of the lake and some of the seeps and springs leads one to conclude that those changes are a wash. The project is 3
essentially the same as in 2005.

The mitigation measures are all almost identical, with the addition of a required standby generator for the potassium permanganate neutralizer station, specific restrictions on dead fish disposal, and extension of the boundary for potassium permanganate by 1.5 miles downstream for the last and visual-only monitoring station.

The inerts, which can survive for up to six days to two weeks, will have reached the California/Nevada stateline in two days and the Lahontan Reservoir within six days.

Four plus years have passed since the last effort and little has changed in this project or the poison, although the world is experiencing global climate change, financial meltdowns, a state that may cut programs even more deeply, and the likelihood that the chemical poison rotenone may not only be banned on land as has been done in 2007, but will be banned for use in water in the near future. It is a poison with ugly chemicals inserted in it, no matter which formulation is proposed. 3

Rotenone as the indigenous people knew it.

The NPDES description of the chemical, as "a naturally occurring pesticide found in the roots of several plants" is certainly just a marketing ploy to cast it in light of a picture of an indigenous person dipping his arrow point into a mash of jungle roots in French Guiana, when the truth is its just another chemical poison manufactured in a large chemical poison factory. Worse, it is not even the chemical used by indigenous peoples, but has been significantly altered in the chemists' boiling pot of rotenone with, as described in the Permit, the addition of accelerants, synergists, carriers, solvents, dispersants, and emulsifiers. Those are described as "objectionable contaminants" in the Basin Plan. (4.1 -22) As the Permit says, four of these inerts in the formulation are on the Proposition 65 list of chemicals known to the state of California to cause cancer or reproductive toxicity. Objectionable indeed. 4

The NPDES should abandon the gratuitous description of the poison as "naturally occurring." unless it is describing only the rotenone as separate from the proposed poison.

Conditions for Use of Rotenone in the Basin Plan

In fact, the Basin Plan (as posted on the Lahontan website) has a number of conditions on the use of rotenone that are barely touched on or flat-out not mentioned in the Permit. These are expanded on as follows:

A. For example, the Basin Plan establishes the following Condition:

Control Measures for Rotenone Use

3. Within two years of the last treatment for a specific project, a fisheries biologist or related specialist from the DFG must assess the restoration of applicable beneficial uses to the treated waters, and certify in writing that those beneficial uses have been restored. A project will be considered to have been completed upon written acceptance by the Regional Board's Executive Officer of such certification. (4.9–23) 5

Although the Permit mentions this requirement at #14.3, that is under the title Project Information Submitted by Discharger Meets Requirements for Variance. The Reporting

Program does not include any reporting required in August 2014 (or 2013 if two years of poisoning is successful) or certification in writing that the beneficial uses have been restored.

The NPDES also references a MacroInvertebrate Monitoring program that requires "Post-treatment monitoring will be conducted during mid-August the first year after treatment, 3 years post-treatment, and 5 years..........." Three and five years are not two years as required under Condition #3. 5

The NPDES MRP must be amended to include the Basin Plan Condition for a two-year certification of restoration of beneficial uses, including re-establishment of benthic macro invertebrates.

B. In addition, the Basin Plan requires, in the same condition #3, that

The Regional Board recognizes that allowing rotenone use may have unavoidable adverse impacts. Some of these impacts could be mitigated in the long-term through the discovery or development of formulations whose "inert" ingredients (i.e., carriers, solvents, dispersants, and emulsifiers) have less objectionable properties, and which are free of objectionable contaminants. The DFG shall: (1) make every reasonable effort to encourage the development of such formulations, 6

The NPDES Permit fails to note the Basin Plan requirement and fails to document that F&G has made any effort to encourage the development of such formulations. In fact, the new formulation is barely discernable from the old formulation, and the new is already known to be highly erratic in different batches.

and (2) provide annual updates to the Regional Board (by December 31 of each calendar year) detailing DFG's progress and obstacles encountered during reformulation efforts. (4.9-23)

The NPDES Permit Findings, in #6 Water Board Policy for Rotenone Use fails to note Condition #2, and fails to document that F&G has actually provided an annual report and has reported, by December 31 of each year, the F&G progress and obstacles each calendar year regarding reformulation. I request complete copies of these annual reports, since 1996, and can pick them up at the Lahontan offices upon notification as soon as possible. 7

In addition, the NPDES does note that "Eligibility criteria and conditions set forth in Chapter 4 of the Basin Plan allows the Water Board the ability to grant the Discharger a variance from meeting Basin Plan water quality objectives." Unfortunately, not all these conditions have been disclosed to the Board, nor are they disclosed in the NPDES permit. 8

The Permit must meet the Conditions of the Basin Plan

Finding #3 notes that rotenone breaks down at water temperatures <u>above</u> 5 degrees C (41 degrees F within five days (that's 120 miles downstream) and the really bad ingredients within two weeks (that's 336 miles downstream) Previous permits from Lahontan to the F&G have prohibited poison from being applied below 5 degrees C.

This Permit does not prohibit application in waters below 5 degrees C. F&G records 9
from Silver King Creek and Wolf Creek Lake report temperatures at and below that level in early September 1991 and 1992. The poison was present for up to seven weeks.

This Permit must include a prohibition on application of the poison including the potassium permanganate below 5 degrees C. I had spoken to Mr. Warden as to this issue and expect the revised NPDES permit to include the prohibition.

<u>New Formulation of Rotenone vs. Old Formulation – follow the pea.</u>

It is doubtful that the Board intended, when it adopted the Basin Plan, to continue the use of the same old poisons 15 years later, defined in the Basin Plan as long-term. Yet, here we are, with little change to show for all those efforts that the F&G may have made, and which may be documented at the Lahontan office files.

One piece of information that is critically important and is not included in the NPDES Permit information is a copy of a sheet from the 2005 permit that delineates the application rates for the poison and its accelerants, etc to compare to Table 1 of this 2010 Permit. That will fully disclose the difference between the two poison formulations. I request that that specific Table from the 2005 Board document be included in the 2010 Permit as presented to the Board and available to the public. Since the application rates
appear to be substantially increased, that document is required to show the comparison to 10
the Board and to defend the allegation that this poison is "less objectionable."

The manufacturers have eliminated one of the old inerts, but added other inerts from the Prop 65 list. And, these poisons can travel many miles downstream. Silver King Creek joins the East Fork of the Carson near to the 2mile visual monitor station near Vaquero Camp, past hiking trails, and meets Hwy 4 at Centerville Flat and campground at another 3 miles. Note that at five hours, this water reaches a campground. Afterwards it travels past a small resort, more hiking trails, a favorite hot springs, through the Washoe Tribal residential area, through ranches, through Minden, through more ranches, through Carson City residential areas, through Dayton and another state park, through FT Churchill State Park and campground and out to the Lahontan Reservoir. A poison that lasts five days to two weeks will arrive at the Lahontan Reservoir around five days after the first day of poisoning. Five days of poisoning will deliver even more Prop 65 chemicals to a lake advertised for fishing and contact sports.

In addition, the new formulation must be applied at double the concentration of the old formulation, which pretty much makes it just as bad, if not worse than using the old formulation. **The Executive Officer has to determine that the poison will result in the**

minimum discharge of chemical substances, but the application rate is a range that ranges well beyond what earlier permits permitted. This double-talk about a new formulation and minimum discharge is just that - - an effort to confuse those of us with no chemistry background into thinking it meets the Basin Plan conditions for a less objectionable poison. Even if it were less objectionable, doubling the application rate 10
cancels any pretension of being less. It is equal or more objectionable, at the very least.

The new formulation and its application rate clearly defeat the Basin Plan conditions of finding less objectionable formulations. **The Board cannot make a finding that this formulation is less objectionable than the previous one**, and that the Basin Plan promises have been kept.

<u>The Monitoring Plan (MRPE pg 4)</u>

The amount of monitoring proposed for the objectionable inerts in the Monitoring Plan is only twice at the downstream monitoring point during the week-long treatment – and then only once for the very ugly methyl pyrrolidnone and ethyl ether the day after, and maybe potentially again a week after, if residues had been present. But, as the NPDES says, "these chemicals do not readily volatilize." According to Table 1, there is double the amount of methyl pyrrolidine in the poison concentration as there is rotenone, and twelve times the amount of DEE as of rotenone per liter of poison. 11

For the toluenes, benzenes, and napthalenes, monitoring is required twice during the five to seven days of poisoning, then not until one week later. Thus whatever escapes the daily poison regime and travels downstream during the long days of poisoning will not be monitored before it arrives at the Lahontan Reservoir. At one week the poison from the first day to the end of the last day will have already traveled past the Washoe Tribal residential area, through the Minden and Carson City ranches, through Dayton, and into the State Recreation Area of the Lahontan Reservoir.

There will surely be some irony if the Lahontan Regional Water Quality Control Board manages to permit poisoning of the Lahontan Reservoir.

<u>Some References to (USFWS/CDFG 2010) that are not available for review.</u>

As noted in the beginning of the letter, these are the references in the NPDES to the not-yet received Joint EIR/EIS, referred to as (USFWS/CDFG, 2010). A footnote describes that as Final EIS/EIR, Paiute Cutthroat Trout Recover Project. 12

Findings in the NPDES permit rely on the 2010 document.

#14(h) page 15 "The chemical composition of the rotenone formulation has not changed significantly.........."

Neither a 2005 comparison to Table 1 is available, nor is the 2010 document available, so there is no way to ascertain the actual difference. At the very least, the statement establishes that the new formulation is essentially the same, but Table 1 indicates that it is being used at a double, if not more, concentration. That hardly sounds “less objectionable.” 12

The NPDES permit must establish exactly how this formulation as proposed for its use is “less objectionable”.

Page 15, pg 15. “The Discharger has considered the alternatives to chemical treatment in the environmental document and determined that rotenone [and its Prop 65 additives] treatment the superior option……”

This document is not available to the public at this time and therefore the finding #15 is based on information not known to the public. This Discharger has always poisoned and always planned to poison the Silver King Creek. The 2010 Environmental Document’s 13
assessments of alternatives may be as flawed as in the draft document. I am precluded from pointing out the inconsistencies that I suspect are there if I do not have a copy. Clearly the Board has not seen the alternatives.

#19, page 17. “The Water Board has evaluated the Paiute Cutthroat Trout Restoration Project EIS/EIR for potentially significant water quality-related effects, and finds that there are no additional, feasible, less-damaging alternatives or mitigation measures that would accomplish the project’s objectives except for rotenone application.” 14

In fact there are feasible, less-damaging alternatives that would accomplish the project’s objectives such as electroshocking and netting, as is being done on the Upper Truckee River, a river that matches much of the topography, gradient, stream volumes, and distance from the trailhead.

Presumably the 2010 document analyses this alternative in more detail than in the Draft, which was terribly flawed. That document is not available to me at this time, and thus the public is precluded from information that would be helpful in reviewing the NPDES statement.

I have attached my comments on the Draft document, as an explanation of the flaws of the analysis of poison vs. electroshock and netting, and for the public record.

Without a timely copy of the 2010 document, review of this NPDES is incomplete.

This letter establishes the basis for a request to postpone the NPDES permit hearing until the public has received and been given the full thirty days to review the document.

IN addition, the entire project is based on two strange statements of fact by the Discharger, but not discussed in this permit. Those are the acceptance of the “historic” range of the fish and the second is the new “bottlenecking” argument.

Point one is the historic argument about the historic range of the PCT. The fact that the fish Department and Service are willing to serve up an improbable fish story from a very old man about an impossible fish adventure in 1912 to establish the "historic" range of 15
the fish in order to poison the lower reaches of SKC doesn't meet the laugh test. It certainly doesn't establish that the PCT needs this range to survive, as it did for thousands of years before Fish and Game discovered the creek.

Point two is that the fish will not survive bottlenecking in such a limited territory. Not only has this fish survived so-called bottlenecking for thousands of years in the upper 16
reaches, the new restoration of the newly dreamed-up "historic" range will just be another bottleneck. How the agencies can cry "bottleneck!!" in one breath and then propose to create another in the next breath is quite the exercise in flexibility. Or desperation.

The project is actually a waste of more than a $million dollars of the taxpayer's money to restore a fish that is already restored to its real historic habitat, and is surviving in its historic habitat as it always has. In addition, four more streams in the Sierra were planted years ago with PCT, so the PCT habitat now is greater than it was in its entire history.

I have discussed these issues at length in my May 2009 comments on the Draft EIR/S and am attaching them as part of the record. In addition I am attaching the F&G notice of the Heritage Trout Fish Challenge, the idea that triggered the F&G to contemplate poisoning SKC again, so that fishermen could fish for the once-endangered fish.

The bottom line is this project is not needed and is damaging to the SKC environment for no reason.

I look forward to receipt of the annual reports files by the F&G since 1995, and notification as to the postponement of the date of the hearing.

Laurel W. Ames
530-541-5752

Attachment 1 – Comments on Draft EIR/S
Attacchment 2 – Heritage Trout Fish Challenge, DFG website

May 3, 2009

To: Robert D. Williams
State Supervisor
Nevada Fish and Wildlife Office
U.S. Fish and Wildlife Service
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Reno, NV 89502

To: Stafford Lehr
Senior Environmental Scientist
Paiute Cutthroat Trout Restoration Project
California Department of Fish and Game
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Markleeville, CA 96120

Re: Comments/ Draft Environmental Impact Statement/
Environmental Impact Report (EIS/EIR) for the PAIUTE CUTTHROAT TROUT RESTORATION PROJECT, Carson-Iceberg Wilderness, Humboldt-Toiyabe National Forest, Alpine County, CA.

ROTENONE POISONING IN THE SILVER KING CREEK WATERSHED.

I am filing these comments on this Draft EIS/R on behalf of myself, as a public citizen in the public interest and as a member of Friends of Silver King Creek, a regional public interest unincorporated nonprofit organization based in northern California. Members of Friends of Silver King Creek depend for their health, culture, education, recreation, and well being on the preservation and protection of central Sierra Nevada wilderness areas and all the species that live within them. Our membership is concerned about the effects of pesticides and other toxic chemicals and activities undertaken by the U.S. Forest Service, the U.S. Fish and Wildlife Service, and the California Department of Fish and

Game in which pesticides are used, and have a special concern for the application of pesticides in wilderness areas.

I have filed comments on this same project in past years, including scoping comments, and Draft and Final EA/Negative Declaration comments. I have hiked and backpacked in the area and am familiar with the terrain and the geography. I am a resident of South Lake Tahoe, and am also quite familiar with the similar terrain and geography of the Upper Truckee River, whose connection to this project will be explained in comments below.

I include by reference each of my comments to the Lahontan Regional Water Quality Control Board, the USFS- Humboldt-Toiyabe Region, the California State Water Quality Control Board, and the California Department of Fish and Game.

I appreciate the opportunity to comment.

Laurel W. Ames

ISSUES OF SIGNIFICANT CONCERN

Failure to Analyze the Claim of Historic Habitat Results in False Basis for Project

The Recovery Plan repeated and adopted the theory from the pervious Environmental Assessment that fish management in Silver King Creek (SKC) began around 1912 and here is stated authoritatively that the specific section of the SKC below the Llewellyn Falls was the historic habitat of the Paiute Cutthroat Trout. (Section 1.7) (PCT) and repeated often in document..

The Draft EIS/R repeats that claim as a fact (Section 1.7) and uses it as a screen to evaluate the No-Action alternative, e.g. "…the No-Action alternative would fail to implement the Revised Recovery Plan (USFWS 2004) and Paiute cutthroat trout would not inhabit its historic range and would be vulnerable to………possible extinction." (Section 1.7) 17

The Draft EIS/R assumes from the Recovery Plan that what was first reported anecdotally by sheepherders or ranchers in 1912 and the site of the fish later named in 1933 by a Stanford professor is the historic basis of this fish's habitat. That, in itself, is a shocking cultural assumption that ignores thousands of years of history of the people who first lived in the eastern Sierra.

The claim that is the foundational premise of this project, that the section of SKC below the Llewellyn Falls is THE Paiute Cutthroat Trout's historic habitat, is founded on recent history, not on an acknowledgment of the history of the first inhabitants of the Washoe territory

In order to claim that the habitat to be poisoned is actually the historic habitat, the document had to ignore the role of the Washoe people as the first people in the Washoe territory and their role in the management of fish in the upper reaches of the drainages of the Walker R, and Carson R, including the SKC. Unfortunately the claim of the historic reach is the foundational rationale provided for this project.

However, fish biologists in the eastern Sierra are well-versed in documents and stories that remind us that over time in the past 5,000 to 8,000 years, the Washoe were farming fish. (pers.comm, Craig Oehrli, fish biologist, LTBMU). Impassable falls, barriers, etc were no match for Washoe people, as they moved fish to where they set up encampments in high Sierra meadows, at lakes, and along creeks, rivers and marshes. The Washoe knew how to propagate fish. (pers.comm, Richard Vacirca, fish biologist, LTBMU).

Observations of grinding rocks in the SKC watershed are indicators of Washoe presence, 17
as well as general acknowledgement of the Carson and Walker River watersheds as important places in Washoe history. The EIS/R authors are referred to the UNR library and the Nevada State library to review the anthropologic and ethnographic records of the Washoe and the management of fish.

The Final EIS/R must analyze the historic and cultural resources of the SKC and disclose the likelihood that whatever fish were reported in SKC in 1912 and 1933 had been transported, hybridized, and otherwise substantially altered from even earlier forms for thousands of years before the white miners and ranchers ventured into the SKC.

Once the anthropologic and ethnographic history of the native tribes is included in the analysis, the historic range of the PCT will be seen as irrelevant or, at least, defined with significantly less certainty.

The Final EIS/R must delete references to a specific historical habitat and acknowledge that the historic habitat is generally in the Silver Creek watershed and the specific range is unknown.

Hyperbole is not an analysis nor an evaluation.

"The survival of a species is at stake" (EISR 3.1.3) That conclusion is derived from the Recovery Plan, but does not explain how each of the other four areas of sustaining PCT
habitat are going to fail, thereby causing the final termination of this sub-species if the 18
9.1 miles of new habitat is not added.

The Final EIS/R must abandon hyperbole and explain how each of the hazard theories impact the overall populations in a such a manner that the sub-species fails to survive, including, cumulatively, all of the various locations of the PCT in SKC as well as the out-of-basin locations of the fish.

Confused Reasoning is not an analysis nor an evaluation – Cost Effectiveness is Referred to but not Analyzed.

Section 3.1.7 Cost-effectiveness is named as one of the second set of criteria for ranking options and selecting the desired option. However, the analysis fails to perform a cost-effectiveness screen, instead declaring that "..overall cost **and** effectiveness was used as a balancing criteria in comparing options that were approximately equal in effectiveness or environmental impact." What does that sentence mean?

Cost-effectiveness does not refer to cost on the one hand and project effectiveness on the other. It refers to an analysis that clarifies which alternative is more effective <u>in relation</u> to its costs. And, while promised in references to other sections, and appendixes, there is no cost data, no effectiveness data, no cost-effectiveness comparisons, and no indication of the analyses results for the alternatives. NEPA generally requires that any cost/benefit analysis prepared for the project be incorporated into or attached to the EIS.

19

In a cursory review, it appears that the preferred alternative would prove to be the highest cost, given up to 50 personnel (Section 3.2.2.3) for seven working days (Sec 2.7) plus overtime, plus travel – including official and unofficial vehicle costs, plus agency-supplied food and drink, plus pack animal support for the unidentified number of gallons of liquid poison, plus generators and gasoline, and numerous pieces of equipment and personal gear, all for each of the projected three years. The document even reveals that a second poisoning could occur in one year, resulting in another increment to be added to the initial estimates. The electroshock and gill netting alternative appears to be substantially less costly and clearly less disruptive of the wilderness area.

The Final EIS/R must disclose the full and actual carefully estimated costs of each alternative. The effectiveness of each alternative has been disclosed, although the alleged effectiveness of Alternative 2 appears to have been understated in order to support the preferred alternative. That issue will be addressed later in these comments, but should be taken into account in the cost-effectiveness analysis.

<u>ALTERNATIVES</u>

<u>Failure to Fairly Analyze Alternatives</u>
CEQ Forty Questions: 5b
NEPA Section 1502.14(b) specifically requires "substantial treatment" in the EIS of each alternative including the proposed action. Here the proposed action and the preferred alternative prepared by the federal agency are the same and the section is relevant.

20

The EIS/R document focuses on the beneficial and adverse impacts of poisoning, reasoning that the 2004 Recovery Plan is the project. But, the Recovery Plan recommends restoration of the fish, and does <u>not</u> recommend poisoning as the solution. However, the two agencies, which have been involved in poisoning or planning for poisoning in this basin during the past 45 years, determined that a three year schedule was required (Sec 3.1.2) and concluded that poisoning was the only alternative that met that schedule. Therefore, the foregone conclusion was that the EIS must frame the arguments as poisoning vs not-poisoning. Due to this historic agency bias, the document fails to attain the "substantial treatment" of alternatives required in NEPA 1502.14(b) for each alternative. Instead, it focuses primarily on the impacts of the preferred poisoning alternative and gives short shrift to the two non-poisoning alternatives.

If your only tool is a hammer, everything looks like a nail. 20

The Final EIS/R must clearly analyze the two other alternatives (1 and 3) in terms of the fish . macrinvertabrate populations, frogs, toads, insect-eating birds, and whether the fish will continue to survive, as is the recommendation of the Recovery Plan, given the factors in the two other alternatives. The comparison that is needed is that of the cumulative impacts of each alternative on the SKC ecosystem, not whether poison is faster. Speed is only relative for a fish that for 5-8,000 years has survived fire, landslide, at least one known 150- year drought (1200-1350 est), fish management by the Washoe, and to date, fish management by the fisheries agencies.

Failure to Analyze the Effects of the No-Action Alternative, in Relation to Recovery of the Fish.

<u>CEQ Forty Questions: 3</u>

NEPA Section 1502.14(d) requires the alternatives analysis in the EIS to "include the alternative of no action." This Draft EIS/R reviews the potential for the No-Action Alternative to not attain the alleged benefits of poisoning, but does not analyze the potential for the No-Action Alternative to provide a stable habitat for the fish, while guaranteeing the benefit of protection of the macrinvertebrates, frogs, toads, and birds that rely on the aquatic insects, as well as not disturbing a wilderness area with three years of poisoning, warning signs regarding poison to the public, transporting gallons of poison into the wilderness, transporting gasoline, transporting and operating motorized generators and augers and the numerous opportunities for hazardous waste spills of poison, neutralizer and gasoline, all in support of up to 50-persons in a seven day assault on the wilderness. In addition, at no time in this document are the non-poison alternatives compared to the alternatives in a favorable light, except when forced to select 21 the environmentally superior alternative.

The Final EIS/R must, under the" substantial treatment" rule of NEPA 1502.14(b), accurately assess and explain all the benefits of the No-Action alternative.

NEPA Section 1502.14 (d) states "The second interpretation of "no action" is illustrated in instances involving federal decisions on proposals for projects. "No action" in such cases would mean the proposed activity would not take place, **and the resulting environmental effects from taking no action would be compared with the effects of permitting the proposed activity** [emphasis added] or an alternative activity to go forward."

Again, the focus on poison as the only solution obscures the vision of this Draft EIS/R document and thus it fails to thoroughly analyze the benefits of not-poisoning, or the potential for ongoing sustainable populations of the fish in the 20.9 miles it currently inhabits. 21

The Final EIS/R must analyze, not just state, the benefits of not-poisoning and the potential for ongoing sustainable populations in the PCT's current habitats.

Failure to Fully Analyze the Combined Physical Removal Alternative (Alt 3)

Here the agencies assume that there is no good that will come of not poisoning, and declares numerous reasons throughout the document that this is so. For example, in Draft EIS/R PCT Recovery Section 1.5 Alternatives Considered and Proposed Action, and repeated throughout the document, the document states that "the method [electroshocking and gill netting] could have low efficiency in a rocky stream environment". Nowhere in the document is this discussed in more detail. What is the measure of efficiency? How is it applied? Where is the evidence? Concluding a fact of low efficiency is not an analysis.

In fact, in the Lake Tahoe Basin, the Forest Service LTBMU is currently conducting electroshocking and gill netting to remove planted Brook trout in a rocky stream environment. – the upper Upper Truckee River covering 17.25 miles. The project objective is to restore the Lahontan cutthroat trout. 22

The Upper Truckee project (attached) lies about 30 miles as the crow flies from the Silver King Creek, has the same geomorphic structure of glacier-sculpted valleys, and similar late season base flows in the creek/river. The USGS reports UTR average flows are 16 cfs in August and 10 cfs in Sept. SKC average flows are 15.1 cfs in Aug, and 10.9 cfs in September (USGS Water Data for Nevada [includes Lake Tahoe] National Water Information System).

The Final EIS/R must provide evidence for conclusive statements. If the non-chemical alternative is effective in the Upper Truckee River, a river that is more rocky, the document must explain why the non-poison method is <u>not</u> effective in SKC. The Final EIS/R must provide clear and accurate explanations of the differences.

Failure to Analyze Historic and Cultural Resources in the **Environmentally Preferable Alternative.**

CEQ 40 Questions: 6a

NEPA Section 1505.2(b) requires that, in cases where an EIS has been prepared, the Record of Decision (ROD) must identify all alternatives that were considered, ". . . specifying the alternative or alternatives which were considered to be environmentally preferable." <u>The environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA's Section 101.</u> 23

Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources. [Emphasis added].

The Question 6a Answer is specifically included in this set of comments on the Draft
EIS/R as a notice to the federal agency (Fish and Wildlife Service) that NEPA is about
more than the ESA: NEPA demands that the environmentally preferable alternative is
that "which best protects, preserves, and enhances historic, cultural, and natural
resources." While the Draft EIS acknowledges that the no-action alternative is the
environmentally preferable alternative, the selection of the Recovery Project has 23
narrowed the focus of the agency in a highly biased manner against the environment,
cultural resources and natural resources and toward more poisoning, resulting in a
comparison to poisoning, rather than to the beneficial effects on the natural resources of
the no-action alternative.

The Draft EIS/R is remiss in not providing a substantial section on the history and role of the Native American Washoe tribe regarding the thousands of years they managed fish in the eastern Sierra and high deserts.

The Final EIS/R must step back from its blatant bias for poisoning and fully analyze each alternative as the alternative benefits all the cultural, historical, and natural resources as required by NEPA.

Failure to Correctly Analyze the Speed of Implementation of Alternatives

Accurate information is critical to a credible analysis of Alternatives. While the document states that the preferred poisoning alternative (#2) will take three years (Sec 1.5), the analysis claims that Alternative 3 will take 10 years to electroshock and gill net 9.1 miles. (Sec. 3.2.2) Yet, an equivalent restoration project in the Upper Truckee River (project description attached) is projected to take 2 seasons to electroshock 8.5 miles in Phase II, using 4-5 crews of two, plus volunteers.

The calculations in Sec 3.2.3.2 are interesting, especially the calculation that totals 72
days of work for Alternative 3. The equivalent number of days for Alternative 2, based 24
on information in the Draft EIS/R, would be 1,050 person days. Clearly an actual
formula is required to disclose the mathematical process and result for all three
alternatives. In addition, while poisoning cannot use volunteers due to training
requirements, electroshocking and gill netting are easily accomplished by volunteers at
significantly reduced cost. The Upper Truckee project expects help from the Sierra
FlyCasters, CalTrout and Trout Unlimited. As these groups are also supporters of the
PCT restoration project, the Final EIS/R can fairly safely include those volunteers in its
calculations of work force and speed of implementation of Alternative 3.

Given that the agency has been poisoning off and on in various parts of Silver King Creek and its tributaries for the past 45 years, three years in the life of a 5,000 year old fish is infinitesimal. These fish have now been "unprotected by the agencies" for 16 years without incident. 24

The final EIS/R must compare the three estimates of total hours and days required to complete the respective alternatives, using accurate information and transparent formulas. The document must also state the exact need for speed, in relation to all of the impacts on the entire ecosystem.

<u>Failure to Analyze Technical Feasibility of the Alternatives</u>
<u>CEQ 40 Questions 5b</u>

NEPA Section 1502.14(b) notes that " The degree of analysis devoted to each alternative in the EIS is to be substantially similar to that devoted to the "proposed action." Section 1502.14 is titled "Alternatives including the proposed action" to reflect such comparable treatment. Section 1502.14(b) specifically requires "substantial treatment" in the EIS of each alternative including the proposed action.

The EIS/R fails to analyze the comparisons between the alternatives as to the technical feasibility to implement the project. In Section 3.1.4 the document states that "the technology must be technically and logistically feasible to implement" and determines that the criteria are

- number of workers,
- remoteness of area, and unpublished site-specific data and reports regarding
- habitat types,
- stream dimensions,
- fish density.

The No-Action alternative is clearly the most technically feasible, as well as the least 25
expensive and should be assessed in each of the above categories.

As to Alternative 3, the experience of the FS-LTBMU in the LCT Upper Truckee River Restoration Project is instructive.

- <u>Numbers of workers.</u>(Sec 3.14) The project requires ten Forest Service personnel in five teams of two – one to carry and use the backpack electroshocker and one to carry and use the gill netter. These teams are joined by volunteers.
  The missing comparison with the poisoning alternative is that a much bigger crew is required to horse pack in equipment, liquid poisons, motorized augurs, generators, gasoline, camp site gear for up to 50 people, personal gear and food for nine days (or seven working days if the crew leaves en masse for the weekend) for up to 50 people.. No volunteers are used in the poison alternative due to the training requirements to handle the poisons, while volunteers are encouraged and recruited for the non-poison method.
- <u>Remoteness.(Sec 3.14</u>) The Draft EIS/R document cites remoteness as a factor in the screening that produced the poisoning alternative. Silver King Creek is the less remote, in comparison to the Upper Truckee project, as the central

section of the proposed SKC project stream area is within 3.3 miles of the trailhead. The lower Meiss end of UTR project begins 4 miles from the closest trailhead. Phase II begins 6.5miles from the closest trailhead.

The two streams are remarkably similar in almost all measures. 25

Given that the CDF&G agency has been poisoning off and on in various parts of Silver King Creek and its tributaries for the past 45 years, the ten-year window predicted for the non-chemical treatment is meaningless in comparison.

Failure of the Alternatives to Adequately Analyze the Impact on Wilderness Values of the Implementation of the Poison Alternative in Relation to the Other Two Alternatives

The Draft EIS/R notes that the Wilderness Act regulates uses in the wilderness in order to protect wilderness values "Human uses such as recreation are allowed but are subordinate to the higher purpose of maintaining wilderness values of 1) outstanding opportunities for solitude, and 2) the ability of natural processes to operate free of human influence". (Sec. 2.2 DEIS/R)

Forest Service Policies FSM 2100 and FSM 2300 as quoted in the document states that pesticide use and motorized equipment use in designated wilderness areas can occur only when necessary to restore significant values within the wilderness, and to base actual use on analyses of effectiveness, specificity, environmental impacts, economic efficiency and human exposure and that motorized equipment use in designated wilderness areas may occur when an essential activity is impossible to accomplish by non-motorized means 26
because of such factors as time or season limitations, safety, or other material restrictions. (Sec 2.4).

The document concludes the preferred alternative meets the above requirements to deserve an exemption from the Wilderness Act. However Alternatives1 and 3 have not received the required "substantial treatment" in the Draft EIS/R in terms of their impacts on the wilderness values of solitude and the ability of natural processes to operate free of human influence. (Sec. 2.4.)

The Draft assumes that the USFS will grant an exemption to the use of motorized equipment and the use of a pesticide in a wilderness and that allowing an excessive number of people in a group that exceeds this wilderness standard "will be authorized" for the poisoning alternative (Sec 3.2.2.3) The failure to analyze the impacts of the other two alternatives on wilderness values is another indicator of the bias of the authors, and their inability to grasp that the other two alternatives require equal attention in the analysis.

The Final EIS/R must analyze and compare the impacts on wilderness values (as above) of the three alternatives.

ISSUES OF IMPORTANCE

Failure to Analyze the Choice of SKC for Restoration Expansion as a Shield to PCT Extinction Caused by Catastrophic Fire and Other Disasters

"By expanding the populations and range of the species, the proposed Action would also increase the probability of long-term viability and reduce threats from genetic bottlenecking and stochastic events". (DEIS/R Sec 2.2)

The multiple references to the likelihood of a species wipe-out due to stochastic events like catastrophic fire (Sec 1.7 et. seq.) is used extensively to justify poisoning in the SKC, but is a puzzling concept. The Silver King Creek is a forested watershed until its uppermost reaches at around 10,000 feet. (See Google Earth). The proposed restoration area is in the lowest reaches, generally in the most heavily forested areas. If there were a catastrophic fire, the more dense forests in the lower elevations would be the more likely to carry a catastrophic fire.

If it is an important rationale for restoring a fish to escape extirpation by catastrophic fire, 27
as stated by the Draft EIS/R numerous times, this element would lead a decisionmaker to undertake restoration in an area that is least likely to carry a catastrophic fire. Here, the decision is to extend the habitat by 9.1 miles into the area of highest fire danger.

The Final EIS/R must explain how the 9.1 miles alleged historic habitat is best for the fish in terms of being more protected from catastrophic fire, as well as floods and landslides, than other potential sites outside of this particular basin, or, conversely, how extending the habitat in one small basin (Silver King) reduces the likelihood of a catastrophic fire, flood, and/or landslides to harm the fish.

Further, the Draft EIS/R lists various events (catastrophic fire, floods, landslides) and states that the survival of the species is at stake (Sec 1.7). The concept of the biblical proportion of these various events occurring all at once or sequentially, coming together in one giant cataclysm, so that the eastern Sierra Nevada, ranging from Fresno County to the Silver King basin, would all be swallowed in flames, floods, and landslides such that the PCT habitat from Fresno County to Silver King Creek (100 miles est.) would be wiped off the face of the earth is dramatic, but not explained.

The Final EIS/R must disclose how the threat of these natural events, occurring together or singly, in one PCT population area or all, events which the PCT has presumably survived for some 5 to 8,000 years to date, would suddenly cause mass extinction of the PCT.

Failure to Disclose the Ingredients in the Alternative Poison Formulation and to Compare That With the Current Poison Formulations Proposed.

The Draft EIS/R states (sec 2.3) that "CFT Legumine™ is a recently developed 28
"alternative" formulation that contains less potentially objectionable 'inert' ingredients."

The 2004 Environmental Assessment on this project disclosed the earlier formulations and their objectionable and highly toxic inert ingredients, used as synergists or accelerators.

The Final EIS/R must disclose the new ingredients in comparison to the old. Further, the Final EIS/R must disclose the presence of endocrine disruptors in the new formulation. And the document must disclose the amount of time the new ingredients are effective as well as 28
the length of time they survive in half-life, and the time until they vanish entirely. The analysis must disclose these factors, adjusted for cold moving water. The document must disclose the number of miles downstream that the endocrine disruptors will migrate. Also, the document must disclose the effectiveness of the potassium permanganate station to neutralize endocrine disruptors as well as the synergists.

The Final EIS/R must also disclose, for each alternative, the impacts on the ecosystem of the high likelihood, based on past experiences, of a failure to control the fish removal process.

<u>Failure to Disclose the Potential for Hazardous Material Spills and the Escape of Poisons Downstream and Failure to Analyze Impacts of Spills Among the Three Alternatives.</u>

Lahontan Regional Water Quality Control Board files are replete with reports of spills, frozen equipment, six month retention of poison in nearby Wolf Lake, downstream fish kills when the neutralizing station failed, and more. There will be substantial opportunity to spill liquid rotenone (including all the inert but toxic ingredients in whatever formulation is selected, or a combination of two or three), liquid potassium permanganate, and gasoline. Given past experience, the agencies would do well to explain these issues and their relevance in the 29
alternatives analysis between the three alternatives.

Previous failures to control rotenone poisoning projects in this area and adjacent streams and lake are evidence that control is not guaranteed. See Lahontan files and previous comments on this project in the agencies' files for the lists of failures, by date, project and amount of inadvertent fish kills.

The Final EIS/R must disclose the past history of mismanagement and accidents regarding poisoning projects using hazardous materials in a wilderness area and report this in the alternatives analysis in relation to each alternative.

<u>Failure to Disclose the Existence of Washoe Tribal Communities in both the Environmental Justice and Housing Sections</u>

The Draft EIS/R includes Environmental Justice and Housing sections in the Chapters, as required. However, the document's Chapters ignore the existence of numerous Washoe Tribe communities, in both California and Nevada, including Woodfords, Stewart, Carson 30
City, Dresslerville, Gardnerville, Sparks and Bridgeport, as well as the dispersed populations of Washoe along the eastern side of the Sierra Nevada. The Washoe Tribe are an important population in western Nevada – the former Washoe Territory. For the FWS, based in Reno, this failure is a significant omission.

At the hearing before the Alpine County Board of Supervisors in 2003 Phil Stein of CDFG presented the same PCT project, and a Washoe Tribe member spoke against poisoning, citing the adverse effects of a previous project in Bridgeport. This testimony should have alerted the agencies to the presence of the Washoe Tribe population. 30

The Final EIS/R must disclose not only the true historic use of the Silver King Creek area, but also recognize that there are significant communities of Washoe in the nearby areas and must be included in the main body as well as in the Environmental Justice and Housing sections.

<u>The Failure of Alternative 2 to Provide a Shorter Stretch of SKC to Poison by Installing the Neutralization Station at the Upper Barrier to Fish Passage.</u>

The Draft EIS/R announces that the neutralization station will be near the Snodgrass Trail intersection with the SKC. This site is approximately two miles below the uppermost fish barrier as noted on the map in Figure 5.1-1.

Neutralizing 2 miles below the upper barrier causes two more miles of damage to the frogs, toads, macroinvertebrates and insectivore birds that is unnecessary and unwarranted. If the barriers are impassable by the non-native fish from which the project intends to protect the PCT, then there is no point in poisoning through the length of the barriers and destroying two more miles of stream habitat. 31

These two miles below the barriers are not intended to provide protected habitat or alleged to be historic habitat, and will not function as habitat for pure PCT. The two miles will be readily available at some time after poisoning to the non-native trout that are presumed to survive below the neutralizing station, providing the neutralizing station is functional throughout the poisoning event.

The Final EIS/R must analyze reducing the extent of the poisoned miles by moving the neutralizing station upstream to the uppermost fish barrier or explain why it is acceptable to poison an additional two miles of this stream.

<u>The On-Again, Off-Again Decision to Poison Tamarack Lake: Necessary or Boondoggle?</u>

The Draft EIS/R carries on the strange issue of whether to poison Tamarack Lake, a shallow lake whose intermittent outflow reaches Silver King Creek in wet years. The lake was unsuccessfully planted with hybridized fish before the last stream poisoning in 1989 or 1990, but has been reported fishless, despite numerous fishing and gill netting efforts. To poison a lake that has been reported fishless for the past 10 years is bizarre, as well as an apparent waste of time, effort and taxpayer's money. 32

The document promises to check for fish one more time before making the decision to poison, presumably sometime this summer. The results of that test and the decision must be reported to the public prior to the planned launch of the poison assault on the creek.

Comment Letter 4

From:	Patty Clary <patty@alt2tox.org>
To:	<BWarden@waterboards.ca.gov>
Date:	3/22/2010 4:59 PM
Subject:	NPDES Permit Paiute Cutthroat Trout Restoration
Attachments:	Lahontan NPDES.doc; Part.001

Californians for Alternatives to Toxics

315 P Street • Eureka, CA • 95501
707.445.5100 • Fax 707.445.5151
cats@alt2tox.org
www.alt2tox.org

Harold Singer, Executive Officer
Lahontan Regional Water Quality Control Board
2501 Lake Tahoe Blvd
So Lake Tahoe, CA 96158

Attn: Bruce Warden

RE: Proposed Waste Discharge Requirements and NPDES Permit (Order) for California Department of Fish and Game Paiute Cutthroat Trout Restoration Project, Alpine County.

Mr. Singer and Mr. Warden,

I write on behalf of the membership of Californians for Alternatives to Toxics (CATs), a regional public interest 501(c)(3) organization based in northern California. Members of CATs depend for their livelihood, health, culture, education and well being on the preservation and protection of national wilderness areas and all the species that live within them. Our membership is concerned about the effects of pesticides and other toxic chemicals and activities undertaken on land managed by the U.S. Forest Service and regulated by the U.S. Fish and Wildlife Service (FWS) with involvement of the California Department of Fish and Game (DFG) wherein pesticides are proposed to be used. The membership has a special concern for the application of pesticides in wilderness areas, which they consider protected from the intentional application of chemicals, especially a biocide as is rotenone, and carcinogenic chemicals that are integral to the toxic mixture proposed for use under an NPDES permit.

I incorporate herein the letter written by Laurel Ames and the friends of Silver King Creek, which describes in detail the inadequacies of the proposed permit and the improper timing of the issuance of the draft permit. 1

Today a CD from DFG arrived at the office of CATs in Eureka with a copy of the EIR released for this project by DFG. This is the first opportunity we have had to see the EIR. Apparently it has not been available at the one public venue, the library in Alpine County, where it is supposed to be available. It is not posted to a website, as are many environmental documents. How are we to review the NPDES without adequate information and analysis that are supposed to be available in the document written specifically to describe the potential impacts of the project, namely the EIR? 2

What's more, the federal analysis, the EIS for this project, is not yet available, so we cannot possibly have an accurate or adequate description of the project since we don't know at this time if FWS in Washington, DC will want to alter or even abandon the project (which is still stinging from accusations of making decisions based on political pressure and is looking to remake its image) or if the Dept of Justice will require changes to the project before it can go forward.

For these reasons, your requirement that today be the final day for comment to the NPDES is premature, chills public participation, skews the needed analysis to support the current iteration of the project and ultimately fails to inform the decision maker. It's not possible to make a decision until the project description is available, and it is not at this time. 3

Please set a new date for review of the permit and public participation in the process, linking it to the availability of the EIR and EIS. Anything less is inexcusable and leaves our organization unable to comment on the current proposed permit since it is based on to many unknown factors, in our view principally the lack of a final EIS as described earlier.

Sincerely,

Patricia M Clary
Executive Director

Comment Letter 5

From: john regan <johnkevinregan@yahoo.com>
To: <bwarden@waterboards.ca.gov>
Date: 3/22/2010 5:15 PM
Subject: Fw: Trout Unlimited Letter Supporting Issuance of NPDES Permit for Paiute Cutthroat Restoration in Silver King Creek
Attachments: TU support for CDFG proposal to use rotenone in Silver King Creek 03-22-10.doc

Dear Mr. Warden,

Attached is Trout Unlimited's letter of support for the issuance of an NPDES permit for the use of rotenone in Silver King Creek to restore native populations of Paiute cutthroat trout.

Thank you.

Sincerely,

John Regan
Native Trout Project
Trout Unlimited of California

TROUT UNLIMITED

March 22, 2010

Lahontan Regional Water Quality Control Board
2501 Lake Tahoe Blvd
So. Lake Tahoe, CA 96150

Attn: Bruce Warden

Delivered by email to bwarden@waterboards.ca.gov.

RE: PROPOSED WASTE DISCHARGE REQUIREMENTS AND NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT (ORDER) FOR CALIFORNIA DEPARTMENT OF FISH AND GAME PAIUTE CUTTHROAT TROUT RESTORATION PROJECT, ALPINE COUNTY

Dear Members of the Lahontan Regional Water Quality Control Board,

Trout Unlimited (TU) and Trout Unlimited of California (TU's California Council) strongly support the California Department of Fish and Game's (CDFG) proposal to use the aquatic pesticide rotenone in Silver King Creek in Alpine County in 2010, as a necessary and timely step towards restoration of Paiute cutthroat trout (Oncorhynchus clarki seleniris) to six miles of this creek below Llewellyn Falls, and to five miles of tributary streams to the mainstem Silver King Creek.

Trout Unlimited is America's largest and oldest sportsmen's group dedicated to coldwater conservation. TU's mission is to conserve, protect, and restore trout and salmon and their native watersheds in North America. TU has a national membership of 140,000, with some 9,000 members residing in California. TU has worked for 25 years, primarily through our North Bay Chapter, in cooperation with CDFG, the U.S. Fish & Wildlife Service (USFWS), and other parties to bring back the Paiute cutthroat from the brink of extinction.

As you know, the Paiute cutthroat is one of the rarest species of trout in North America, indigenous only to the Silver King Creek watershed. The Paiute cutthroat trout was listed by the USFWS as federally endangered in October, 1970, and reclassified as federally threatened in July, 1975. You are also aware that Paiute cutthroat were successfully reintroduced to that segment of Silver King Creek above Llewellyn Falls subsequent to successful rotenone treatments in 1991, 1992, and 1993.

We share the concern of both CDFG and USFWS that trout not native to Silver King Creek could be introduced above Llewellyn Falls, either intentionally or accidentally, by human activity in the watershed, in all likelihood compromising the population of pure strain Paiute cutthroat that have been re-established above the falls and undermining decades of restoration efforts.

We note that CDFG and other agencies have successfully used rotenone in other native trout restoration efforts, to purge native habitat of non-native fish. The application of rotenone in Lake Davis last year to rid the lake of introduced northern pike was dramatically effective, in a project far more complex in logistics and social issues than the Silver King Creek project -- water quality in Lake Davis was not impaired while other aquatic organisms were quickly re-established.

It is now time to implement this phase of the Paiute Cutthroat Recovery Plan, completed by USFWS as required by the Endangered Species Act. A full Environmental Impact Report for the Paiute cutthroat restoration project has been completed. The findings of the EIR support the limited and targeted application of rotenone in Silver King Creek below Llewellyn Falls. CDFG has extensive, successful experience in this kind of habitat treatment, which is the only way to guarantee that non-native fish in Silver King Creek below Llewellyn Falls will not somehow make it over the falls and compromise the pure population of Paiute cutthroat that has been re-established there. And rotenone is proven to have no lasting effects on water quality, while desirable aquatic biota readily come back to streams that have been so treated.

In this era of changing climate, with many populations of freshwater fish and other native species at risk of significant habitat loss or even extirpation, we must do whatever we can to preserve these populations. The Paiute Cutthroat Recovery Plan is a sensible and necessary response to the plight of one of California's rarest species. We respectfully
request that you approve the permit (NPDES order) for CDFG's proposed action at your 1
meeting on April 14 and 15. Our state's unique outdoor heritage hangs in the balance.

Respectfully submitted,

Sam Davidson

Sam Davidson
California Field Director, Trout Unlimited
Aromas, CA

Drew Irby
Chair, Trout Unlimited of California
San Juan Capistrano, CA

John K. Regan
Bend, OR

Comment Letter 6

From: "Nancy A. Erman" <naerman@ucdavis.edu>
To: <bwarden@waterboards.ca.gov>
Date: 3/22/2010 5:42 PM
Subject: Silver King/rotenone/NPDES permit
Attachments: letr.-Lahontan -NPDES conditions-III-22 .pdf; Part.002

Bruce,

Attached are further comments on the NPDES permit.

Nancy Erman

Comments on proposed NPDES permit for poisoning Silver King Creek and tributaries. March 22, 2010

Don C. Erman and Nancy A. Erman

We have not had time to analyze and compare the Final EIR released by CDFG on March 16, with this NPDES permit. Information not in previous documents is in the Final EIR. We are requesting that the hearing on this permit be postponed until June 9-10 meeting of the Lahontan Board in South Lake Tahoe. 1

<u>Incorrect statement regarding historic range of Paiute Cutthroat trout</u>

P. 2 Suggest you remove the last part of the first sentence, …"all of which comprise the historic range of the fish." There is no scientific evidence that this subspecies of Lahontan CT, the Paiute CT, ever inhabited the area below Llewellyn Falls, except for those fish that may now wash over the falls. It was originally collected and described from above Llewellyn Falls on or about 1933. That is what science considers its "type locality." See our comments on the FWS Recovery Plan, March 20, 2004, in Lahontan files). 2

<u>Misleading and incorrect statement about "rotenone."</u>

We have commented on the toxicity of rotenone repeatedly in past documents already in the Lahontan Board files; but because the NPDES permit still contains misleading language concerning this poison, we will review that information again.

The NPDES permit states that "rotenone is a naturally occurring pesticide found in the roots of certain plants. It is used for insect control and for fisheries management."

In fact, rotenone has been withdrawn for all terrestrial use (insect and/or invertebrate control) in the U.S., Canada, and the European Union. The EPA asked the companies that produce rotenone to submit evidence on the neurotoxic affects of rotenone on humans. The companies chose to withdraw from the market the products containing rotenone rather than supply the data. Many studies over the past 10 years have shown a connection between rotenone and Parkinson's disease.

The only use of rotenone now is as an aquatic poison to kill fish. It does indeed kill aquatic insects, other aquatic invertebrates, and amphibians at the same time it kills fish.

The formulations of rotenone being used are not "natural" products, as implied in the statement above in the NPDES permit. They are complicated formulations of many chemicals. CFT Legumine, the rotenone formula proposed for the Silver King poisoning has twice as much rotenone and twice as much other cube resins as the Nusyn-Noxfish formula, used in the past, as well as large amounts of other chemicals described later in the NPDES permit (section 8). 3

To continue calling rotenone a natural pesticide, as if somehow that makes it harmless, is disingenuous and should be omitted from the permit. Cyanide is also a natural poison. So is arsenic. Mercury is natural. Do we want these added to the unspoiled waters of our Wilderness Areas?

<u>Basin Plan Requirement for restoration of invertebrate species</u>

We think language in the DFGs Programmatic EIR Rotenone Use for Fisheries Management, 1994, requires that invertebrate species composition be restored within one-year following poisoning of streams/lakes. The paragraph labeled 4 at the top of the page on p. 14 (NPDES permit) states that "Whenever the language contained in the above mentioned documents [Basin Plan or DFG Programmatic EIR...] may overlap, the requirements that will provide the most restrictive protection of water quality shall apply." 4

We find the same requirements in Ch 3 Water Quality Objectives, Lahontan Basin Plan, p 3-11. But at 4.9-25-3 in the same document we find another standard for restoration of beneficial uses within two years. We have not had time yet to analyze the newest plan for monitoring released last week by the DFG in the final EIR. Clarification is needed on which standard you are using for restoration of species composition.

No pre-project inventory of aquatic invertebrate species has yet been conducted. Thus, there is limited basis for determining whether or not species conditions in either the Basin Plan or the Programmatic EIR for Rotenone Use will be met. The DFG and FWS now have finally admitted that past poisoning projects had impacts of at least three years, as we contended before and at the time of the 2004 hearing on an NPDES permit for this same project. These results would qualify as "long-term" whether you use one year or two years for recovery period.

"The Agencies agree that Trumbo et al. (2000 a, b) found impacts on invertebrates three years following the 1993 Silver King Creek rotenone treatment and that impacts on invertebrates were still evident two years after the final Silver Creek rotenone treatment" (p. F-87, section 2-19 response to comments, FEIR)

The CDFG misrepresented results of past monitoring to the Lahontan Board during the 2004 hearings. And their statement became part of the 2004 proposed NPDES permit as Attachment 2: "No evidence of long-term impacts were found in either study" (referring to Trumbo et al. 2000a and 2000b studies on Silver King Creek and Silver Creek) (Proposed NPDES permit, July 8, 2004, Attachment 2, Interagency Study Proposal, June 15, 2003).

In reference to this past misrepresentation of data and results, we note the specific wording and conditions at 14, p. 3, Standard Provisions for NPDES Permits that were attached to the 2004 permit. The same conditions are included in the present permit as attachment B, p 3, number 14. 5

Incorrect assumptions in NPDES permit regarding invertebrate "refugia."

We have commented extensively on this issue in past documents that the Board should have on file. But once again misstatements have found their way into the permit. Invertebrates occupy specific microhabitats within a stream system. They are not everywhere present throughout a stream system. They are distributed by species along a stream gradient. All but the most widely distributed species are replaced rather than added to from upstream to downstream. Extensive research has been done on this topic since the 1940s. We can supply you with published species-level studies that we have conducted on Sierra streams. Statements made in this NPDES permit that upstream areas will serve as refugia to re-colonize downstream areas are fundamentally false. Only a small percent of species would be able to exist throughout the stream system. 6

Data have been supplied by the DFG and FWS (the Agencies) (Draft EIR/S) that prove this point:

Similarity of Upstream (unpoisoned) Stations to Downstream Stations:

The NPDES permit accepts the Agencies' claim that upstream, unpoisoned sites have species of invertebrates that will colonize and replace the same species lost through poisoning downstream. The Agencies have provided no data from Silver King Creek to substantiate that claim. There is only one unpoisoned station sampled (for which we have seen data) as recently as 1996, Four Mile Canyon Creek.

Here is a comparison of the similarity of invertebrate composition of Four Mile Canyon Creek (elevation 8440') from 1996 and a new invertebrate station SK 8 sampled in 2006 (the last year for which we have seen data from 2003-2006) that will be poisoned if the latest project is approved. Station SK 8 is the most downstream station on Silver King Creek (elevation about 7880') below Llewellyn Falls and about 0.5 miles above the junction with Tamarack Creek.

In the monitoring from 1990-1996, the Agencies sampled 5 stations on Silver King Creek above Llewellyn Falls and one (control) station on Four-Mile Canyon Creek. Beginning in 2003 through 2006, all stations on Silver King Creek were changed, and 8 stations were sampled: 4 above Llewellyn Falls and 4 downstream.

To make this comparison we used a common ecological index of taxonomic similarity, the Jaccard Coefficient (Cj). This similarity coefficient is calculated by dividing the number of "species" in common between both stations (a) by the number of "species" in one station (b) plus the number of species in the other station (c) minus the number of species in common to both (a) times 100:

$$Cj = a/(b+c-a) * 100$$

The definition of "species" in this context should be some taxonomic level that is distinctive: we have used the taxa level listed in the Agencies data tables as "subfamilies, genus, and species".

	4-Mile Canyon 1996	SK 8 2006	
Total Operational Taxonomic Units	44	45	
No. subfamily, genus, species	32	32	
No. Identified to species	5	8	
Taxa in common			12

Cj = 12/(32+32-1

=12/52

=23 %

Therefore, even at low taxonomic resolution (mostly genera and subfamilies, NOT species) only 23% of the taxa are present in upstream refugia of Four Mile Canyon Creek to replace what is lost downstream in Silver King Creek by poisoning.

In terms of species level analysis, there were 11.4 — 17.8 % of the Operational Taxonomic Units (which is the same as the term "total taxa" used in the Agencies' analyses) identified to species.

<u>Rotenone Testing of CFT Legumine used in Lake Davis Tributaries 2007:</u>

<u>Implications for Silver King Creek and NPDES permit:</u>

The report by McMillin and Finlayson 2008 is cited in the proposed NPDES permit for methods of analysis of CFT Legumine constituents. It presented results and methods used in analysis of some active and inactive ingredients of CFT Legumine for the poisoning of Lake Davis and tributaries in 2007. We present here some implications of their report to the proposed project and NPDES permit for Silver King Creek. Only on March 16, 2010, were we informed in a Final EIR what chemical was actually to be applied.

We note first that the analysis of components in the rotenone formulation CFT Legumine is incomplete in their report (and in the Proposed NPDES permit and in the consultants report to CDFG by Fisher 2007). The Active Ingredient "Other resins" (other rotenoid compounds that "have some active role in controlling the pest") was not tested or measured. (In previous submissions we have presented literature and discussion of the compounds in "Other resins" and their known toxicity.) The Proposed NPDES permit for Silver King Creek does not identify, set discharge levels, or plan monitoring of this pesticide active ingredient as it should. We request the staff of Lahontan Board to verify Active Ingredients in CFT Legumine by examining specimen labels or the CFT Legumine materials sheet and revise the permit for monitoring and compliance. 7

Likelihood of Exceeding Label Requirements

Based on the most recent evidence, and the only example we know in California, we believe application of CFT Legumine in Silver King Creek cannot meet EPA label requirements for rotenone. CDFG applied poison on two separate occasions to tributaries in three drainage basins of Lake Davis (McMillin and Finlayson, 2008). Data in the report from Appendix I included rotenone concentrations for 70 samples (excluding four samples with no data), 38 from the first poisoning September 10-13, 2007, 32 samples from the second poisoning from September 25-26, 2007, and 10 samples 12-14 days after the first poisoning of tributaries and immediately before the second poisoning. The application rate of rotenone for the tributaries was designed to be 51 and 102 μg/L rotenone from CFT Legumine. CDFG took samples within 2 hours of application at a number of stations distributed along each tributary, but no information was presented in the report on where samples were taken relative to poison stations.

The data from Appendix I show that CDFG was unable to apply the poison at the target concentrations. Of the 70 samples, 30 (42.9 %) exceeded the highest designed level of 102 μg/L. Five of the six mean values for three streams and two poison applications exceeded 51 μg/L. A total of 15 of the 70 reported values (21.4 %) were greater than the theoretical solubility limit of 200 μg/L for rotenone. At 5 sites, the concentration of rotenone was 1,392 to 2,414 % higher than the upper design level. McMillin and Finlayson (2008) suggested that the extreme values of rotenone were due to collecting samples too early or before complete mixing of stream water with poison, especially during the first poison event. They stated "Sampling times were better coordinated during the second treatment to account for mixing..." (p.12) and therefore, fewer high readings occurred. We examined this conclusion and found that although extremely high (>1,000 % of target levels) concentrations did not occur, high concentrations were even more common in the second poisoning. We used a concentration greater than 200 μg/L as the threshold (the theoretical solubility limit for rotenone and twice the upper target level chosen for the project) criterion of high values. In the first poisoning 8 out of 38 samples (21%) and in the second poisoning 9 out of 32 samples (31%) exceeded 200 μg/L. If coordination was improved in the second poisoning, meeting target concentrations was not.

A plot of the rotenone results separated into the three tributaries (Big Grizzly Creek, Cow Creek, and Freeman Creek and two poison applications is given in Figure 1. This plot shows that five of the six mean concentrations were above the 51 μg/L target level and four of the six mean concentrations were above the 102 μg/L target concentration selected by CDFG.

These results illustrate the inability of CDFG to deliver the poison rotenone in CFT Legumine under field conditions at designed concentrations. Both the number of sites and the frequency of occurrence illustrate that high values were not simply unusual events. High poison concentrations have several implications.

First, the CDFG likely is unable to meet label requirements for the use of rotenone (see below current EPA/FIFRA label requirements). If CDFG/FWS are granted the proposed NPDES permit as presented to poison Silver King Creek at

8 the concentration of 25.5—50.9 $\mu g/L$, we believe, based on the most recent project results at Lake Davis, that a high proportion of the time they will exceed the label restrictions of 50 $\mu g/L$. It also seems unwise to propose an NPDES permit that technically stipulates a violation of the label (i.e., 50.9 $\mu g/L$ rather than the label requirement of 50 $\mu g/L$).

9 Second, high concentrations can move beyond the location of initial application and pass through stream sections as a "poisonous cloud" even if concentrations are reduced by half through normal breakdown. Regulatory compliance monitoring stations in Silver King Creek identified in the Proposed NPDES permit are only in the vicinity of the most downstream end of the project near Snodgrass Creek. Monitoring stations above Silver King Creek canyon, Tamarack Creek, and Tamarack Lake Creek are required only to take two samples (timing unspecified) and for unidentified purpose other than to insure sufficient chemical for killing. Thus, the true chemical concentrations along most of the extent of Silver King Creek and tributaries will be unmeasured, and compliance with the Proposed NPDES permit to "meet label requirements" will not be verified.

10 Third, rotenone from CFT Legumine apparently persists in streams and rotenone is deposited in sediments where, according to McMillin and Finlayson (2008), it decomposes more slowly than in open water. As they pointed out for their lake samples "The most persistent constituent of the CFT Legumine™ in sediment was rotenone. Rotenone persisted in sediment for up to six months" (p. 20).

Their data for tributaries (Appendix I) also suggested persistence of rotenone in the streams. After 12-14 days the three tributary streams were poisoned a second time in 2007. Water samples from 10 locations on Big Grizzly Creek immediately <u>before</u> the second poisoning averaged 19.5 $\mu g/L$ rotenone and 59.8 $\mu g/L$ of rotenolone. Because no poison had been applied to the streams for 12 to 14 days, we assume that rotenone was slowly released from bottom sediments back into the water column and there is a behavior of CFT Legumine

that is unexplained and unknown at present. There are no provisions in the
NPDES permit for frequent enough water sampling above Silver King Creek 10
canyon that might detect the behavior of rotenone in the main reaches poisoned.
The Proposed NPDES permit also presents no alterations of CFT Legumine 11
application methods that avoid this problem.

Finally, all the actual values from field samples in the Lake Davis project were higher (on average 16 % higher) than actually reported. This conclusion follows from the findings given by McMillin and Finlayson (2008) who reported results of laboratory testing of compound recovery of major constituents in CFT Legumine (Appendix A, Table 5). After fortification, they tested compound recovery at concentrations of 2, 10, 50, and 100 μg/L rotenone. We found no difference ($p>0.05$, ANOVA) in the percentage recovery of rotenone at the four levels of Lake Davis water, and the average recovery from all tests combined was 83.9 %. No samples equaled or exceeded 100 % recovery. Therefore, reported monitoring values, with the same techniques reviewed in this proposed NPDES permit and reported by McMillin and Finlayson (2008), may be expected to be 16% lower than actually occur. We have not adjusted the data, nor did McMillin and Finlayson (2008), for the three tributaries but it is clear that the true concentrations of rotenone exceeded the target values even more than what was reported.

New EPA Label Requirements

Poisoning of Lake Davis and its main tributaries took place in September 2007. On March 31, 2007 the US EPA released its Reregistration Eligibility Decision for Rotenone (RED for rotenone). That decision required changes to labels for all piscicidal uses of rotenone. Included in these changes were separate maximum treatment concentrations for lakes and streams (US EPA 2007):

Restrictions for all Formulations	"The Certified Applicator supervising the treatment must remain on-site for the duration of the application." "Do not allow recreational access (e.g., wading, swimming,

	boating, fishing) within the treatment area while rotenone is being applied." "In lakes/reservoirs/ponds, do not apply this product in a way that will result in treatment concentrations greater than 200 parts per billion." "In streams/rivers, do not apply this product in a way that will result in treatment concentrations greater than 50 parts per billion."

Although the poisoning of Lake Davis occurred in September after the release of the new label requirements in March 2007, the CDFG apparently chose not to follow the new requirements. As McMillin and Finlayson (2008) noted in their report, the designed treatment concentrations for tributaries were 51 to 102 $\mu g/L$ of rotenone.

We request that any NPDES permit for the use of pesticides include a specimen label so that the public may review requirements with actual permit language. We also request that staff from the Lahontan Board review the entire 2007 RED for rotenone cited above and ensure that monitoring and reporting are 12
sufficient to meet regulatory compliance of label requirements. At present, the permit is deficient. The permit should also be modified to include monitoring and regulation of all active ingredients.

(see attached figure below)

References:

Fisher, J.P. 2007. Screening level risk analysis of previously unidentified rotenone formulation constituents associated with the treatment of Lake Davis. Environ consultants, prepared for California Department of Fish and Game, September, 2007.

McMillin, S. and B.J. Finlayson. 2008. Chemical residues in water and sediment following rotenone application to Lake Davis, California 2007. California

Department of Fish and Game, Pesticide Investigations Unit, OSPR Administrative Report 08-01, Rancho Cordova, California.

US Environmental Protection Agency. March 31, 2007. Reregistration eligibility decision for rotenone. EPA 738-R-07-005.

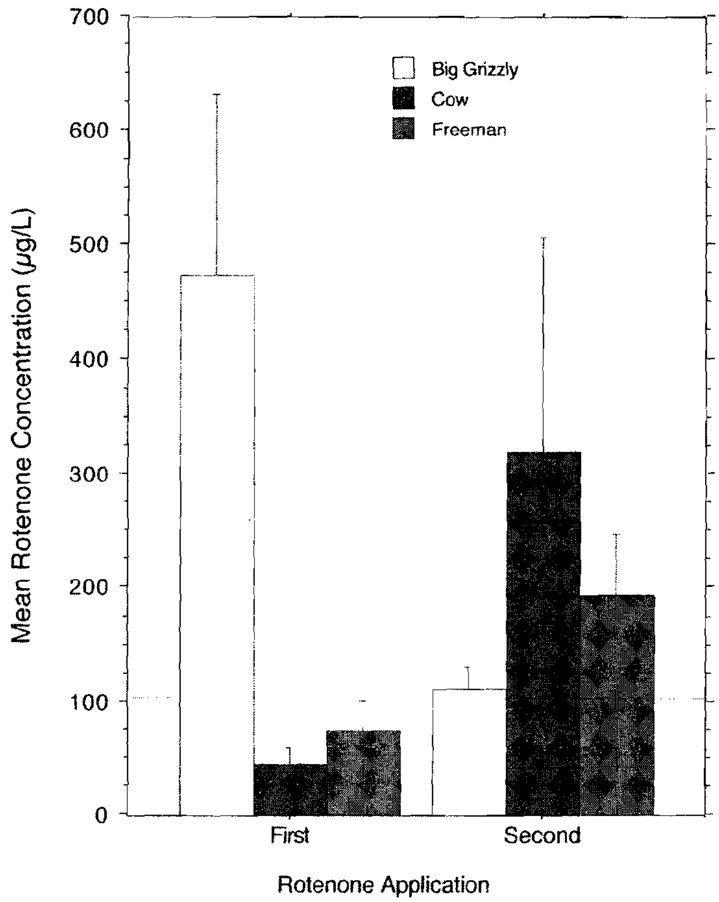

Figure 1. Mean rotenone concentration in three tributaries of Lake Davis, Sept. 2007 (from McMillin and Finlayson 2008). Horizontal lines indicate design concentrations of 51 $\mu g/L$ and 102 $\mu g/L$.

From: "Nancy A. Erman" <naerman@ucdavis.edu>
To: <bwarden@waterboards.ca.gov>
Date: 3/22/2010 6:25 PM
Subject: NPDES permit/EPA docs.
Attachments: EPA=NPDES=_FIFRA=April_05.pdf; Erman.pdf:EPA-06; Erman=antimycin.pdf; Erman comments-Inerts.-Il-l0.pdf; EPA-reply to comments.pdf

Bruce,

Attached are four documents concerning fish and aquatic poisons that
we have submitted to the EPA in the past few years. All are relevant
to the NPDES permit discussion for Silver King Creek. 13
We would like to make the EPA response to our comments on rotenone
risk assessment (also attached) part of the Lahontan Board record, as
well.

Thank you for your attention.

Nancy Erman

Office of Pesticide Programs (OPP),
Regulatory Public Docket (7502P)
Environmental Protection Agency,
1200 Pennsylvania Ave., NW., Washington, DC 20460-0001.
Docket ID No. EPA–HQ–OPP–2006–1002.
Sent to *Federal eRulemaking Portal:* http://www.regulations.gov
Document includes 19 pages + 3 figures (22 pages)

March 19, 2007

To:
Environmental Protection Agency
Antimycin A Risk Assessments
Attention Docket ID No. OPP–EPA–HQ–2006–1002

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We are aquatic ecologists who have reviewed over the past several years many of the freshwater poisoning projects conducted or proposed by state fish and game agencies, by the US Fish and Wildlife Service (FWS), and as permitted by the USDA Forest Service throughout the western U.S. We have read the EPA risk assessment for the reregistration of Antimycin A (Young and Seeger undated). We have reviewed much of the literature on effects of antimycin on non-target species (aquatic invertebrates and amphibians). We are submitting these comments as private citizens in the public interest. We are commenting specifically on the environmental effects of antimycin (trade name Fintrol) when used as a "piscicide" in the nation's streams, rivers, and lakes.

We submitted comments and data to the EPA in April 2005 and April 2006 on the need to retain NPDES permits under the Clean Water Act for the use of pesticides in the Nation's waters and on the problems that rotenone poisons cause for non-target species when used to kill fish in streams and lakes. It is with some sense of futility that we submit these comments on antimycin. We have little hope that the EPA will take appropriate action to protect the freshwater environment and non-target species from the application of poisons by fish and game agencies to the nation's most sensitive and pristine waters. The recent action by the EPA to eliminate NPDES permits for aquatic pesticides is a major step backward in protecting the environment, aquatic species, and water quality in the US.

We assume that independent scientists and other members of the public will be allowed the same opportunity for comment after the EPA deadline that employees of fish and game agencies and other government agencies were allowed following the comment deadline for rotenone use last year.

Myths about antimycin

Two myths arise repeatedly in discussions of antimycin. One is that antimycin is an antibiotic (e.g., Dawson and Kolar 2003). The second is that it has no lasting impact on non-target species.

We know of no record that antimycin has ever been registered with the FDA as an antibiotic for either human or veterinary use. It has been known since at least 1973 that it does not kill most bacteria, and is therefore not an antibiotic in the common sense (Lennon and Vezina 1973). However, it may have been the unfortunate title of that 1973 paper, "Antimycin A, a piscicidal antibiotic," that led fisheries managers to believe that it was an antibiotic. At any rate, the myth has continued and is often repeated, perhaps in the belief that calling a substance an "antibiotic" sounds better somehow than acknowledging that it is a poison that kills many forms of life. It seems odd that the Lennon and Vezina paper was not reviewed in a 2002 assessment of antimycin A use in fisheries (Finlayson et al. 2002), nor was it included in the EPA risk assessment.

In addition to its use by fish managers to poison freshwater life, antimycin, along with rotenone, has become a common agent used in biochemistry to block mitochondrial electron transport and inhibit the respiratory chain at known locations. Both chemicals are routinely used to kill cells (apoptosis) in experimental biochemical research (e.g., Campas, et al. 2006; Ding, et al. 2006).

The second myth, that antimycin has little or no lasting impact on other non-target aquatic animals, is less investigated and has not been proven. Antimycin, like the various formulations of rotenone, can not be referred to merely as a"piscicide," thereby implying that it kills only fish. In fact, antimycin acts as a poison on many non-target organisms. It readily kills aquatic invertebrates and amphibians, as the EPA risk assessment has acknowledged.

The problem

It was never the intention of the Endangered Species Act to attempt to save one species while putting other species at risk of extinction. Therefore, whether or not all species of aquatic invertebrates and amphibians are present and survive the use of aquatic poisons must be examined in detail. So, also, should the EPA examine the long-term or permanent success rate of aquatic poisons to "restore" the target fish species. It seems within the purview of the EPA to examine the policies of state fish and game agencies and the U.S. Fish and Wildlife Service that have led to the release of so many non-native fish species into U.S. waters. This form of biological pollution continues without environmental review. It leads to the professed need by these same agencies to poison streams and lakes in our most pristine waters, that is, National Parks, Wilderness Areas, and Outstanding National Resource Water (ONRW).

Many of the "restoration" projects being proposed and conducted at present are in water most likely to have endemic and rare species of amphibians and invertebrates as well as rare species of fish. State fish and game agencies, the USDA Forest Service, and the Fish and Wildlife Service have been taking a single-species approach to these poisoning projects, poisoning everything in an aquatic system and then replacing the fish species they want. The projects are often large and have little chance of succeeding in eliminating the unwanted fish species over the long term. "Complete elimination of undesirable fish is the exception rather than the rule in larger lakes and streams" (Lennon 1970).

Inadequacy of studies and evidence of impacts to non-target species

In the studies we have examined, the questions being asked and the analyses being done are inadequate to determine the impact of antimycin on freshwater communities and non-target species. The fundamental questions arising from the application of antimycin and rotenone to aquatic systems should be, 1) are species of non-target animals disappearing from the single or repeated use of poisons over many years? 2) Is the community of species changing in terms of relative proportions and numbers of individuals? And 3) what are the aquatic and terrestrial food web effects of these changes or losses in the short- and long-term?

Instead, however, the few studies that have been conducted on antimycin effects on aquatic invertebrates have asked, "Are invertebrates present again in the stream or lake following poisoning within a relatively short period of time (usually one year or less)?" The answer to that question will always be "yes" because some species of invertebrates are adapted to almost any environmental condition and will inhabit even the most disturbed sites.

Few studies on the effects of antimycin on non-target species have been published in peer-reviewed journals. Most are unpublished agency reports based on monitoring before and after the application of antimycin. Most of these reports do not contain the raw data. None have been done at a species level. Antimycin has been used to poison aquatic habitats in the US for 40 years.

To our knowledge, no inventories of species have been done anywhere in the western US prior to a stream or lake poisoning operation. And we suspect the same is true for the eastern US. The monitoring studies done in co-ordination with poisoning operations are conducted at broader taxonomic levels than species, that is, at genus, family, order, and class levels. Total taxa and EPT (Ephemeroptera, Plecoptera, Trichoptera) measurements are not precise enough to answer the most fundamental questions about the outcomes of poisoning. Some species will be highly sensitive to antimycin and will disappear; others will be less so. Some species will rapidly inhabit a recently vacated ecological niche and will expand in numbers. Not all species of mayflies, stoneflies and caddisflies, the EPT, (incidentally, these are orders of insects, not families as stated in the EPA risk assessment) are sensitive to all impacts. Some are highly tolerant to some conditions (see, for example, a discussion in Erman 1996). Nor do we necessarily know that these groups of insects are the aquatic invertebrates most sensitive to antimycin. They may be, but data do not exist to make that assessment. Diptera, for example, are far more diverse (more species) in freshwater habitats than the EPT and some may be as sensitive to antimycin or more so than are some species of mayflies, stoneflies, or caddisflies.

In the study of a small trout stream poisoned with antimycin to remove non-game fish in Wisconsin, Jacobi and Degan (1977) found that the cranefly genus *Antocha*, a Diptera, decreased after antimycin exposure and continued a downward trend two years after the application of antimycin (Fig. 1). *Antocha* showed a similar response to rotenone poisoning in the Great Basin National Park (NP) where it was still missing three years after the poisoning (Darby et al. 2004). It was probably not the same species as that in Wisconsin, but illustrates the extreme sensitivity of some Diptera to aquatic poisons.

In the Great Basin NP study a species of mayfly was as sensitive to rotenone as was *Antocha* and also was still missing after three years.

Many species of invertebrates were significantly depressed immediately following the antimycin poisoning in the Wisconsin study (Jacobi and Degan

1977). The crustacean *Gammarus pseudolimnaeus* recovered rapidly and increased in biomass over its pre-antimycin levels (Fig. 1).

The same study reported dramatic changes in the amount of plant cover on the stream bottom and the total biomass of benthic macroinvertebrates. Both measures increased substantially up to two years after antimycin poisoning compared to the control stream (Fig. 2). In other words, in the stream poisoned with antimycin the community structure and food pathways became much altered up to 2 years after poisoning compared to a control stream. We were unable to evaluate other changes because data for only the most common 18 taxa out of 38 were presented in the report (Jacobi and Degan 1977). The study was conducted for only two years. Therefore, it is unknown whether or not the aquatic invertebrate and plant community ever recovered from this poisoning.

The EPA must recognize that following a large disturbance, a common response in streams at some point is an increase in abundance or biomass of some species. This response has been known since the earliest days of pollution monitoring, and should not be confused with a "recovery" of the stream ecosystem. The EPA risk assessment in reviewing a macroinvertebrate monitoring study in Great Basin National Park states, "However, by 9 months post-treatment, invertebrate populations had returned to pre-treatment conditions and in some cases exceeded pre-treatment abundance by over 300%...." This particular study was conducted for only one year after poisoning. There is no way to know whether or not the stream community and species recovered. The 300% increase in abundance of something can not be considered a recovery, but is rather indication of a disturbance.

Cosmopolitan, less sensitive, or "weedy" colonizer species tend to increase in numbers following a disturbance: poison released into a stream or lake is a disturbance.

There also seems to be some misunderstanding in the EPA risk assessment and in some of the studies we have reviewed about the meaning of the word "taxa." It refers to any level of taxonomic resolution. It is not synonymous with "species." If a taxon higher than the species level disappears, we know that at least one species is gone, but the taxon may have represented several or many species. In most cases, the broader the taxon, the more species it represents. For example, a family represents far more species than a genus (with a few exceptions).

Most aquatic insects can be identified to species only by their adult forms, and mature forms are necessary for species identification for most other aquatic invertebrates (such as snails, clams, aquatic worms, crustaceans, etc.). A study reported by the National Park Service in Moore et al. (2005) states in the Executive Summary that "after one year all aquatic macroinvertebrate species were at or above pre-treatment levels." However, the rapid bioassessment methods of aquatic forms that were used in the study could not have determined species.

Monitoring of larval forms at genus levels and higher can often indicate impacts from a disturbance. It can not, however, tell us what species or how many may be lost from poisoning. Monitoring is not mitigation for poisoning. There is no mitigation for the loss of a species. And monitoring is not the same thing as a species inventory.

A healthy stream system may have 200 or more species of aquatic macroinvertebrates in it.

Stream poisoning is a special risk to species in springs, seeps and headwater streams. Many of the projects we have reviewed have poisoned these habitats. Such habitats are highly likely to contain rare, endemic, or relict species. Many have narrow distributions and narrow environmental tolerances. Many are not found lower in the stream system (Erman and Erman 1990, 1995; Erman 1998). They can not be replaced by downstream drift of larvae from upstream or by adults flying upstream to deposit eggs. And, of course, species that do not fly or have limited flight capability have even less chance of repopulating poisoned streams or lakes.

The terms "short-term" and "long-term" when referring to impacts on aquatic invertebrates are not defined by the EPA or in the studies we have reviewed. We have found no data collected on antimycin effects on non-target species for longer than two years following poisoning. We suggest that any impact still obvious one year after a poisoning event should be considered a long-term impact, but that monitoring should continue as long as changes are apparent. That period may be five or ten years or more.

A study in California, South Fork of the Kern River, on drift of invertebrates following antimycin application showed major drift as a result of the poisoning (Stefferud 1977). Drift occurred as dead or dying invertebrates lost their hold on the bottom substrate and drifted in the water column. "The data gathered in this study indicate that use of antimycin as a piscicide has a definite effect upon the aquatic invertebrate community in cold mountain streams" (Stefferud 1977). "Dead or dying tadpoles were also collected in the drift nets" (Stefferud 1977). Funding for the planned continuation of that study was apparently withdrawn, and no further data were collected after the first year of results.

The EPA risk assessment seems to have relied uncritically on interpretations of data and studies provided to them from proponents of antimycin and rotenone for fish management. In our review of the Moore et al., 2005, report on the Sam's Creek study from the National Park Service, we found that there were few data presented to fully evaluate statements and conclusions. Different methods of sampling, different methods of taxonomic identification, and different levels of expertise were used to obtain data for number or identity of taxa. We were unable to differentiate what data were obtained under the various methods. We also found many errors in the data and missing sampling periods.

The few data that are presented reveal major problems in the report. There are three figures (Figures 8, 9, 10 in Moore et al. 2005) from the Sams Creek macroinvertebrate study and some additional numbers given in the text. There were 5 control and 4 treatment sites in the study. The so-called Treatment Site 9, however, was outside the boundaries of the antimycin exposure zone (i.e., downstream from the project boundary at stream barrier 646 m). The authors claim the station was affected in 2001 by the potassium permanganate detoxification process but (perhaps?) not antimycin. In either case, it did not receive the same treatment as the three other treatment stations.

There are no data on concentrations of antimycin A or $KMnO_4$ reported from samples in Sams Creek to judge the exposure of macroinvertebrates from site 9. The change in total taxa number (Fig. 8) and EPT taxa number (Fig. 9) for site 9 suggests something happened.

A portion of Sams Creek and Starkey Creek (the farthest upstream locations) was poisoned with antimycin in October 2000. Two macroinvertebrate Treatment Sites (site 2 and site 4) lie within the treatment area of this poisoning event. Three different releases of antimycin occurred because the NPS personnel considered the dose insufficient to kill all fish (see p. 15-17 in Moore et al. 2005). Nevertheless, the report summarized "The observations of October 25, 26, and 27, 2000, provided evidence that the antimycin was eliminating rainbow trout but that it was only effective over a much shorter vertical distance..." (Moore et al. 2005, p. 17). We are unable to determine from the report whether or not the data reported in Fig. 10 for the period Sept./Oct. '00 was before or after the antimycin release. Thus, the interpretation of subsequent samples at site 2 and 4 taken the following year in September 2001, and considered "before" conditions is unclear. It is possible that antimycin released in the upstream reaches in October 2000 affected sensitive taxa of macroinvertebrates. Taxa loss or replacement of sensitive species may have already occurred at these sites. Thus, after another antimycin exposure in 2001 further changes in taxa in October 2001 and September 2002 would be confounded.

If stations 2 and 4 were poisoned in 2000, they are not "before" treatment stations for the purposes of Figures 8 and 9. For some reason the "before treatment" data referred to in the report and collected in 1996-97 were not used in these figures.

We are told nothing about the use of potassium permanganate in 2000 and do not know if it affected station 9 at that time as well.

Data presented (Figures 8, 9, 10) are internally inconsistent from one figure to another, and do not correspond to text references to the "same" data.
For example, Fig. 10 summarized the total number of taxa collected at all sites for all dates. These values can be compared for the dates of September 2001 and October 2001 shown in Figure 8. Of the nine values representing the number of total taxa before poisoning (September 2001), seven are different between Fig. 8 and Fig. 10, and for the 9 values representing October 2001, four appear

different. In other words, 61% of the supposed same data for two sampling periods differed between Figs. 8 and. 10.

In addition, the authors' text reference to data (p. 23) concerning (treated) site 9 stated total taxa declined from 61 in September 2001 to 40 taxa in October 2001. These values do not correspond to data in either Figure 8 or 10 (58 to 46 and 61 to 47, respectively).

Nevertheless, the National Park Service carried out its own analysis of variance on the number of total taxa (and EPT taxa) before (Sept. 2001) compared to 1 year after (Sept./Oct. '02) antimycin exposure using all 9 stations for treatment and control. They found no significant differences (although no ANOVA table was presented.) We are unable to fully replicate the analysis they performed without the full original (correct) data. However, we used the difference in number of total taxa shown in their Figure 10 between Sept. '01 and Oct. 01 and Sept./Oct. '02 (Fig. 3).

Our results suggest that there were differences before and after antimycin and treatment and control. In the ANOVA of just the 1-year difference in total taxa, the result is a significant difference at p=0.0901. We reject a null hypothesis at less than p= 0.05 because of the very weak power of the test with so few degrees of freedom and other uncertainties about the data.

Additional uncertainties about the study appear in the report. In the section on methods for the macroinvertebrate study, the report states "In the laboratory, aquatic insects were identified to the lowest taxonomic level possible" (Moore, et al. 2005, p. 9), and also "teams of experienced collectors used a multi-habitat approach to conduct aquatic macroinvertebrate sampling for each sample collected." But, later, explaining variation in samples from control stations, the report states: "Variation between samples occurred because: 1) the same collectors were not available for each sample, 2) each collector did not have the same field identification expertise for a particular taxon, or 3) were uncertain of how many potential taxa might be represented by what appeared to be a single taxon in the field" (p. 21). These contradictions leave us questioning, were identifications made in the laboratory or in the field? Were collectors experienced or were they not? They also represent another large inconsistency in the methods and, therefore, in the data.

Without seeing the original data we can not answer the many questions raised by the Moore et al. report. If the EPA is going to rely so heavily on these studies to make their determination of risk assessment, we strongly recommend they obtain and analyze the original data and send it out for independent peer review by scientists who have no connection to, or interest in, promoting the use of aquatic poisons.

In our analysis of studies on rotenone effects in California, we found that the California Department of Fish and Game final reports to the Regional Water Quality Board misrepresented invertebrate impacts that were obvious in the raw data (see Erman and Erman comments on rotenone submitted to the EPA, April 2006)

Problems with Antimycin Application

Agency personnel have difficulty correctly applying the target dose of antimycin to streams. Recent examples are revealing. During the project in Sams Creek in the Great Smoky Mountain NP (Moore et al. 2005), personnel were unable to regulate antimycin dosage for two days in the initial stream poisoning in October 2000. "Unfortunately, the bottle containing the correct amount of antimycin for Sams Creek was inadvertently switched with the bottle for Starkey Creek" (Moore et al. 2005, p. 16). Personnel repeatedly tried different applications, new batches of antimycin, and increasing concentrations because sentinel trout failed to die as fast as expected. These procedures were eventually halted by the third day when "...additional concerns related to *Neophylax kolodskii* (a caddisfly thought to exist only in the treatment area) were raised as was the issue of not completing the project within allotted time frames..." (Moore et al. 2005, p. 16).

It is worth noting that actual measurement of antimycin in the stream sections was not conducted (is it possible with existing technology?), and there is no further information in the report concerning the fate of the endemic caddisfly species. We also wonder whether the detoxification station, cued by dye in the water and not the presence of antimycin, might also have operated for a period of time with unknown effects on downstream invertebrate populations.

This episode at Sams Creek is reminiscent of a project in Wisconsin in 1972 in which errors in calculating dosage and equipment failure resulted in four times the concentrations administered over the "target" values (Jacobi and Degan 1977).

When antimycin poisoning of Sams Creek was resumed in September 2001, the project lasted over 11 days during which time potassium permanganate was used on nine days at the single detoxification station for a total of 64 hours (Moore et al. 2005, Table 2, p. 21). The authors state that in treatment site 9, below the detoxification location, "Apparently the cumulative effect of nine days of treatment with this strong oxidizer eliminated the Ephemeroptera (mayfly) taxon and all but one individual in the common stonefly family Peltoperlidae from this sample site" (Moore et al. 2005, p. 23).

The target concentration of antimycin relies on estimates of stream flow, among other factors. Measurement of stream discharge by velocity-cross section techniques is known to have uncertainty. Under ideal conditions errors in discharge can be as small as 2% (standard error of the estimate) or as large as about 20% when conditions are poor. (Sauer and Meyer 1992).

Poison drip stations are allocated along a stream course according to "best guesses" of past experience elsewhere for how far a lethal concentration will travel (e.g., Moore et al. 2005). It is common practice not only to drip rotenone or antimycin into the stream but also to deliver additional unknown quantities to springs, seeps, side channels, pools, and back eddies (Darby et al. 2004, Moore et al. 2005). For example, in the project in the Great Basin National Park, Darby et al. 2004 stated "...rotenone dry powder was mixed with sand and gelatin with handfuls deposited in rivulets that fed the main channel from seeps and springs" (p. 5). And elsewhere "Concentrations of antimycin averaged 8 μg/L. Concentration within various headwater reaches often exceeded 25 μg/L to compensate for spring and seep inflows between drip stations. Back eddies of the stream and adjacent springs and seeps were treated with 250 ml of Fintrol using a backpack sprayer" (Darby et al. 2004, p. 5).

In a more recent project in Arizona, antimycin was applied by the usual drip stations and also by antimycin laden sand into pools and by backpack sprayers to isolated water bodies, backwaters, and vegetated stream margins "...with renovation crews instructed to approximate an application of 50 $\mu g/L$" (Dinger and Marks, in press). These procedures hardly constitute rigorous control of application rates and given the fact that few projects report actual (rather than "target") concentrations over time; true exposure values are speculative. If, as suggested in the EPA risk assessment, some limitations will be recommended for frequency of application, we suspect that agencies will merely substitute higher dose rates to insure lethal conditions. In other words, more projects would operate at the manufacturers legal limit on the label for antimycin. Already, as seen in the Fossil Creek project, state agency personnel in Arizona opted for levels of 50 to 100 $\mu g/L$ antimycin A because of concerns that water quality would reduce efficacy and the desire to have total fish kill on the first try (Dinger and Marks, in press).

The Dinger and Marks study (in press) reported that antimycin killed invertebrates, many taxa were still missing after 5 months, and there was a shift to "more tolerant taxa." No changes in taxa occurred at the control station during those five months. But the study was marred by a permanent change in flow after the first five months. Nevertheless, the authors continued collecting samples for two years after the antimycin poisoning. Some taxa had not recovered after two years. The authors do not report taxa numbers or type at the control station after two years. Whether or not the taxa missing after two years were from antimycin or the change in flow is unknown.

The Dinger and Marks study is the highest "target" rate of antimycin application reported in invertebrate studies we have reviewed, but there were insufficient instream measurements of actual concentrations to determine what levels were reached in the past. In our review of rotenone projects, for example, we found that in Silver King Creek, CA, the target level of rotenone (which is measured) was 25 $\mu g/L$. Concentrations measured on several occasions at a single downstream monitoring station, however, showed rotenone plus the first decay product (rotenolone, also poisonous) reached 40 $\mu g/L$ (Flint et al. 1998).

Those measurements did not include the equal amounts of other cube resins, also poisons, in the Nusyn-Noxfish.

The routine procedure of adding "handfuls" of poison-laced sand, of using backpack sprayers "to approximate an application rate," and of other uncontrolled methods of dispersing poison render meaningless approximations of actual instream concentrations. In addition, we urge caution in making the judgement that a single high concentration of antimycin is more toxic than repeated releases of a lower concentration. The issue for animal survival is exposure to a poison, that is, time and concentration.

We have noticed in recent environmental assessments that agencies do not want to reveal or decide on the poison or formulation they will use. In a recent Finding of No significant Impact on an extremely large poisoning project in New Mexico, in the Rio Costilla watershed (over 150 miles of stream, 25 lakes, and a reservoir) the poisons and formulations to be used are not specified in the public document. The same tactic is being used in the Lake Davis watershed in California by the California Department of Fish and Game. (Antimycin is not proposed for use in the California study, however, because at present it is not allowed in California.) That watershed and reservoir was poisoned about 10 years ago and is now slated to be poisoned again because of a total failure to eliminate the targeted fish species. We must assume that agencies may use more than one poison, as often as they want, in amounts as high as they want, and without monitoring or oversight by any independent agency.

The Fintrol label (FIFRA approved) does not restrict concentration at present. It recommends up to roughly 25 $\mu g/L$ if cold temperatures and high pH exist in the receiving water. It says the only way to determine lethal dose is to perform a bioassay. It does not contain an explicit legal limit.

The EPA draft risk assessment states on p. 18, "Although maximum treatment rates are not stated on the label, this risk assessment is based on an upper-bound treatment rate of 25 $\mu g/L$ applied once per year." The EPA Table 3 (p. 18) also reiterates that the maximum rate per application is "roughly" 25 ppb ($\mu g/L$). But in an Addendum to the EPA risk assessment much higher levels of antimycin and more applications per year are listed.

Further, the paper by Dinger and Marks states, "However, the label allows for treatment outside this limit when 2 conditions are met: 1) bioassays indicate the need for higher levels, and 2) permission from the state game and fish agency are [sic] required. For Fossil Creek both conditions were met (the treatment was performed by AZGFD), ensuring legality" (note: AZGFD means Arizona Game and Fish Dept).

Therefore, at present, the EPA has removed the requirement of NPDES permits and the FIFRA label says that if more than "roughly 25 $\mu g/L$" is applied, the agency doing the poisoning can determine whether or not to use more poison than recommended. There is no independent monitoring and no oversight by other agencies.

A statement appeared in a 2006 Decision Notice for a poisoning project on Crawford Creek, Montana: "Antimycin (another EPA registered piscicide) will not be used in this project because of recent information related to quality control of product and reduced effectiveness." If the product has poor quality control and is ineffective, why is it being used in natural waters at all; and why are these problems not part of the EPA risk assessment discussion?

<u>Interactions with other pesticides present in water</u>.

The EPA risk assessment has evaluated antimycin as if there are no other complicating chemicals in the environment that may increase toxicity. Antimycin works by interfering with the electron transport system in cell mitochondria (Dawson and Kolar 2003). With many toxins, such as rotenone and antimycin, the effect on the transport system is mediated by an organism's natural defenses. But when certain compounds are also present in the environment, toxicity is increased because the natural defense system (cytochrome P450) is reduced (Li et al. 2007). This result is well established for the role of piperonyl butoxide (PBO) as a synergist in formulations of rotenone and other insecticides. However, it is also known that other pesticides themselves may function much like PBO (in blocking cytochrome P450) and, hence, increase substantially the toxicity of insecticides. The EPA is aware of these relationships, and in their rotenone risk assessment cited the work by Bills et al., 1981, for example, that showed PCBs multiplied the toxicity of rotenone to fish. There is other work that has established similar relationships among a range of pesticides and herbicides (e.g., Bielza, et al. 2007). There is also strong evidence that residues of common herbicides and insecticides (and PBO) may remain in aquatic sediments (Woudneh and Oros 2006) or in the water, even in remote national parks (LeNoir et al. 1999, Angermann et al. 2002).

It is likely that low level residues of pesticides are present now in many aquatic habitats, and these levels may increase without the further review or analysis previously required by NPDES permits. At present, we are unaware of any fish poisoning project that has analyzed water or sediments for low level pesticide residue prior to applying rotenone formulations or antimycin.

Has the EPA considered the role of potential synergists on the toxicity of antimycin in its risk analysis, and are these risks to non-target aquatic invertebrates and amphibians accounted for under the proposed reregistration?

Summary and conclusions

Antimycin clearly affects non-target species and probably eliminates some and, possibly many, invertebrates and amphibians. Some species may be permanently exterminated. No studies to date have proven that antimycin is harmless. Several studies have shown impacts to non-target animals and communities at broad taxonomic levels.

The EPA was wrong to eliminate National Pollution Discharge Elimination System (NPDES) permits for the use of stream and lake poisons. NPDES permits, issued under the Clean Water Act, allowed projects to be evaluated by an independent agency (in California, Regional Water Quality Boards and the State Water Board) on a site-specific basis, at the local level, and to include monitoring requirements. In California, the NPDES review assures that projects are in compliance with the Basin Plans for each regional water district. The NPDES permit review also determines whether or not a project is likely to cause harm to non-target species and whether or not the project protects beneficial uses of water.

Stream and lake poisoning projects, being conducted and proposed by agencies at present, are large covering many stream miles and many lakes. They are often in the most pristine areas of the country—Wilderness Areas, National Parks, and Outstanding National Resource Waters. These areas deserve the greatest protection and are most likely to have endemic and/ or rare non-target species.

Stream and lake poisoning projects to eliminate unwanted fish species have a poor record of long-term success. Agencies poison waters for two or three years, unwanted fish return within about 10 years, and the agencies begin poisoning again. Agencies have a long record of errors and mishaps with their poisoning operations.

We recommend that antimycin reregistration be denied for all but small, artificial ponds and self-contained fish farm ponds that have no outlets.

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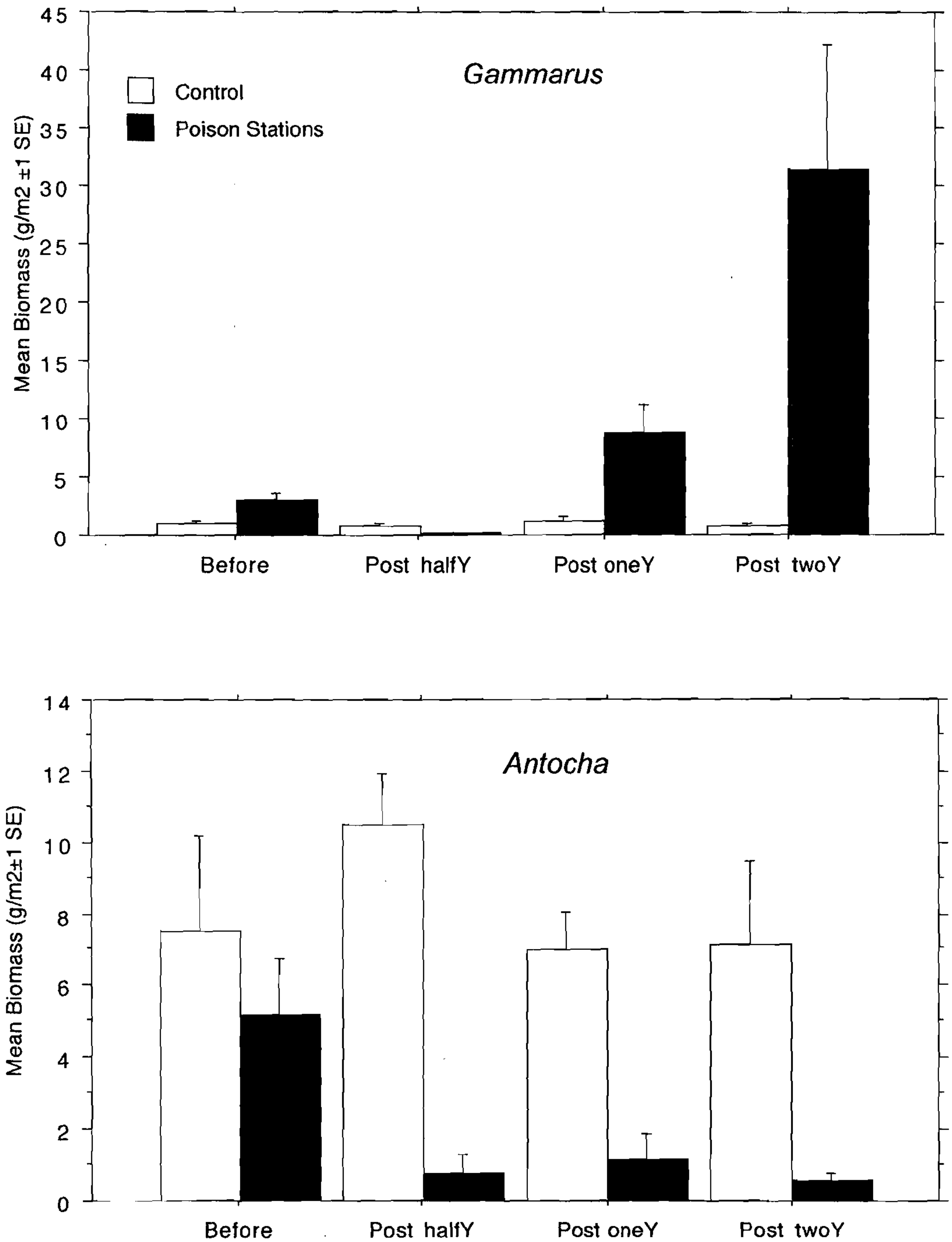

Fig.1. Change in biomass of the crustacean *Gammarus* and crane fly larvae *Antocha* before and 0.5, 1, and 2 years after treatment with antimycin (Data from Jacobi and Degan 1977).

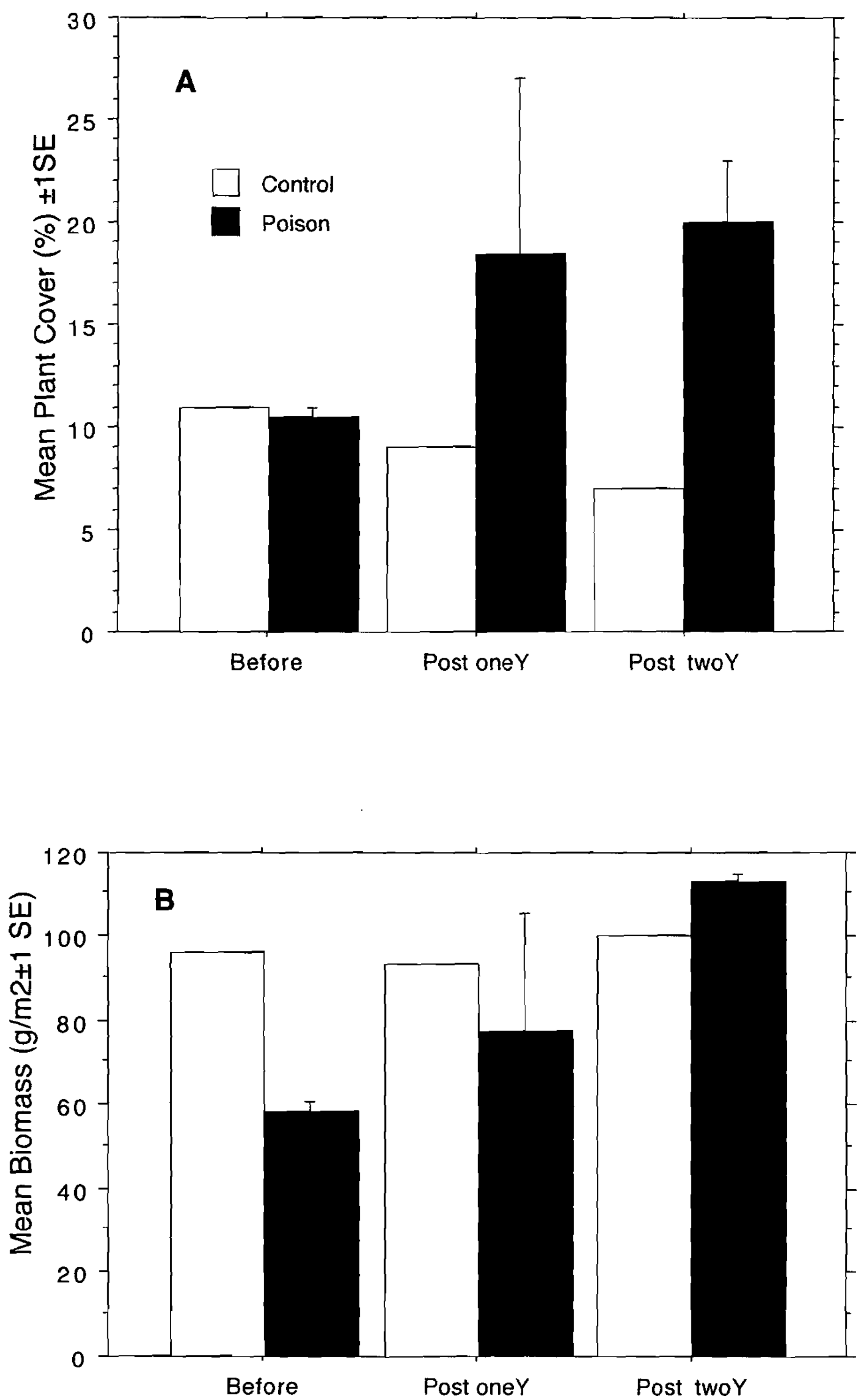

Fig.2. Percentage of stream bottom covered by aquatic plants (A) and total benthic macoinvertebrate biomass (B) in treated and control streams before, 1 year and 2 years after antimycin po.
(Data from Table 6, Jacobi and Degan 1977)

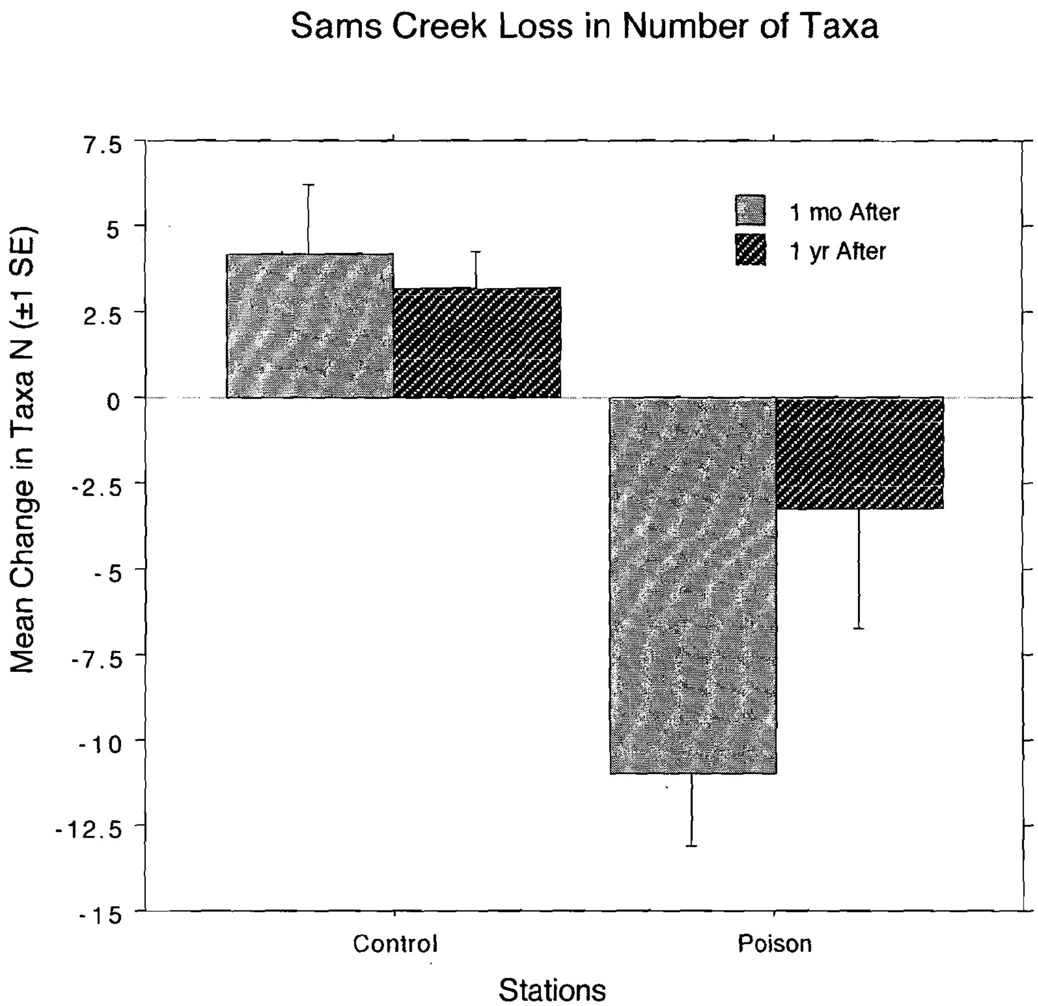

Fig. 3. Change in total number of taxa at control and antimycin treatment stations in Sams Creek. Bars represent the number of total taxa collected before antimycin treatment in September 2001 minus the total number of taxa collected in October 2001 (1 mo after) and September 2002 (1 yr after) in control and treatment sites. (Data from Fig. 10, Moore et al. 2005). The treatment sites averaged 11 taxa lost in the month after poisoning and 3.2 taxa 1 year after antimycin while the control sites gained 4.2 and 3.2 taxa for the same periods.

Comments submitted by e-mail to: opp–docket@epa.gov. PLEASE CONFIRM RECEIPT. Document is 22 pages including 8 figures. Hard copy to follow by mail to:

Public Information and Records Integrity Branch (PIRIB) (7502C),
Office of Pesticide Programs (OPP),
Environmental Protection Agency,
1200 Pennsylvania Ave., NW, Washington, DC 20460-0001.
Docket ID No. OPP-EPA-HQ-2005-0494.

April 10, 2006.

To:
Environmental Protection Agency
Rotenone Risk Assessments
Attention Docket ID No. OPP-EPA-HQ-2005-0494

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We are aquatic ecologists who have reviewed over the past several years many of the rotenone poisoning projects conducted or proposed by the California Department of Fish and Game (CDFG) on streams and lakes on public land in California and by other state fish and game agencies, by the US Fish and Wildlife Service (FWS), and as permitted by the USDA Forest Service (US Forest Service) throughout the West. We are submitting these comments as private citizens in the public interest. We are commenting specifically on the effects of rotenone when used as a "piscicide" in the nation's streams, rivers, and lakes.

Rotenone versus synergized rotenone formulations:

The Environmental Protection Agency should recognize and distinguish among the many formulations of "rotenone." Pure rotenone is rarely used in fish poisoning operations. For example, the formulation of choice by CDFG in California over the past many years has been Nusyn-Noxfish, which contains other toxic cube resins, such as deguelin, and piperonyl butoxide in percentages equal to rotenone. Deguelin, tephrosin and other rotenoids have been shown in published reports to have the same properties as rotenone as an insecticide. Piperonyl butoxide is highly acutely toxic to aquatic macroinvertebrates (EPA, National Pesticide Telecommunications Network). These formulations also contain many other inert ingredients that are not desirable for release into natural waters.

Collateral damage to non-target species and aquatic communities from the application of rotenone formulations:

Rotenone formulations can not be referred to merely as "piscicides" (as this EPA announcement has) thereby implying that they kill only fish. In fact, rotenone formulations act as a poison on many non-target organisms and have major long-term impacts on aquatic invertebrates and on amphibians. Rotenone inhibits the ability of fish and other aquatic animals that obtain oxygen from water, to use oxygen.

The CDFG and the US Forest Service have recently been requesting rotenone projects of three years duration, with up to two applications per year, because they have had so little success in eliminating unwanted fish with one-year applications (e.g., US Forest Service Decision Notice 2004). And often these poisoning regimens have been repeated on approximately 10-year cycles in the same stream basins or lakes. The great majority of aquatic invertebrates have one-year life cycles. A three-year project eliminates many invertebrates from the stream and riparian area for as long as four years and longer. Many terrestrial animals are dependent on the food source of emerging stream insects, amphibians, and fish and are put at risk from these projects because a major part of their food supply is eliminated for several years. This cascading effect in food webs is a major ecological disturbance.

The impacts of rotenone on aquatic invertebrates are well known, have been studied for many years and continue to be studied (e.g. Almquist 1959, Binns 1967, Meadows 1973, Helfrich 1978, Engstrom-Heg et al. 1978, Chandler 1982, Dudgeon 1990, Mangum and Madrigal 1999, Cerreto et al. 2003). The impacts are variable depending on the sensitivity of each species to rotenone. Some species may be eliminated or greatly reduced while more resistant species are increased after rotenone poisoning. Cosmopolitan or "weedy" colonizer species, relatively insensitive to rotenone, tend to replace more sensitive species and the overall species diversity decreases.

Most of the aquatic invertebrate studies have been short-term. Most have only identified larval aquatic insect forms and, therefore, have not determined the number of species affected or eliminated by rotenone. If a higher taxon than a single species is affected, one can assume that a higher number of species is being affected. For example, when a study reports that a genus, family, or order has disappeared or shown major stream drift, one must assume the taxon represents more than one, and perhaps many, species.

In a short-term study on a Pennsylvania stream, Helfrich (1978) found that all 4 major orders of macroinvertebrates in the study stream exhibited substantial decreases in numerical abundance 11 days after rotenone treatment. Populations of Plecoptera and Diptera were "nearly exterminated." Trichoptera and Ephemeroptera were reduced to 50% of the pretreatment levels.

A 5-year study on a river in Utah (Mangum and Madrigal 1999) found that "up to 100% of Ephemeroptera, Plecoptera, and Trichoptera [mayflies, stoneflies and caddisflies] were missing after the second rotenone application. Forty-six percent of the taxa recovered within one year, but 21% of the taxa were still missing after five years. At least 19 species were still missing five years after the rotenone treatments. (We say "at least" because some taxa were identified only to genus and may have included more than one species). It should be noted that the rotenone formulation that was used in the Mangum and Madrigal study was Noxfish, which does not contain the synergist piperonyl butoxide found in

Nusyn-Noxfish. We would expect even more toxic effects to macroinvertebrates from Nusyn-Noxfish.

The California Lahontan Regional Water Quality Control Board required that the CDFG conduct monitoring on aquatic macroinvertebrates before and after the application of Nusyn-Noxfish to several streams in the Lahontan region. We have obtained CDFG reports and data from two of those studies, one on Silver King Creek, 1990 through 1996 (Trumbo et al. 2000 a), and the other on Silver Creek, 1994 through 1998 (Trumbo et al. 2000 b), both in the Carson–Iceberg Wilderness Area, Humboldt-Toiyabe National Forest, CA. We also obtained most of the original data reports that were prepared by the USDA Forest Service, National Aquatic Ecosystem Monitoring Center Laboratory, Provo, Utah for these two CDFG reports.

F.A. Mangum of the National Aquatic Ecosystem Monitoring Center Laboratory, prepared the reports from data collected before and after the 1991-1993 poisoning of Silver King Creek above Llewellyn Falls. We found the following quotes in the data report submitted to the California Department of Fish and Game in 1997 from the USDA Forest Service, National Aquatic Ecosystem Monitoring Center Laboratory, Provo, Utah. (Mangum, F.A. 9 Jan. 1997. Aquatic Ecosystem Inventory - Macroinvertebrate Analysis Silver King Creek, 1996. USDA Forest Service, National Aquatic Ecosystem Monitoring Center Laboratory, Provo, Utah):

Station 1, Control Section, Four Mile Creek

"Many of the species missing in Silver King Creek following rotenone treatments were still found in Four Mile Creek." (p. 8)

Station 2, Silver King Creek

"16 taxa (33%) found in the pre-rotenone community were still missing;" (p. 14)

Station 3, Silver King Creek

"There were still 11 taxa or 28% of the pre-rotenone community still missing at this station;" (p. 15)

Station 6, Silver King Creek

"...there were still 17 taxa or 38% of the pre-rotenone community missing;" (p. 15)

Station 7, Silver King Creek

"...but 13 taxa (30%) were still missing from the pre-rotenone community at this station; see Table 4. Most of the missing taxa have been observed to be sensitive to rotenone." (p. 16)

Station 8, Silver King Creek

"There were still 14 taxa (30%) missing at this station compared to pre-rotenone samples;" (p. 17).

Our analysis of the same data indicates an even higher number of macroinvertebrate taxa missing three years after the last poisoning on Silver King Creek. The average percent missing taxa from the five treatment stations was 41.9%; the highest percent taxa missing from a single station was 46.7%.

Some of our analyses of these data are summarized in Figures 1 through 8. We found that macroinvertebrate diversity in Silver King Creek was significantly reduced two and three years (considered long-term in the Lahontan Basin Plan) following poisoning with Nusyn-Noxfish (Fig. 1) and that peltoperlid stoneflies were greatly reduced in the long-term (Figs. 2 and 3). Percentage of taxa that were still the same at the poisoned stations after they were poisoned compared to before was significantly lower than at the control station (Fig. 4). In Silver Creek (a different stream from Silver King Creek) the mean number of taxa were significantly reduced two years after the last poisoning (Figs. 5 and 6), stonefly abundance was greatly reduced (Fig. 7), and peltoperlid stoneflies had nearly disappeared two years after the last rotenone poisoning (Fig 8). The peltoperlid stoneflies had been the most abundant stonefly group prior to poisoning.

In 2003, CDFG provided the Lahontan Regional Water Quality Control Board (LRWQCB) staff misleading information when they claimed that "No evidence of long-term impacts were found in either study" (Interagency Study Proposal, LRWQCB files, June 15, 2003, Evaluation of Rotenone use in Silver King Basin on Aquatic Macroinvertebrates, 2003-2007). Our analysis of the data available in the reports showed otherwise.

Our analyses of these data will continue as agencies release the data to us. However, it has been extremely difficult to get all the data and the US Forest Service and CDFG failed to release a complete set of data from these two streams even to the Lahontan RWQCB after the Board formally requested it.

We know that an average of 41.9% of the broad taxa of macroinvertebrates were still missing from the Silver King Creek drainage as long as three years following the last rotenone treatment. We do not know how many species these taxa represent. To our knowledge, neither the US Forest Service, CDFG, nor the USFWS have ever made an inventory of macroinvertebrate species prior to a stream or lake poisoning project in California. There is no way to know whether or not other rare and/or endemic macroinvertebrate species are in a project area prior to poisoning or whether or not any of the macroinvertebrate species ranked as endangered, restricted range, or rare in the California Natural Diversity Database are present. We think this lack of knowledge of aquatic species present prior to rotenone poisoning extends throughout the US.

Many of the stream poisoning projects now being carried out or proposed in the western US are in the most pristine and unspoiled streams and rivers of the country in designated Wilderness Areas and national parks. Many are in isolated headwater areas that have a high probability of containing other rare and endemic aquatic species, for the same reason that they have rare subspecies of fish. Our research has revealed rare and/or endemic species of invertebrates in many springs and headwater reaches in the Sierra (e.g., Erman and Erman 1990, 1995). We also have found that aquatic invertebrate species persist in undisturbed streams over many years. Other researchers also have found persistence of invertebrate taxa in undisturbed streams over many years (e.g., Robinson et al. 2000). These are the sites that should be most protected.

Studies of insect dispersal in Europe have found that biological recovery of aquatic insect communities following insecticide poison events or severe organic pollution may take decades (Sode and Wiberg-Larsen 1993).

The mountain yellow-legged frog and the Yosemite toad are both candidates for listing as endangered species and both are or were found in stream basins in the Sierra Nevada that are proposed for fish eradication or where fish eradication has been attempted for many decades. There is no time during the year that tadpoles of the mountain yellow-legged frog would not be in a stream in higher elevations because the mountain yellow-legged frog spends up to four years as a tadpole. Adult frogs are highly aquatic compared to other amphibian species (Dr. Kathleen Matthews, USDA Pacific Southwest Experiment Station 2003, High Sierra Ecosystems, Science Perspectives, USDA Pacific Southwest Experiment Station).

Inability of fish and game departments to properly manage rotenone applications in the field:

Use of rotenone as a fish poison requires that rotenone must be neutralized chemically in order to control its toxic effect downstream from treatment areas. This chemical neutralization is commonly attempted with potassium permanganate. Failure by the CDFG to achieve complete neutralization and to cause fish kills from the potassium permanganate itself is documented in California Regional Water Quality Control Board (RWQCB) files.

We have read reports from the Lahontan RWQCB files and from CDFG files. During rotenone poisoning of Silver King Creek, Mono County, 1992, approximately 1000 fish were killed downstream of the project area from the application of potassium permanganate (Lahontan RWQCB files). The following year, 1993, during a repeat poisoning of the same area, detoxification of the rotenone was chemically incomplete (Flint et al. 1998). The record shows that CDFG has difficulty managing the performance of potassium permanganate and detoxifying the rotenone.

In the Lahontan Region alone, 6 of 11 rotenone projects since 1988 have violated water quality standards. Rotenone, rotenolone, or naphthalene have been detected downstream or have persisted longer than limits established in Basin Plans (Lahontan RWQCB files).

During application of rotenone in Silver Creek, Mono County, in 1994, independent testing by the Regional Water Quality Control Board found carcinogenic compounds in water. In contrast, testing by CDFG at the same sites found no detectable carcinogenic compounds (Lahontan RWQCB files).

Rotenone was detected in sediment during a CDFG project in Silver Creek, Sept. 20, 1995. CDFG was well over their target application rate of rotenone, with data apparently missing at a critical period (Lahontan RWQCB files).

Rotenone and its breakdown products have persisted in water for long periods after CDFG poisoning projects (Lahontan RWQCB files).

Higher amounts of rotenone have been used than are recommended because of accidents (e.g., Flint et al. 1998). In Silver King Creek non-native fish in live cars (used to monitor effectiveness of the poison) escaped into the stream section being poisoned, not once but twice (Flint et al. 1998). As a result, "the creek was heavily doused with rotenone from backpack sprayers so that total concentrations peaked at 40 $\mu g/l$ at detox, about twice (sic) expected." Not all the escaped fish were found (Flint et al. 1998). Thus, even as CDFG was attempting to get rid of fish, they were accidentally introducing them.

Rotenone can not solve the problem of unwanted fish species

Until the responsible agencies recognize and acknowledge the underlying reasons for many of the unwanted species in the nation's waters and riparian zones, they will be unable to solve the problems with pesticides.

Non-native fish species have been and continue to be stocked by state fish and game agencies and by the US Fish and Wildlife Service. These species were/are stocked without environmental review and constitute a form of biological pollution. Perhaps the greatest threat of these stocking programs is the lesson they teach the public: it is a good idea to move fish around. For this reason and because of the continued official agency fish stocking, few fish eradication projects are successful in removing unwanted fish species over the long term (see for example, the decades-long records of poisoning streams and springs in the Golden Trout Wilderness and the Carson–Iceberg Wilderness, CA).

Rotenone formulations usually can not kill all the unwanted fish. An attempted fish eradication project in a reservoir, Lake Davis, CA, in the mid 1990s failed to eradicate the northern pike, poisoned a water supply for the town of Portola, and cost the state $15 million, some paid in reparations to the local community (Braxton-Little, Sacramento Bee, March 1, 2005). Components of the rotenone formulation, including piperonyl butoxide, persisted in the reservoir long after the poisoning was conducted. Portola has not used water from the reservoir since that time. The pike have been thriving in the intervening years, probably partly due to elimination of predators and competitors. The reservoir had been stocked with many non-native fish, but the northern pike was an illegal stocking, that is, a species not stocked by the CDFG. It is not easy for members of the public to understand why they can not stock the fish they want, if fish and game agencies can do it.

Freshwater habitats in the US are undergoing degradation and biological impoverishment from many sources (Erman 1996). It makes little sense to add poisons to streams and lakes in misguided attempts to save threatened and endangered fish without comprehensive understanding of why these fish species are endangered and with no concern for endangering other non-target species. It was never the intent of the Endangered Species Act to conduct recovery projects to increase single species that would put other species at risk of extinction.

Inadequate EPA review of connection between rotenone and Parkinson's Disease

The EPA rotenone risk assessment document has provided inadequate review and analysis of the connection between rotenone and Parkinson's Disease. In the various sections where the topic comes up, the EPA has repeated the statement "although several studies have linked sub-chronic rotenone exposure to Parkinson's disease-like symptoms in laboratory rats, the exposure methods used to obtain these results are not typically encountered through the current registered uses of rotenone." A critical analysis of the literature on this subject is restricted in the EPA document to the original study by Betarbet et al. (2000) and a paper on zebrafish by Bretaud et al. (2004). The Betarbet et al. study methods are critiqued and the findings judged of "uncertain relevancy" (p. 55 and elsewhere) as if this initial paper which first showed the connection between rotenone and Parkinson's disease is the sum total of current knowledge and technique. Such a review and analysis is insufficient for an EPA document of this importance.

The Web of Science presently lists 210 scientific papers connecting rotenone and Parkinson's disease. Many of these are extremely relevant to the EPA assessment, for example, Vanacore et al., 2002, have conducted a meta-analysis of all case control studies to the date of their work and are following the fate of a cohort of licensed pesticide users. More recently, Brown, T.P. et al., 2006, reviewed the extensive and growing literature on this subject and found "...a relatively consistent relationship between pesticide exposure and PD" and "...data suggest that paraquat and rotenone may have neurotoxic actions that potentially play a role in the development of PD..."

Inadequate EPA review of components of rotenone formulations

The EPA rotenone risk assessment document is incomplete in its treatment of ingredients associated with formulated end-products of rotenone. It has concluded that cube root resins do not contribute substantially to the toxicity of rotenone because technical grade rotenone is twice (at least) as toxic as the formulated end-product of rotenone. This conclusion is apparently based on the data reported in Table 3.17 for three formulations, Prentox Grass Carp Management Bait, Chem Sect Chem Fish Regular, and Chem Sect Cube Root Powder Toxicant.

However, the range of fomulations presented does not cover the range of actual formulations, associated products or potential toxicity. For example, work by Cabizza et al., 2004, found residues on olives of deguelin, tephrosin, and beta-rotenolone were very similar to rotenone and some data indicated similar acute toxicity values for deguelin and rotenone. The EPA and producers of rotenone products (e.g., Chem Sect Chem fish Regular, Table 3.17, and Nusyn-Noxfish and CFT Legumine) combine all such active compounds as "cube root resins" although their relative amounts and toxicities in end-product formulations are not equivalent. The limited data presented in Table 3.17 of the document support caution in making conclusions about toxicity of other cube resins. For example, Chem Sect Chem Fish Regular, 5% rotenone and 5% other cube resins, was 8 times more toxic to male rats than the other two products that contained no other cube resins. There are no data to reveal whether the other cube resins in Chem Sect Chem Fish Regular were rotenolone, tephrosin, deguelin or a mixture, or which was predominant.

Detailed work on extract from the source plant (*Lonchocarpus*) has found as many as 25 other minor rotenoids in cube resin (Fang andCasida 1999). Thus, other "cube root resins" is too broad a term for useful toxicity characterization and a more complete discussion and review is required than is in the EPA document.

Recommendations

We recommend 1) that the use of rotenone as an aquatic poison be halted in most cases in the US, 2) that its use should always require an NPDES permit [See earlier comments we submitted to the EPA, Attention Docket ID No. OW–2003–0063, April 1, 2005], and 3) that where it is permitted, application should be monitored and overseen by an independent, unbiased agency. The agencies promoting the use of rotenone in stream and lake poisoning can not be relied upon to also monitor and accurately report the effects of its use. We think that independent aquatic scientists, including macroinvertebrate and amphibian specialists, must be involved in the analysis of the impacts of rotenone on aquatic communities and species of non-target organisms.

Summary

To summarize, aquatic poisons rarely solve the problems for which they are used because the same fish and game agencies that promote them continue to stock non-native fish. Members of the public learn from the example of the agencies and also move fish around. And fish poisoning often does not kill all the target fish.

The record is clear that the state and federal agencies using rotenone in California streams and lakes are incapable of applying the products without major problems.

We think the impacts of rotenone use in the streams and lakes of the US over the past 60 or 70 years has significantly reduced the diversity and changed the communities of aquatic macroinvertebrates and has probably eliminated some, perhaps many, non-target species. It has likely also had a major effect on some amphibians and has had a secondary food web effect on terrestrial animals that depend on fish, amphibians, and emerging aquatic insects for food. The effects of "piscicides" in general on non-target species have been understudied, poorly analyzed, and denied or ignored by some of the state and federal agencies involved in stream and lake poisoning.

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Explanation of figures:

Figure 1. Silver King Creek Macroinvertebrate Diversity Long-term Response to Nusyn-Noxfish (a rotenone poison).

Plot of the Margalev diversity index. Data is from Trumbo et al. (2000a) It compares the mean diversity index (± 1 standard error) for the control site (Station 1 in Trumbo et al. 2000a) and the sites eventually poisoned (Stations 2, 3, 6, 7, 8). The bars labeled "Before" are mean values for the two years before poisoning (1990 and 1991 before poison). The bars labeled "Long-term" are mean values for the two years, 1995 and 1996, following the last poisoning in 1993.

Figure 2. Silver King Peltoperlid Stoneflies.

Mean number of individuals (± 1 standard error) of the stonefly family Peltoperlidae, a taxon difficult to mistakenly identify. Data are from Trumbo et al. (2000a). Data in the Trumbo et al. (2000a) report are in tables of Plecoptera by taxon. Values for all taxa in the family Peltoperlidae (i.e., *Yoroperla brevis*, *Yoroperla* and Peltoperlidae) were summed for each date and station. "Before" on the x-axis means before poison and includes the samples from 1990 and 1991 (before poisoning). "During" includes the samples from 1991 after poisoning, 1992 before and after, 1993 before and after, and 1994 (one year after final poisoning). "Long-term" includes samples from 1995 and 1996, two and three years following the final poisoning.

Figure 3. Percentage of Peltoperlidae in Silver King Creek (of all Stoneflies).

This plot is of the same data and source as Fig. 2 except the number of individuals of Peltoperlidae from the poisoned stations (Stations 2, 3, 6, 7, 8) are divided by the total number of individuals of all taxa and expressed as a percentage (± 1 standard error). The periods and samples are the same as in Fig. 2.

Figure 4. Percentage of taxa the same as those found before poisoning began, Silver King Creek.

The mean of 5 poison stations includes ± 1 SE. Data were not available for 1992 at the Control station. 1992 and 1993 include samples from before (b) and after (p) poison applied. Long-term results are considered those of 1995 and 1996 according to Lahonton Basin Plan. (Data from Mangum 1991, 1993-1996)

Figure 5. Silver Creek Number of Taxa.

Mean number of taxa (±1 standard error) from a study on Silver Creek (a different stream from Silver King Creek) reported in Trumbo et al. (2000 b. There was no control station in this study. The years are given under the periods used to calculate Before, During and Long-term. All four stations are used to calculate the mean for each bar.

Figure 6. Silver Creek Number of Taxa showing time of poison (Nusyn-Noxfish) application.

This is a plot of the mean number of taxa from Silver Creek based on the same data (Trumbo et al. 2000 b) shown in Fig. 4. The sample periods are given on the x-axis and vertical arrows indicate time of poisoning.

Figure 7. Silver Creek Stonefly abundance

Plot of mean (± 1 standard error) number of individuals (for all taxa in the Stonefly order) for Silver Creek based on data in Trumbo et al. (2000 b). Data are grouped as in Fig. 5. All four stations are used for each bar.

Figure 8. Silver Creek Peltoperlid Stonefly Abundance.

Mean number of individuals (± 1 standard error) of the family Peltoperlidae. The data are from the report by Trumbo et al. (2000 b). Times and stations are as in Fig. 6.

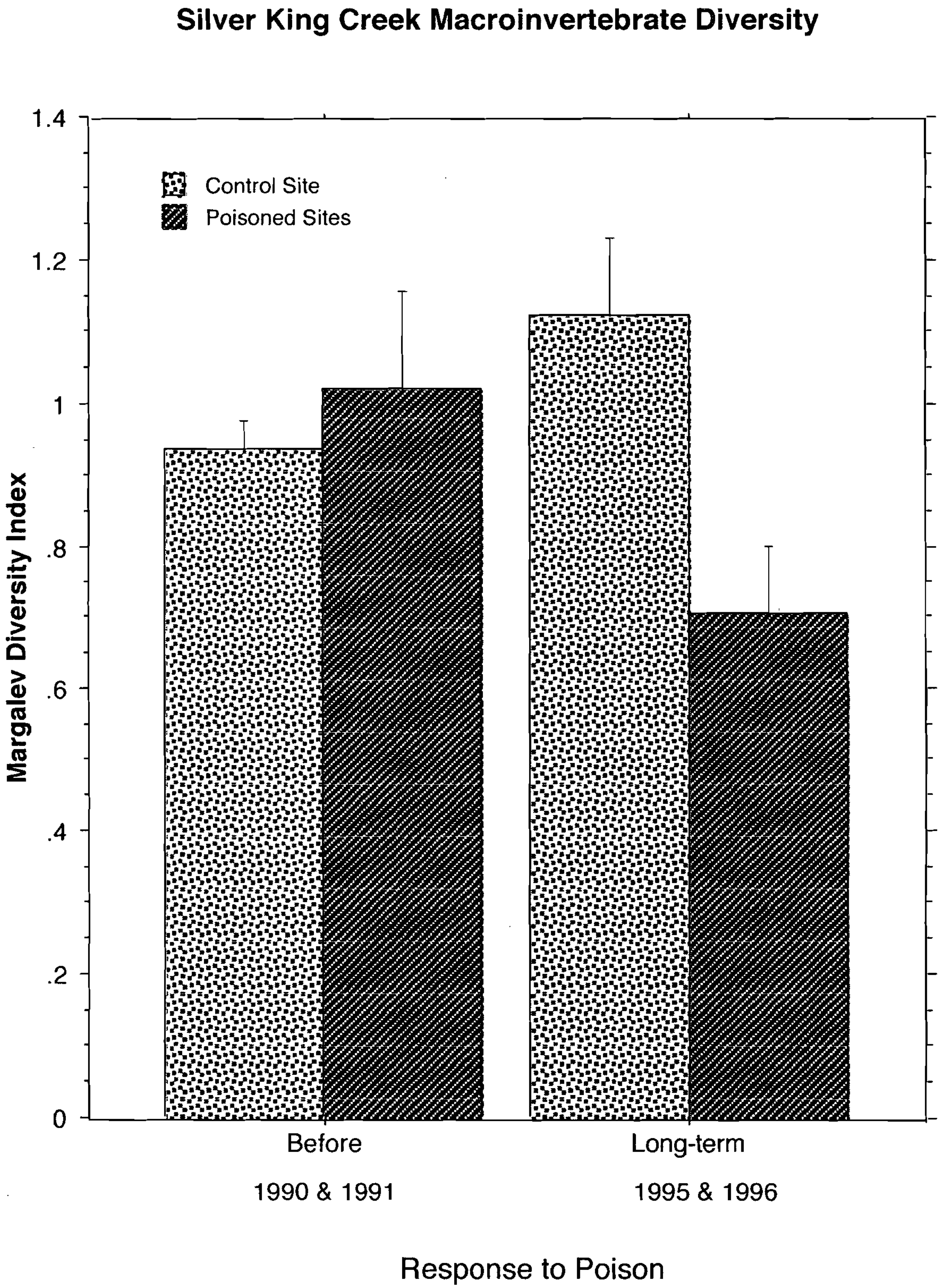


Figure 1. Silver King Creek macroinvertebrate diversity long-term response to Nusyn-Noxfish (a rotenone poison).

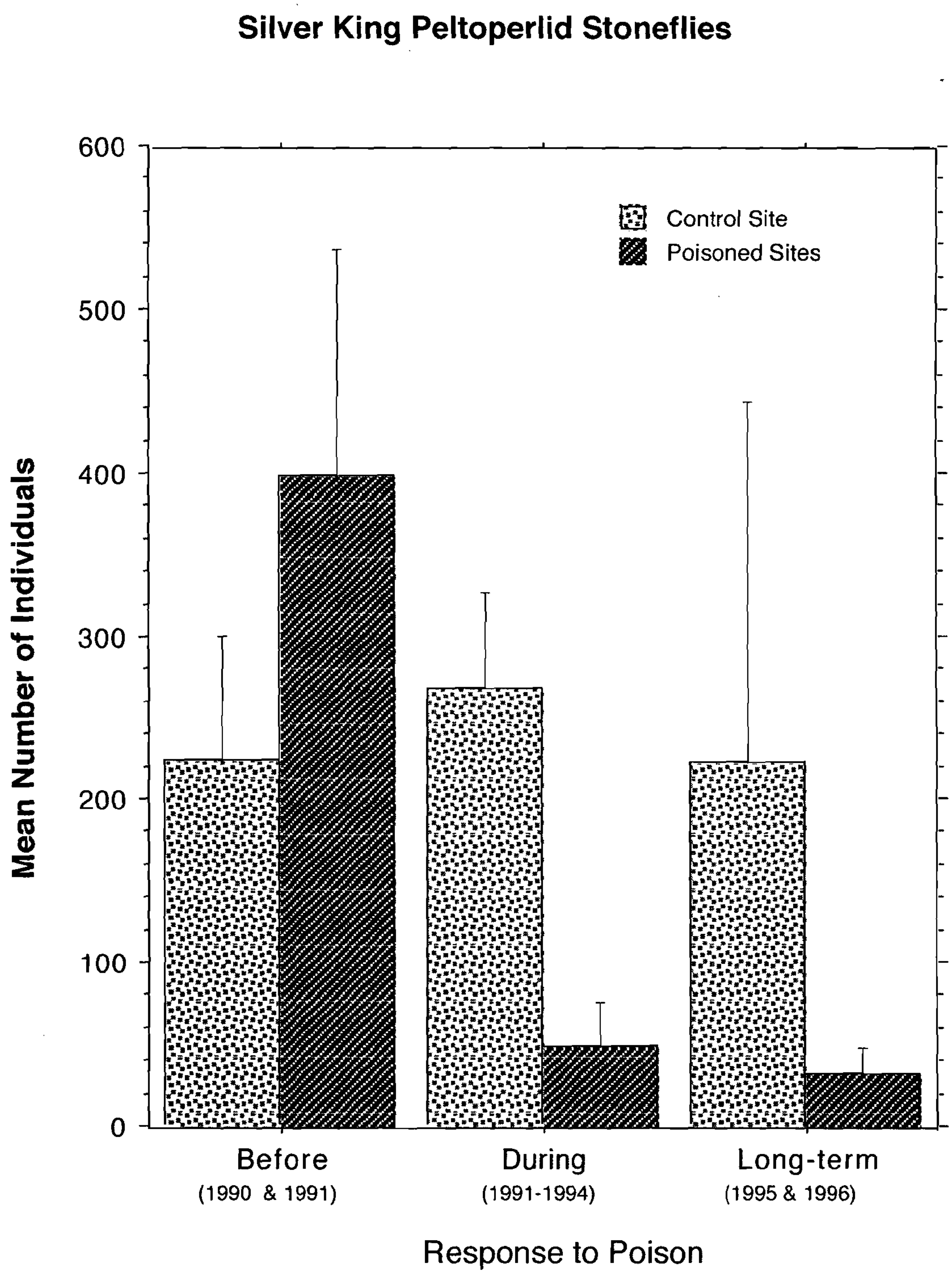


Figure 2. Silver King peltoperlid stoneflies.

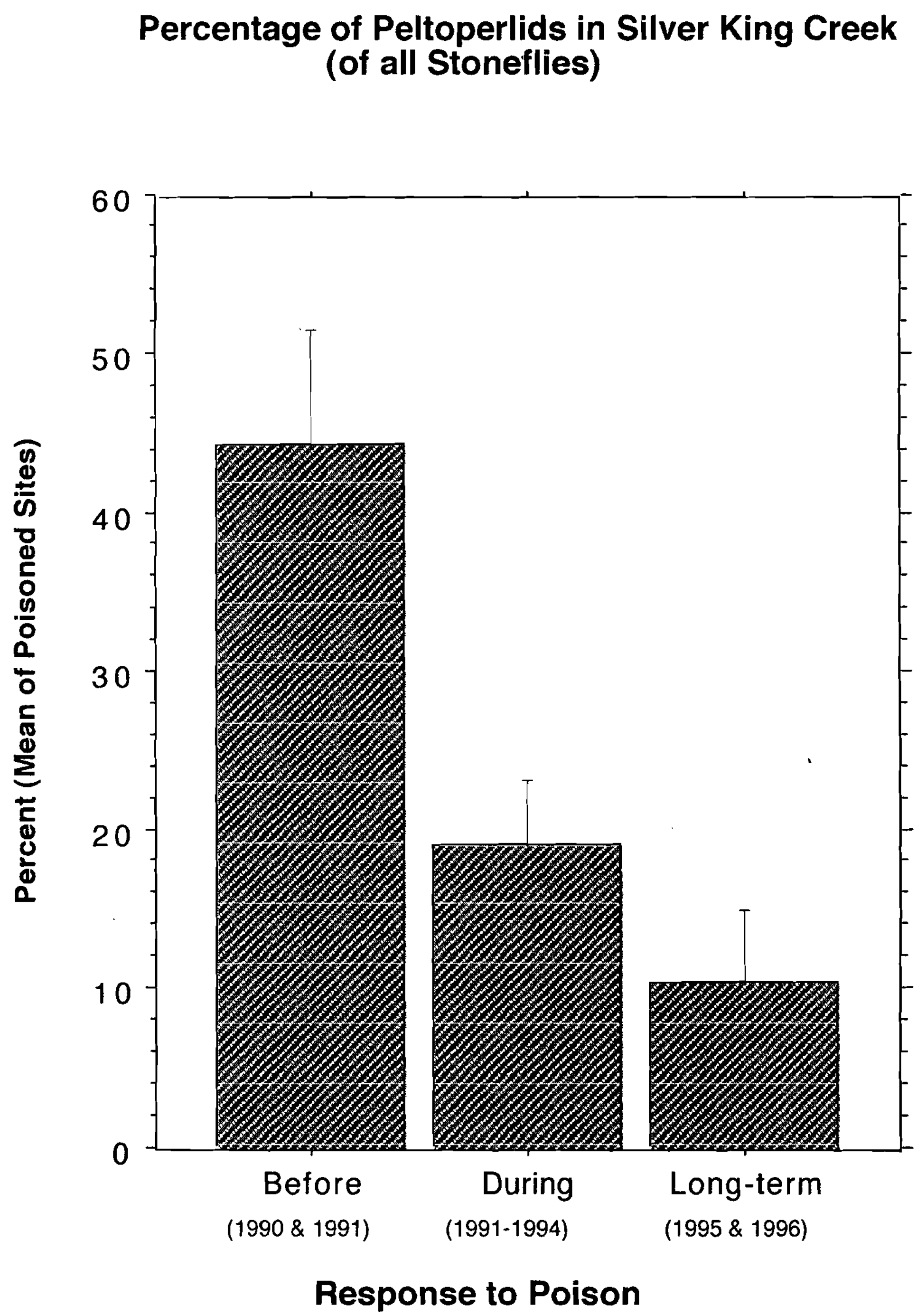
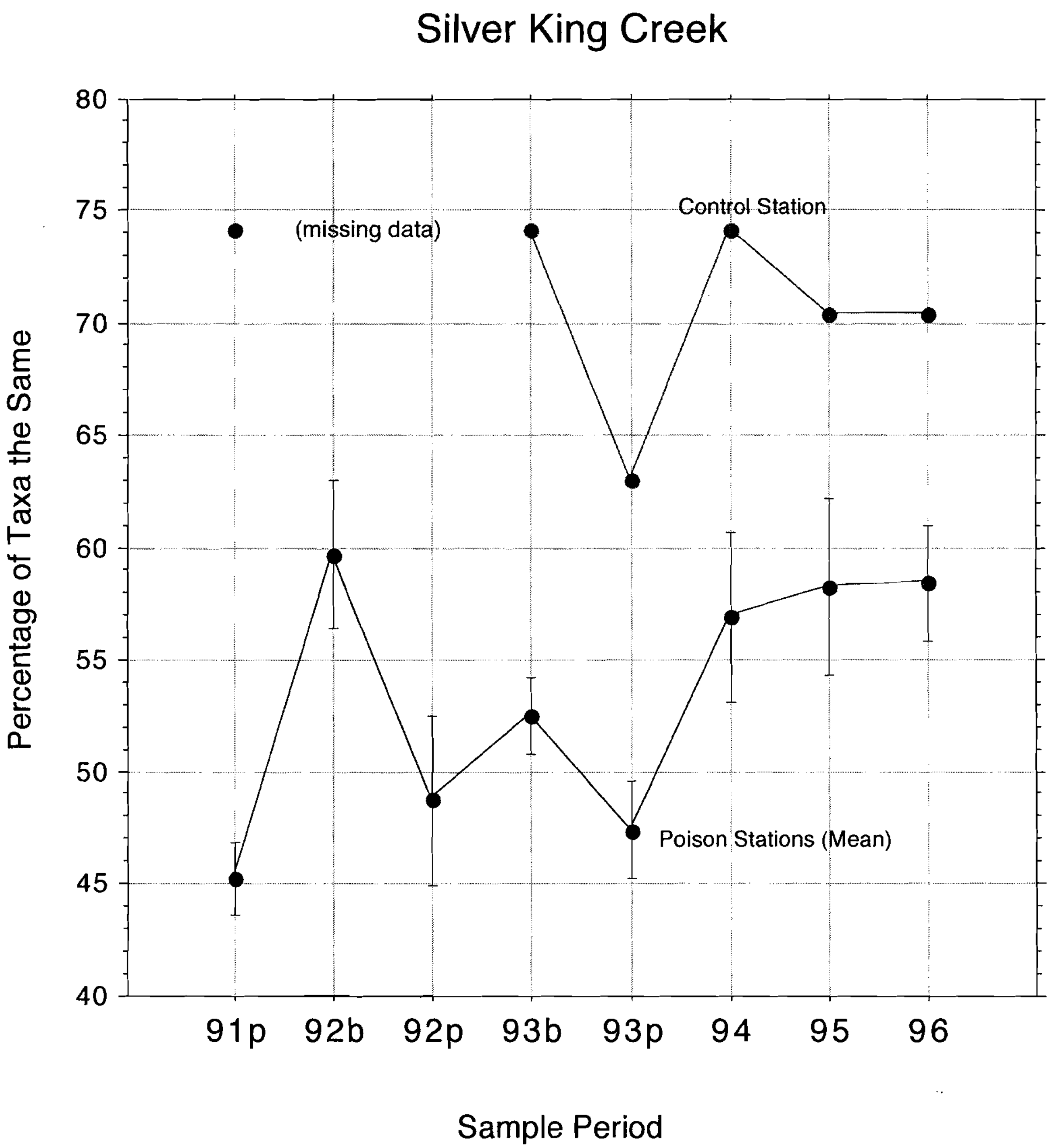


Figure 3. Percentage of peltoperlids in Silver King Creek (of all stoneflies).



Figurè 4. Percentage of taxa the same as those found before poisoning began.

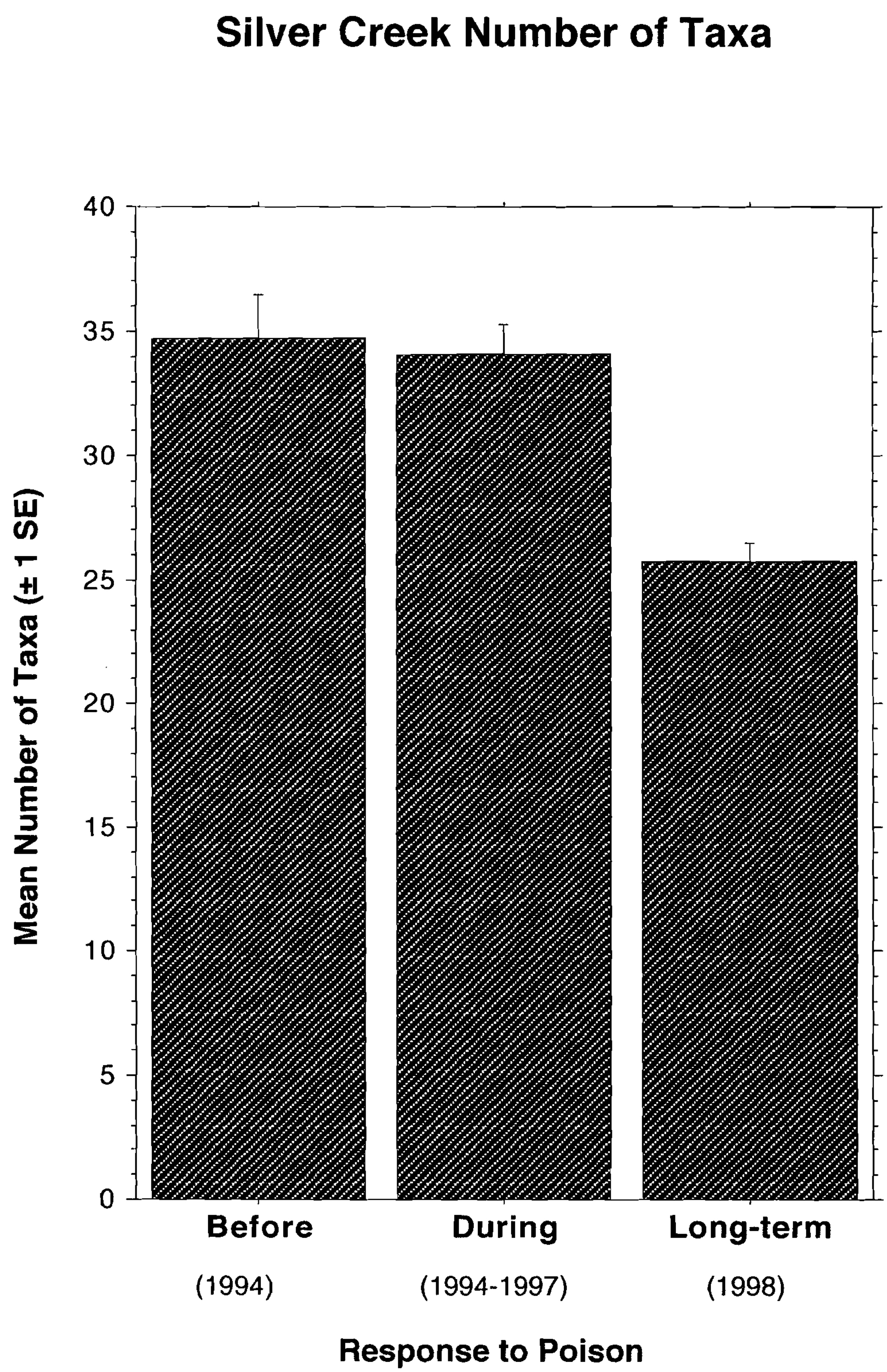


Figure 5. Silver Creek number of taxa.

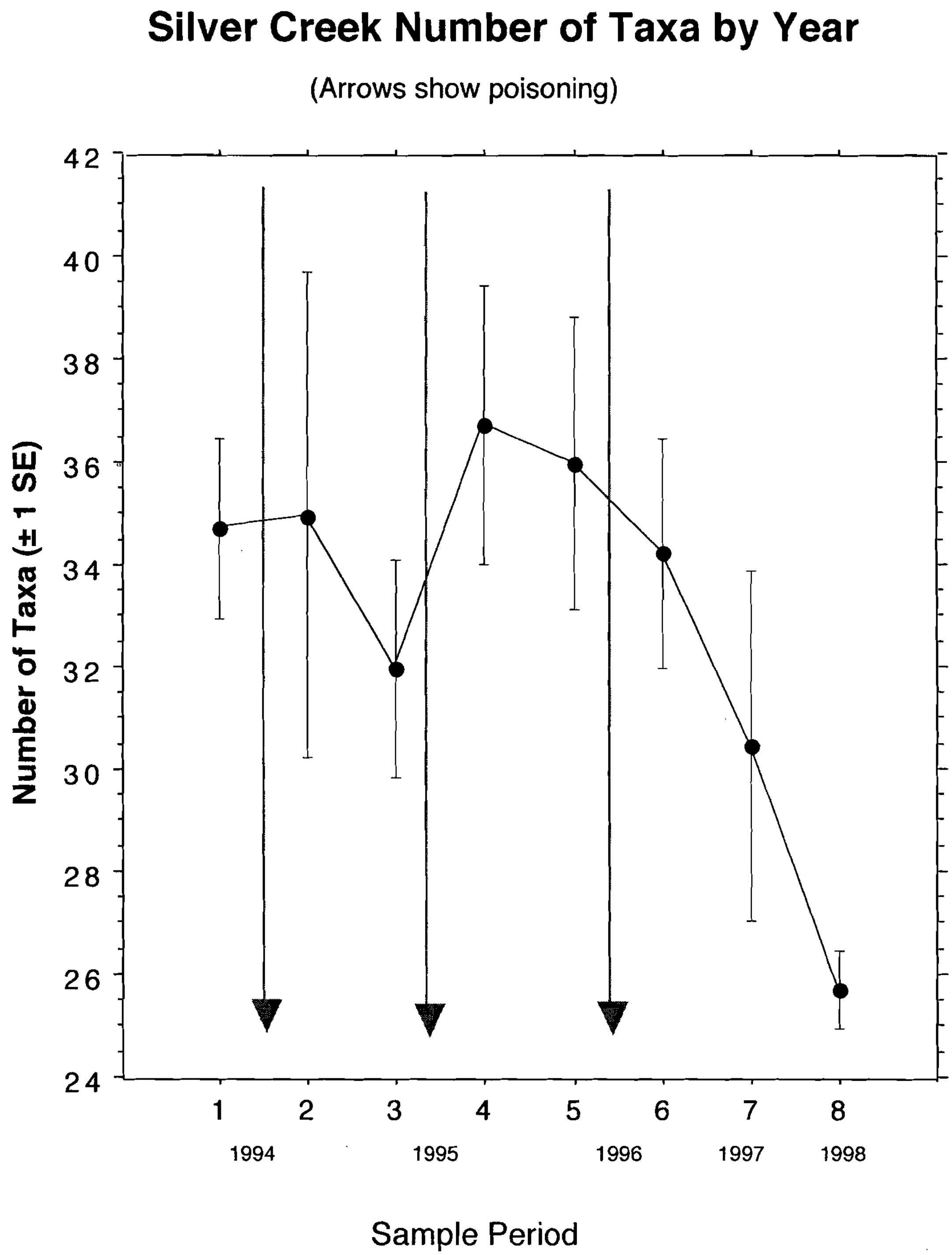


Figure 6. Silver Creek number of taxa showing time of poison (Nusyn-Noxfish) application.

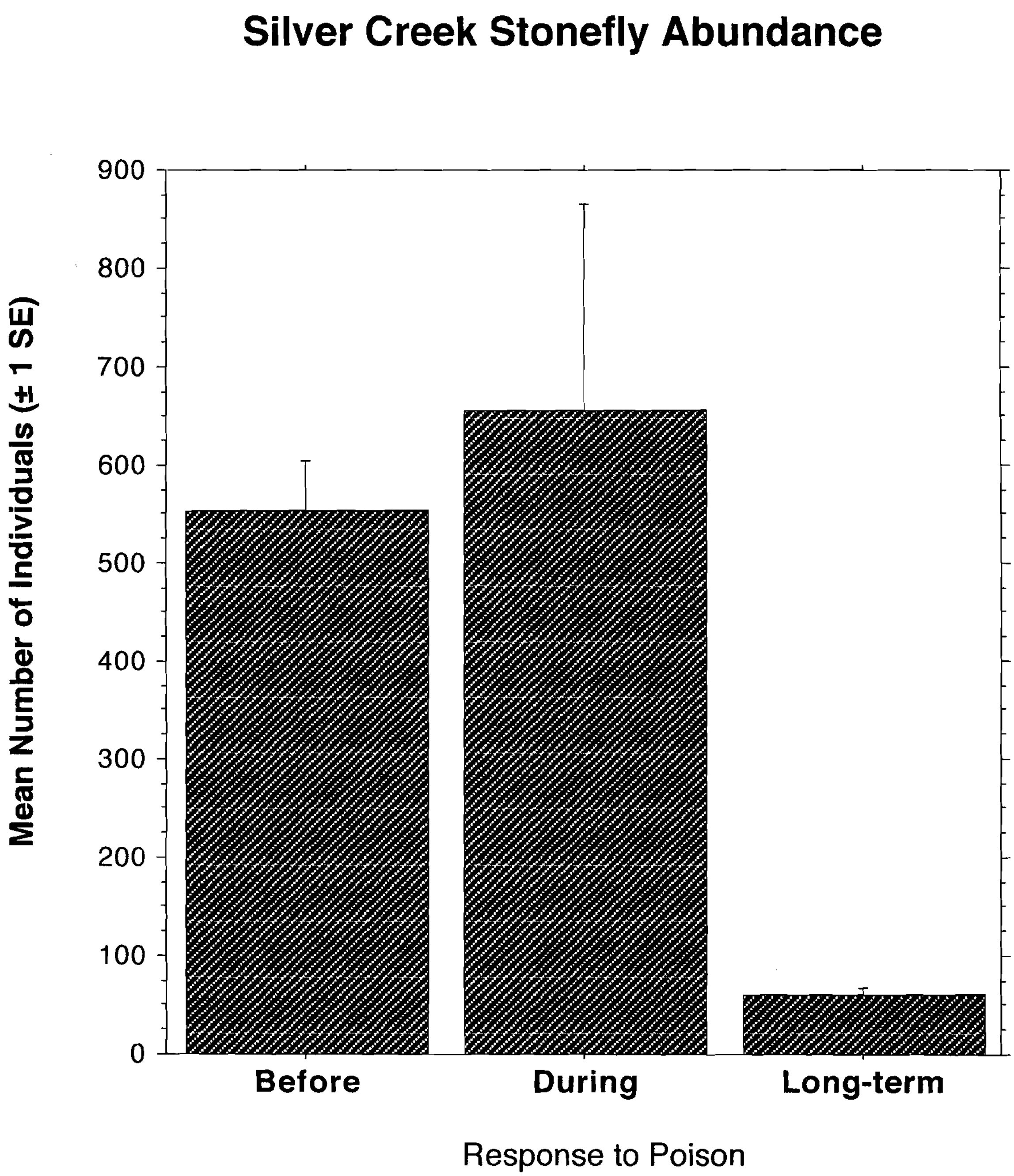


Figure 7. Silver Creek stonefly abundance.

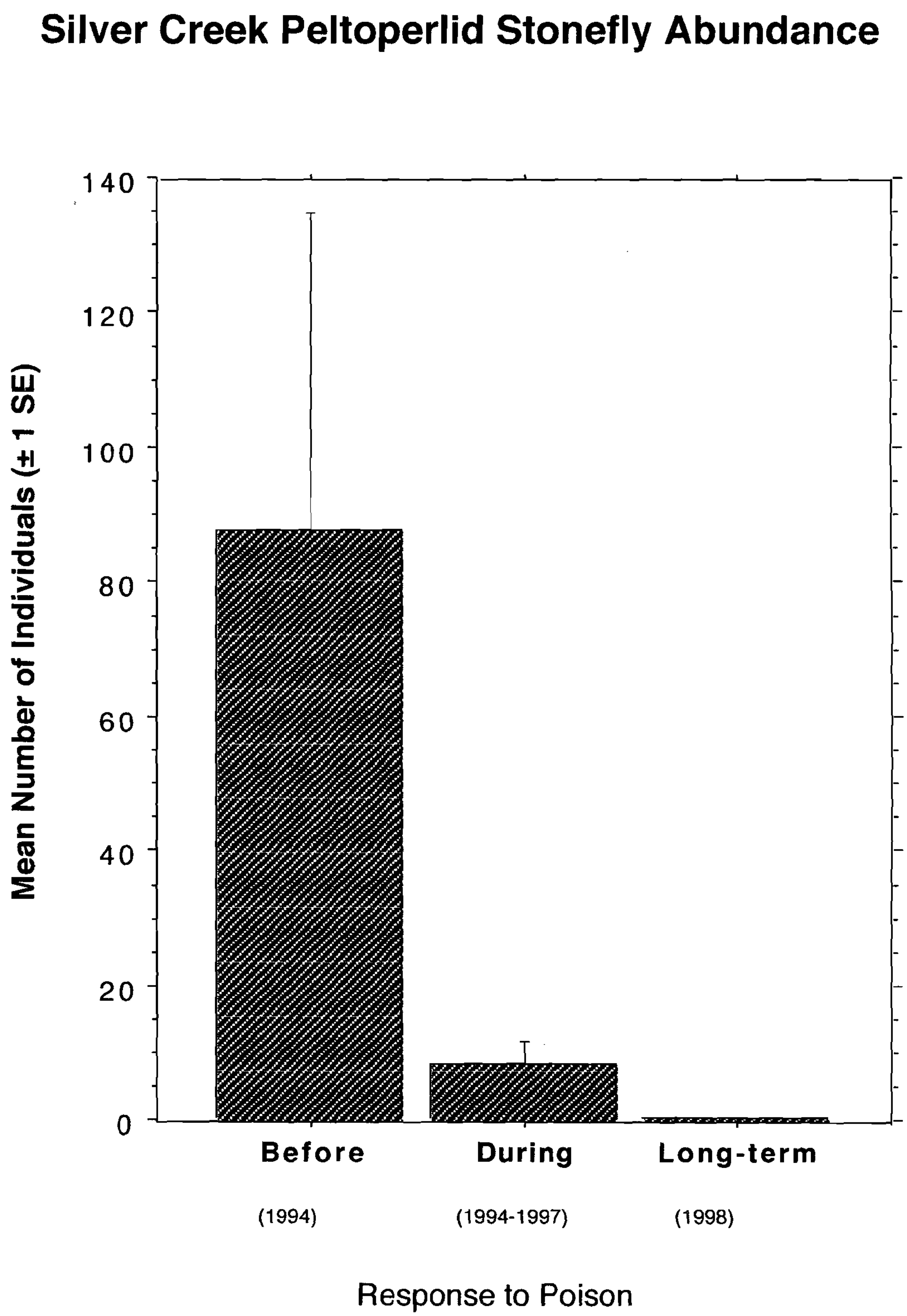


Figure 8. Silver Creek peltoperlid stonefly abundance.

Comments submitted by e-mail to: *Federal eRulemaking Portal*: *http://www.regulations.gov*.

To:

Docket ID number EPA–HQ–OPP–2009–0635.
Environmental Protection Agency
Public Availability of Identities of Inert
Ingredients in Pesticides

February 20, 2010.

PLEASE CONFIRM RECEIPT.

Document is 4 pages.

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We are aquatic ecologists who have reviewed over the past several years many of the rotenone poisoning projects conducted or proposed by the California Department of Fish and Game and by other state fish and game agencies, by the US Fish and Wildlife Service, the National Park Service, and as permitted by the USDA Forest Service on streams and lakes on public lands in California and throughout the western U.S. We have commented in detail to the

EPA in recent years on the ecological risks of rotenone (IV-10-06) and of antimycin-A (III-19-07), and on the misguided EPA proposal to abandon NPDES permits for pesticide applications to waters of the U.S. (IV-1-05). We have also reviewed the growing use of herbicides by state and federal agencies on public lands in the West. We are submitting these comments as private citizens in the public interest.

We support an EPA rule to list all ingredients in pesticides. We think that information on contents and hazards will lead to more informed decisions about alternative means of controlling pests and a reduction of hazardous chemicals in formulations.

We recommend the following:

A. List all ingredients by name in a pesticide formulation as "Active" and "Other." Include impurities in the list. Abandon the use of "inert."
B. Do not list as a class of ingredient (e.g., surfactant).
C. Identify quantity of each ingredient as percent. If less than 0.1%, list as "trace."
D. Footnote the hazard of each ingredient, both "active" and "other," by a 1) or a 2). A 1) means this chemical is on an EPA list as a known or suspected environmental hazard. A 2) means this chemical is a known or suspected human health hazard.

We support and encourage an EPA rule to develop a master list that triggers disclosure of all hazardous ingredients. The list should be updated as new information becomes available and reviewed every five years.

Many pesticide formulations contain such chemicals as solvents, dispersants, emulsifiers, surfactants, etc. which also may be carcinogenic or endocrine disruptors or harmful in some other way. And these are in addition to "active" ingredients. The term "inert" is not suitable for these other ingredients.

Contents of active and inactive ingredients should be identified by chemical name rather than as a class of ingredient. At present, even active ingredients are not being fully disclosed in the rotenone formulations we have reviewed. For example, CFT Legumine™ and Nusyn Noxfish™, both popular formulations of so-called "rotenone" for aquatic use, contain equal amounts of other, toxic cube resins. These resins are not specified by name on labels and may be deguelin, tephrosin, or something else. Rotenone is a very small percentage of the actual ingredients in these aquatic poisons. Nusyn-Noxfish™, which has been used for many years in Wilderness Areas and other places in California, contains only 2.5% rotenone.

The EPA states in the Federal Register that the agency "requires a complete description of the composition of a pesticide formulation, including the identity of each active ingredient…" This assertion is incorrect as discussed above.

The aquatic poisoning projects now being conducted in the U.S. in many public lands to kill fish also kill hundreds of non-target species of invertebrates and many amphibians and disrupt terrestrial and aquatic food webs. The government agencies conducting these poisonings like to describe the pesticide as "rotenone, a natural substance produced by plants." The formulations being used, however, are far from natural and contain many other chemicals besides rotenone.

It is difficult, if not impossible, for the public to be an "informed consumer" when public agencies are completely misrepresenting both the ingredients of pesticides and the outcome of their use.

Pesticides clearly labeled with all their ingredients and hazardous status, will allow the public to begin judging their risk. Commercial applicators and government agencies have total control over revealing contents and judging risks. And they are too often wrong.

An information gap exists between the licensed applicator and the public. The public never sees the label on these pesticides. Licensed applicators, whether commercial or a government agency, should be required to fully disclose to the end consumer the complete contents and label information on pesticides. In the case of government poisoning projects, the end consumer is the public. The EPA should require full disclosure of product ingredients and quantities in the environmental review process (for example in a NEPA document or state environmental document) and in the NPDES permit (for aquatic pesticides).

Testing has never kept up with the constantly changing formulations of pesticides. And testing that is done is inadequate, usually based on a few easily grown laboratory species and on whether they live or die from the pesticide. *In situ* tests of whole species assemblages cannot be conducted and more subtle effects (egg thinning, lack of reproductive fitness, change in migration, etc.) can rarely be seen until it is too late. Species interactions and disruptions caused by greater or lesser sensitivity of some species are almost never understood or identified. The history of pesticide use in the U.S. is rife with major mistakes that were not caught until whole groups of organisms were threatened. Listing all ingredients and identifying hazardous status are essential as a first-step in reducing continued major ecological disturbance from pesticide use.

Only recently have researchers identified the surfactant POEA as the ingredient in the herbicide Round-up™, a formulation of glyphosate, that is highly toxic to aquatic organisms.

Fifteen years ago rotenone was considered a safe insecticide for organic gardening. Ten years ago the connection between rotenone and Parkinson's disease was unknown. Today rotenone formulations for terrestrial use have been taken off the market in the U.S., Canada, and the European Union.

As recently as five years ago, the California Department of Fish and Game was claiming that Nusyn-Noxfish™, a rotenone formulation, was harmless to non-target aquatic organisms. Today the same agency is no longer planning to use Nusyn-Noxfish™ for stream and lake poisoning, but now makes much the same claim for a new formulation of rotenone with a different set of "inert" ingredients. It remains to be seen what we will know about the effects of CFT Legumine™ in another five years. Research will never keep pace with changing formulations of pesticides; but, at least, the public should be allowed to know what is in the formulations.

The argument used by the pesticide companies that they must protect trade secrets by not revealing what is in formulations is no longer valid. Analytical laboratory testing of the formulas is a simple matter now for any competitor who wants to learn the formula. Secrecy only hurts the public. Pesticides should have at least as much information on the label as we require of foods and cosmetics.

The quantity of every ingredient should be revealed by percent. Trace amounts, perhaps less than 0.1 %, should be revealed as well. Such labeling in foods has reduced risks to people who have peanut allergies and has allowed people on low salt diets to choose more wisely. We should expect no less from labels on known environmental poisons.

As aquatic ecologists we have been disappointed with the EPA in recent years. We hope a step to more honest labeling of environmental poisons will mark a turning point in the agency.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON D.C., 20460

MEMORANDUM **Date: May 9, 2006**

SUBJECT: Response to 60-Day Public Comments on the Draft Environmental Fate and Ecological Risk Assessment Chapter in Support of the Reregistration Eligibility Decision on Rotenone (PC Code 071003; DP Barcodes D307382 and D307381)

FROM: R. David Jones, Ph.D., Senior Agronomist
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THROUGH: Elizabeth Behl, Branch Chief
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TO: Katherine Hall, Chemical Review Manager
Tom Myers, Risk Manager
Special Review and Reregistration Division (7508C)
Office of Pesticide Programs

The Environmental Fate and Effects Division (EFED) has completed its review of comments (Data Package (DP) Barcodes D307382 and D307381) received during the 60-day public comment period on the draft environmental fate and ecological risk assessment chapter for rotenone (DP Barcode D307390). A total of twelve comments were received during the public comment phase (Phase 3) of the reregistration process on rotenone. All of the comments posted on the public docket (EPA-HQ-2005-0494) are listed in **Table 1**. Comments from Mr. Harold J. Singer (EPA-HQ-0494-0026), Mr. Bob Broscheid (EPA-HQ-2005-0494-0027), Mr. Douglas Stang (EPA-HQ-2005-0494-0028) and from Dr. Brian Finlayson and Dr. Rosalie Schnick (EPA-HQ-2005-0494-0029) were posted to the docket after the public comment period had closed on April 11, 2005; however, responses to these comments are included in this memo.

Table 1. Summary of comments received on the draft environmental fate and ecological risk assessment of rotenone during the 60-day public comment phase (Phase 3) of reregistration (Rotenone Docket No.: EPA-HQ-OPP-2005-0494).

Docket Number EPA-HQ-2005-0494	Submission
-0018	B. Schau
-0019	A. Campbell (duplicate of -0024)_
-0020	L. W. Ames (Board of California Watershed Network)
-0021 -- -0021.3	J.M. Horvath
-0022	R. Huber (Wyoming Game and Fish)
-0023	N.A. Erman
-0024 -- -0024.4	A. Campbell
-0025	M. Smith (Missouri Department of Conservation)
-0026	H. Singer (California Regional Water Quality Control Board)
-0027	B. Broscheid (Arizona Game and Fish Department)
-0028	D. Stang (New York Dept. of Environmental Conservation)
-0029	B. Finlayson and R. Schnick (American Fisheries Society)

This review paraphrases issues and concerns in order to efficiently address common concerns. After comments are summarized, EFED then provides a response to the comments. The intent of EFED's review is to address issues regarding the underlying science/data used to estimate potential risk to the environment from the use of rotenone. Comments regarding human health and worker exposure issues will be addressed separately by the Health Effects Division; comments regarding potential mitigation measures will be addressed by EPA regulatory staff in a separate review. Many of the comments focused on policy matters related to the use of piscicides to control fish populations; however, the decision process used by resource managers to renovate fish populations is beyond the scope of the environmental fate and ecological risk assessment and will not be addressed by EFED.. The ecological risk assessment briefly discusses alternative fish control measures; mechanical measures to remove fish include primarily electrofishing, netting and angling; however, mechanical means of reducing fish numbers have varied widely in their effectiveness depending on the size of the water body requiring management and the management objective. Integrating mechanical measures such as electrofishing with rotenone treatments has in some cases increased the overall effectiveness of rotenone by selectively eliminating fish in isolated refuges where the rotenone may not be effective.

Comment: B. Sachau (EPA-HQ-2005-0494-0018) opposed the use or sale of rotenone given the chemical's "harmful effects" and the uncertainty regarding potential effects on children. In support of these comments, information on rotenone from the Pesticide Action Network (PAN) was included.

EFED Response: The information taken from PAN on the environmental fate and effects of rotenone is relatively consistent with that contained in the environmental fate and ecological risk assessment. As with most pesticides, there is a potential for adverse effects to non-target organisms and the ecological risk assessment attempts to identify the risks associated with each of the supported uses. PAN indicated that the precautionary principle should be applied to all pesticides; screening-level risk assessments are intended to be conservative (precautionary) by making use of the most sensitive toxicity endpoints and the highest estimated environmental concentrations to make point estimates of potential risks.

Agricultural uses of rotenone are no longer supported by the technical registrants and thus, the only remaining supported use of rotenone is as a piscicide. The ecological risk assessment makes clear that based on the highest treatment rate (250 µg/L) and using the most sensitive toxicity endpoint, most aquatic animals in the targeted treatment area will likely be killed. The extent to which rotenone may move outside of the targeted treatment area is intended to be limited by rigorous standard operating *procedures used by resource managers to apply and contain the chemical. It should be noted however, that while the ecological risk assessment made use of maximum treatment concentrations to estimate risk quotients, applications rates in the field may be considerably lower and the extent of mortality even within the targeted treatment area may be significantly less than that indicated in the risk assessment.*

Concerns regarding the potential effects of rotenone on humans will be addressed by the Health Effects Division.

Comment: Dr. Ann McCampbell (EPA-HQ-2005-0494-0019) wrote to express concern that the use of rotenone as a piscicide should be cancelled since it results in unacceptable water pollution and harm to other species. If rotenone is reregistered, Dr. McCampbell asserted that its use should be limited to contained water bodies on private property and that no formulations should contain piperonyl butoxide. In support of her assertions, Dr. McCampbell provided three attachments which deal primarily with another piscicide, antimycin A. Dr. McCampbell comments along with the attachments were also submitted to the docket under EPA-HQ-0494-0024.1 through 0024.3.

EFED Response:Under the Federal Insecticide, Fungicide and Rodenticide Act, the decision to (re)register a pesticide is based on whether a compound causes an unreasonable risk to the environment and human health. As part of the decision process, the risks and benefits associated with the use of a pesticide are considered. The intent of the environmental fate and ecological risk assessment chapter is to identify potential risks associated with the registered used of rotenone in order to inform the decision process.Whether chemicals should be used to manipulate the environment is a question that extends beyond the scope of the ecological risk assessment. Additionally, human health-related issues will be responded to separately by the Health Effects Division. Since Dr. McCampbell's comments and submissions are duplicated in the Federal Docket, EFED provides a more thorough response below under Docket No. EPA-HQ-0494-0024.

Comment: Laurel W. Ames, an organizer and founding member of the Board of the California Watershed Network (EPA-HQ-2005-0494-0020), expressed concern regarding the unintended consequences of the use of rotenone in its various formulations on non-target species. Ms. Ames stated that the risk assessment must disclose that each poisoning project will adversely effect aquatic species and "*must determine the amount of extirpation that is caused by the use . . ..*" She asserted that the assessment should address the problem of toxic residues that linger in the water and sediments and noted that residues were detected two years after treatment of Lake Davis; she suggested that applicators are not following label instructions and that risk assessments should assume "a high level of non-compliance". She also stated that a number of recent studies have linked rotenone and its formulations to Parkinson's disease. Additionally, Ms. Ames believed that the risk assessment must compare the risks of using rotenone to well known non-chemical alternative fish control measures such as electrofishing and gill netting. Concern was expressed over the lack of a standard operating procedure that would require pre-application surveys of aquatic life so that rotenone's acute and chronic effects on non-target animals can be better documented.

EFED Response: It is unclear from Ms. Ames' comments whether she is referring to the EFED environmental fate and ecological risk assessment chapter or whether she is referring to environmental impact studies that various states may perform to document pre- and post-treatment populations. The screening-level risk assessment makes clear that rotenone is very highly toxic to aquatic animals and that the direct application of rotenone to freshwater environments as a piscicide is typically intended to kill all of the fish [and will likely also kill aquatic invertebrates as well] in the target area. Exposure of aquatic organisms outside the treatment area is intended to be limited through rigorous application standard *operating procedures used by trained fishery professionals. In situations where rotenone is likely to move out of the intended treatment area, e.g., flowing water environments, rotenone is typically deactivated with potassium permanganate to prevent its movement out of the treatment areas. Additionally, rotenone is a restricted use pesticide and can only be applied by certified pesticide applicators who have undergone training in applying chemicals to aquatic environments.*

Screening level risk assessments are intended to estimate risks based on the labeled use of the chemical. If would not be possible to evaluate the effects of the misuse of any pesticide given the potential number of ways that a chemical can be misused. The presumption underlying the ecological risk assessment is that applications are being made legally, according to the label.

EPA is aware of the studies linking sub-chronic rotenone exposure to Parkinson's disease-like symptoms in laboratory rats. The relevancy of these studies to potential exposure to wildlife from rotenone use in fishery management is unclear.

The ecological risk assessment of rotenone is not intended to explore alternative means of removing fish; however, the chapter does briefly discuss mechanical alternatives to the use of chemicals. Like most sampling methods though, there are sampling biases that may limit the effectiveness of mechanical fish removal methods. Limitations may include size selectivity or simple impracticability.

Comment: In three documents, J. M. Horvath (EPA-HQ-2005-0493-0021.1 to -0021.3) expressed concern regarding the link between rotenone and Parkinson's-like disease particularly related to exposures that may occur through the agricultural uses of rotenone. The commenter recommended that neurotoxicity studies should be required and that these studies should attempt to address potential age-dependent effects. The commenter also provided an annotated bibliography to support their concerns.

EFED Response: These comments are primarily directed at the human health risk assessment and will be addressed separately by the Health Effects Division. However, it is important to note that the agricultural uses of rotenone are no longer being supported by the technical registrants and that the only remaining supported use of rotenone is that as a piscicide. The ecological risk assessment discusses the studies linking rotenone exposure to Parkinson's disease-like symptoms in mammals in the laboratory; however, it is uncertain how exposures similar to those used to obtain these laboratory results would occur based on the registered use of rotenone as a piscicide.

Comment: Mr. Rick Huber with Wyoming Game and Fish submitted comments (EPA-HQ-2005-0493-0022) emphasizing the critical role that rotenone plays in allowing Wyoming Game and Fish Department (WGFD) to meet their species conservation goals and objectives. Mr. Huber emphasized that rotenone can only be applied by WGFD employees who hold Department of Agriculture Commercial Pesticide Applicator License specifically issued for fish control. The comments included a brief description of the methods and concentrations used by WGFD to treat streams, ponds and reservoirs.

EFED Response: Comments on behalf of the WGFD are consistent with EFED's understanding of how rotenone is used for fishery management purposes.

Comment: Nancy A. and Don C. Erman (EPA-HQ-2005-0494-0023) with the Department of Wildlife, Fish and Conservation Biology at the University of California (Davis), wrote that technical grade rotenone is rarely used as a piscicide and that EPA should "recognize and distinguish among the many formulations" used and that some of the inerts formulated with rotenone are toxic. Since

rotenone is prone to kill a range of non-target organisms [in addition to fish], the Ermans believed that rotenone should not be referred to as a piscicide. They asserted that macroinvertebrates are sensitive to rotenone and that repeated applications of the chemical can result in decreased species diversity and thus potentially affect the entire aquatic food chain. According to the Ermans, decreased species diversity and displacement of sensitive species with more tolerant organisms may persist for a number of years following treatment.

The Ermans also commented that rotenone and co-formulants have been detected outside of targeted treatment areas and that efforts to inactive rotenone with potassium permanganate have not been entirely effective. They also believed that the risk assessment provided an inadequate review of the toxicity of formulated end-products.

The Ermans commented that the risk assessment provided an insufficient review of relevant literature linking Parkinson's disease to rotenone exposure.

EFED Response: EFED concurs with the Erman's comments that rotenone will kill not only fish but aquatic invertebrates as well. The use of the term piscicide though is intended to reflect the labeled use of the compound to kill fish. Just as many insecticides may kill other non-target organisms such as spiders and fish, the chemicals are registered for the purpose of killing insects and thus are referred to as insecticides.

The ecological risk assessment of rotenone states that rotenone is very highly toxic to fish and invertebrates on an acute exposure basis with median lethal concentration (LC_{50}) values less than 10 µg/L and that the use of rotenone for fishery management at maximum application rates would likely eliminate both aquatic vertebrates and invertebrates in the treatment area. The chapter states that although the lowest toxicity value for freshwater invertebrates (48-hr EC_{50}=3.7 µg/L) was chosen for risk assessment purposes, it is likely that more sensitive invertebrates could be found in the wild. In this case, at maximum application rates, acute mortality of aquatic invertebrates would be expected. Despite the fact that invertebrates are less conspicuous members of the aquatic community, they are a major component of aquatic ecosystems and food webs. Any significant effects on invertebrates would most likely influence other components of the ecosystem. Effects may not be limited to merely a change in total biomass as a result of widespread mortality but any changes associated with differential sensitivity could bring about significant changes in the community structure, which could alter system function.

The extent to which inerts, contaminants and other active ingredients affect the toxicity of rotenone is not well known; however, toxicity testing with formulated end-products suggests that in general, co-formulants do not substantially affect the toxicity of rotenone based on a species sensitivity distribution of fish acute 96-hr LC_{50} values. It is assumed that the distribution of fish species sensitivities observed from laboratory tests represent the distribution of sensitivities that are likely to be encountered in the environment. This assumption may not be warranted though since laboratory test species are not selected based on their sensitivity to chemicals but rather are selected based on their ability to thrive under laboratory conditions.

EFED concurs with the comment that not all of the literature linking sub-chronic rotenone exposure to Parkinson's disease-like symptoms in laboratory rats was reviewed; however, the exposure methods (route and duration) used to produce these results are not considered likely to occur through the remaining registered use of rotenone as a piscicide. The Agency is not aware of any literature where environmentally relevant concentrations of rotenone with similar exposure pathways that may occur through the registered use of rotenone results in Parkinson's disease-like lesions. If the Ermans are familiar with any such studies, they are encouraged to submit these studies for review and possible *inclusion in the ecological risk assessment. Additionally, given that most aquatic animals in the target area are killed by rotenone, whether the compound is capable of causing neurological effects may be academic. Potential worker exposure risks from rotenone are more thoroughly discussed in the Health Effects Division's chapter on human health risks.*

The environmental fate assessment of rotenone makes clear that the chemical's persistence depends on environmental conditions at the time of application. In warm alkaline waters, rotenone is likely to degrade rapidly; however, in cold, neutral or acidic water, the chemical is more likely to persist. The risk assessment discusses the fact that residues have been detected for some time following application and that the chemical may move beyond the targeted treatment area. However, the chapter also states that exposure of aquatic organisms outside the intended treatment area is intended to be limited through rigorous application standard operating procedures used by trained fishery professionals. Additionally, in lotic (flowing water) environments, rotenone is typically deactivated with potassium permanganate to prevent its movement out of the treatment areas. The efficacy of potassium permanganate in deactivating rotenone is likely highly variable; the degradation kinetics of rotenone due to permanganate treatment are poorly documented. Hhowever, it is also likely that resource management agencies make every effort to confine the compound to the targeted treatment area.

EFED concurs with the comment that the toxicity of all formulated end-products was not evaluated in the chapter. Only a limited amount of toxicity data was available on formulated end-products. However, the data that were available suggest that technical grade rotenone is more toxic than formulated end-products and that the chemicals co-formulated with rotenone do not substantially affect the toxicity of rotenone. The process used in the rotenone chapter for evaluating the toxicity of formulated end-products is consistent with that described in the document entitled "Overview of the Ecological Risk Assessment Process in the Office of Pesticide Programs".[1] With respect to inerts though, the Agency is in the process of reviewing the potential ecological effects of chemicals that are commonly co-formulated with pesticides.

The ecological risk assessment of rotenone states that aquatic macroinvertebrates exhibit roughly similar sensitivity to rotenone as do fish, that it is likely that most if not all fish and macroinvertebrates will be killed in the targeted treatment area, and that the entire aquatic food chain can be affected. The expectation is that treated streams/lakes will repopulate through immigration and/or restocking. Whether species density/richness is identical to pretreatment conditions is uncertain; however, EFED concurs with the Ermans that it is possible that more tolerant species can potentially displace those less tolerant to rotenone if rotenone is repeatedly applied. However, the logistics of conducting a rotenone treatment are typically relatively complicated and involve considerable resources. While a national Standard Operating Procedure for rotenone use in fishery management has not been developed, most resource managers are highly trained and would likely attempt to limit the need for re-treatment and the extent to which rotenone would extend beyond the desired treatment area as this could limit the extent to which any aquatic population could recover. EFED has recommended that a Standard Operating Procedure be developed by the registrants to accompany the product.

Whether chemical means of manipulation should be used over other mechanical control measures or to what extent other species should be sacrificed to aid in the recovery of endangered species are important questions which the Ermans raise; however, the answers involve policy issues and are beyond the scope of screening-level risk assessment.

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[1] *http://www.epa.gov/oppfead1/endanger/consultation/ecorisk-overview.pdf*

The risk assessment has been revised to include data recently submitted by the California Department of Game and Fish. While these data indicate that rotenone was detected downstream of targeted treatment areas in spite of efforts to detoxify the compound with potassium permanganate, the concentrations were at or near the limit of detection for rotenone. Additionally, although the data are highly variable, they indicate that at the treatment concentrations used, i.e., 2.5 – 25 μg active ingredient/L, benthic macroinvertebrates were not eliminated after several consecutive years of rotenone application. Sampling conducted one week after treatments shows that while macroinvertebrate abundance and diversity were reduced [in some cases], the measurement indices did not appear to have been significantly diminished based on the limited statistics that were provided in the reports. Overall abundance of benthic macroinvertebrates appeared to have recovered in the treated stream reaches; however, there is uncertainty regarding the extent to which species diversity may be affected. Whether the post-treatment benthic invertebrate sampling results are due to immigration/relocation from upstream reaches or whether the macroinvertebrates in the treatment area were less sensitive to the rotenone concentrations used during the consecutive treatments is uncertain.

Comment: Dr. Ann McCampbell (EPA-HQ-2005-0494-0024.1) submitted her public testimony from a New Mexico Water Quality Control Commission hearing on a petition to use piscicides in Rio Costilla drainage; Dr. McCampbell objected to the use of chemicals to restore native fish populations in New Mexico.

EFED Response: None of the comments provided by Dr. McCampbell are specific to the environmental fate and ecological risk assessment of rotenone. Although Dr. McCampbell states that EPA "will register a product [pesticide] if it causes unreasonable harm if it chooses to without telling anyone that's what it did", she does not provide any information regarding either the environmental fate or toxicity of rotenone to support her contention that rotenone use will result in unreasonable harm. The decision to (re)register a pesticide under the Federal Insecticide, Fungicide and Rodenticide Act takes into account risks and benefits; however, ecological risks is one factor considered in that decision. If Dr. McCampbell has data to support her statements, she should submit the data to EPA for consideration. Additionally, all actions taken on the (re)registration of a pesticide are included in public record and can be accessed under the Freedom of Information Act. The status of the reregistration of rotenone can be accessed on the internet at http://www.epa.gov/oppsrrd1/reregistration/rotenone/.

Comment: Dr. Ann McCampbell (EPA-HQ-2005-0494-0024.2) submitted a fact sheet on antimycin A (PC Code 006314) in which she inserts comments regarding how piscicides in general can have adverse effects on aquatic communities. In a brief section that is related to rotenone specifically, Dr. McCampbell asserts that rotenone has a mechanism of action similar to antimycin A and that rotenone exposure has been related to Parkinson Disease-like symptoms in laboratory animals. Dr. McCampbell mentions that several organic solvents are used in formulated end-products of rotenone and that these co-formulants are considered toxic in their own right. She also raises concerns regarding the potential effects of rotenone on plants.

EFED Response: Although Dr. McCampbell raises several issues related to whether a state elects to use piscicides to control fish populations these comments are not related to the environmental fate and ecological risk assessment of rotenone but are rather state policy issues. In sections of Dr. McCampbell's comments that do address rotenone, Dr. McCampbell is correct regarding the presence of organic solvents in liquid formulations of rotenone. The ecological risk assessment of rotenone discusses this fact; however, for some constituents of the liquid end-products, e.g. toluene, application rates are expected to result in concentrations that are below established human health criteria. With respect to risk associated with formulated end-products, the EFED chapter states that "[T]oxicity' data are not available on all of the formulated products of rotenone for all of the surrogate species typically evaluated. However, based on toxicity data collected on both technical grade rotenone (>95% active ingredient) and formulated end-product, the technical grade active ingredient is generally more toxic than formulated end-product [corrected for active ingredient] by at least a factor of two. These data suggest that for the formulated products tested and the toxicity endpoints measured, the inerts do not contribute substantially to the toxicity of the active ingredient. These data also suggest that the similarly structured rotenolones of plant resins (cube root resins) contained to varying amounts in formulated end-products also do not contribute substantially to the toxicity of rotenone. The extent to which the toxicity of untested formulations would be similar cannot be determined from the currently available data.

To the extent that the surrogate species tested represent the range of sensitivities of aquatic organisms, the ecological risk assessment states that within the treatment area, most aquatic vertebrates (including aquatic phase amphibians) and invertebrates are likely to be killed at treatment concentrations used to restore native fish populations. The chapter also goes on to say that exposure of aquatic organisms outside the intended treatment area is limited through rigorous application standard operating procedures used by trained fishery professionals and that in most lotic (flowing water) environments, *rotenone is typically deactivated with potassium permanganate to prevent its movement out of the treatment areas.*

With respect to the potential effects of rotenone on plants, the EFED chapter states that no data are available to evaluate the toxicity of rotenone to terrestrial plants. Although rotenone is isolated from plants and has been routinely used as an insecticide on plants, no information is available to evaluate potential effects on plants.

Although several studies have linked sub-chronic rotenone exposure to Parkinson's disease-like symptoms in laboratory rats, the exposure methods (route and duration) used to obtain these results are not typically encountered through the current registered uses of rotenone. The relevancy of these studies to potential exposure to rotenone from its registered use in fishery management is uncertain.

Comment: Also included in the comments submitted by Dr. McCampbell is an article ("Purity and the Rio Grande Cutthroat") written by M. H. Dutch Solomon (EPA-HQ-2005-0494-0024.3). In this article written for Country Sports, Mr. Solomon focuses on the use of antimycin to restore native fish populations and the rationale to support this effort, *i.e.*, restore genetic purity.

EFED Response. None of the comments refer specifically to the environmental fate and ecological risk assessment of rotenone. The extent to which chemical means are or should be used to restore native fish populations is a policy issue and is not discussed in the ecological risk assessment

Comment: Michael S. Smith, Policy Coordinator for the Missouri Department of Conservation (MDC; EPA-HQ-2005-0494-0025) wrote that the MDA supports the continued availability of rotenone to control unwanted fish in small impoundments and fish culture ponds. Mr. Smith indicated that all MDC personnel who apply rotenone are trained and licensed as certified pesticide applicators by the Missouri Department of Agriculture.

EFED Response: Comments on behalf of the MDC are consistent with EFED's understanding of how rotenone is used for fishery management purposes.

Comment: Mr. Harold J. Singer (EPA-HQ-2005-0494-0026), Executive Officer of the California Regional Water Quality Control Board Lahontan Region, wrote to request that the EPA consider the water quality risks associated with rotenone applications and requested that EPA impose conditions/requirements on applicators to limit unintended impacts of rotenone "formulation residues" on non-target organisms including humans. Mr. Singer goes on to list rotenone-specific and potassium permanganate prohibitions and conditions for their use in the Lahontan Basin and cites circumstances where past applications have "violated" permit-prescribed water quality objectives. Plans to use rotenone have had to be abandoned because of a lack of certainty that some potentially affected organisms may actually be relatively rare and that rotenone residues may persist under certain environmental conditions. Additionally, there is concern that rotenone may have long-term effects on community structure, that rotenone formulations may have differential toxicity, that both chemical and non-chemical alternative exist, and that there are potential health risks to humans.

EFED Response: Mr. Singer raises valid concerns regarding the use of rotenone where his experience has been that permit-prescribed conditions have not been met. However, none of his concerns are contrary to what is discussed in the ecological risk assessment of rotenone. The chapter indicates that rotenone can persist under certain conditions and that the chemical can be equally toxic to both fish and aquatic invertebrates particularly at maximum treatment rates. It is EFED's understanding(although a *national Standard Operating Procedures have not been developed) though that resource management agencies go to considerable lengths to limit the extent of non-target mortality by adhering to relatively rigorous application procedures. Based on Mr. Singer's comments, all of the violations that occurred though were unintentional and were likely a result of the inability of anyone to completely control the field environment. EFED encourages the development of standard operating procedures that can effectively limit non-target animal exposure*

As stated previously, the ecological risk assessment has been revised to include data recently submitted by the California Department of Game and Fish (discussed in greater detail below).These data substantiate Mr. Singer's comments that rotenone has been detected downstream of targeted treatment areas in spite of efforts to detoxify the compound with potassium permanganate; however, concentrations were at or near the limit of detection for rotenone. The water and sediment monitoring data suggest though that potassium permanganate treatment was relatively effective at limiting the movement of rotenone outside of the treatment area.

Whether chemical or non-chemical means of control are used to meet management objectives is a policy decision. Also, the extent to which pre- and post-monitoring of aquatic communities is required is not within the scope of a national screening-level ecological risk assessment. However, EFED has recommended the development of a relatively comprehensive Standard Operating Procedure and that pre- and post-treatment monitoring of non-target aquatic animals could be a component of the procedure.

Comment: Mr. Bob Broscheid (EPA-HQ-2005-0494-0027), Habitat Branch Chief with the State of Arizona Game and Fish Department (AGF), wrote to emphasize the importance of rotenone as a management tool to implement fish assemblage changes to all the state to meet management goals. Without rotenone as a management tool, he believed that recovery of Federally-listed fish would not be possible in Arizona or nationally and that effective management of recreational fisheries [in general] would be jeopardized. In his comments Mr. Brosheid provided examples of how rotenone is used by the State of Arizona, and he described his department's efforts to engage stakeholders and limit human exposure by rigorous application procedures. The potential effects from nuisance invasive species on aquatic communities is a concern for the State of Arizona and rotenone offers a cost-effective means of control on large bodies of water and streams with high flows.

EFED Response: Comments on behalf of the AGF are consistent with EFED's understanding of how rotenone is used for fishery management purposes.

Comment: Mr. Douglas Stang, Chief of the New York State Department of Environmental Conservation Bureau of Fisheries, wrote to emphasize New York State's reliance on rotenone to restore fish communities degraded by introduced fish species and that the chemical has proven to be a "safe and effective fish management tool ... essential to what has become one of the premier fish restoration programs in the country."

Mr. Stang expressed concern that the ecological risk assessment suggests that all aquatic organisms will be eliminated during rotenone treatments; however, in New York where treatments are typically at 1 μg/L, invertebrate and [aquatic phase] amphibian mortality it generally low. Mr. Stang believed that the risks to aquatic invertebrates are overstated in the risk assessment and do not reflect the scientific literature.

EFED Response: The methodology used to assess the ecological risks associated with the supported uses of rotenone are consistent with the process identified in the "Overview of the Ecological Risk Assessment Process in the Office of Pesticide Programs" referred to earlier. Screening-level risk assessments are *intended to be conservative, and it is EFED policy to model maximum estimated environmental concentrations against the most sensitive toxicity endpoints. The maximum supported treatment rate for rotenone is 250 µg/L; however, the water solubility limit of rotenone is 200 µg/L. At 200 µg/L, the most sensitive median lethal concentrations for aquatic vertebrates and invertebrates are exceeded. Additionally, the upper 95% confidence interval around a distribution of median LC_{50} values for fish is also exceeded. Based on the available data and the maximum label rate, it is expected that most aquatic animals would die at the maximum label rate. However, as Mr. Stang has noted, applicators are not required to use the maximum rate but rather adjust rates to meet management objectives under specific environmental conditions. According to Mr. Stang, New York typically relies on a treatment concentration (1 µg/L) considerably below the maximum label rate and has observed less mortality of aquatic invertebrates and aquatic phase amphibians than may occur at the maximum rate. As evidenced by benthic macroinvertebrate monitoring data collected by the California Department of Game and Fish, lower treatment concentrations do not appear to substantially reduce benthic macroinvertebrate abundance [one week after treatment] relative to pretreatment conditions.*

EFED will revise the chapter to mention that rates as low as 0.1 µg/L have been reported used and that the reduced rates will reduce the extent of mortality inflicted on the aquatic community. The effect of reduced application rates on aquatic community structure is uncertain though as the acute risk level of concern (risk quotient ≥0.5) would still be exceeded for both aquatic vertebrates and invertebrates.

Comment: Dr. Brian Finlayson and Dr. Rosalie Schnick with the American Fisheries Society (AFS) Task Force on Fishery Chemicals and representing the user stakeholders expressed concerns regarding the relevancy of the studies linking Parkinson's disease with rotenone exposures that may actually occur through the labeled use of rotenone as a piscicide. According to AFS, the chemical properties (low vapor pressure), the methods used to apply rotenone (closed mixer-loading system coupled with application "immediately above or below the water surface", the relatively dilute solutions of application solutions, and the fact that applicators wear respirators limit the potential for inhalation. AFS expressed concern that both dermal and inhalation exposure potential are artificially inflated since with the exception of "low-pressure backpack sprayers applying dilute rotenone solutions as a stream, rotenone is applied using closed systems with little, if any, worker exposure." AFS also believed that rotenone application rates were miscalculated and that the maximum application rate for use as a piscicide should be 200 µg/L, the solubility limit of rotenone in water at 20°C.

AFS asserted that concentrations and durations of rotenone exposure during most stream treatments allows for the survival of macroinvertebrates. AFS also stated that while the efficacy of the rotenone treatment on Lake Davis, CA, [discussed in the ecological risk assessment] will remain uncertain, they questioned the relevancy of "EPA's subjective assessment of this rotenone treatment" to the reregistration of rotenone.

AFS had commented previously on behalf of the technical registrants during the 30-day error correction phase (Phase I). The comments essentially echoed those of the technical registrant Prentiss.

EFED Response: As discussed previously in this response document and in the ecological risk assessment as well, EFED is uncertain regarding the ecological relevancy of the studies linking rotenone exposure to Parkinson disease-like symptoms in mammals. However, the Health Effects Division will provide a separate response on the relevancy of these studies to human health.

Although AFS has repeatedly asserted that all rotenone applications are conducted using a closed system and that the maximum application rate (250 μg/L) should be reduced to reflect the solubility limit of rotenone (200 μg/L), it is OPP policy to evaluate maximum label application rates in screening-level risk assessments. If the technical registrants are willing to reduce the maximum label rate to 200 μg/L, then the ecological risk assessment will be revised to reflect that change. Additionally, one technical registrant has specifically requested to retain the 250 μg/L application since it is useful in eradicating carp in lakes with high organic matter.[2] *However, the ecological risk assessment has been revised to evaluate potential risks at application rates of 250, 200 and 50 μg/L.*

With respect to the discussion of the rotenone treatment of Lake Davis, EFED is required to evaluate all of the available data on incidents reported under FIFRA 6(a)2 adverse effect reporting requirements. The rotenone treatment of Lake Davis is contained in the Ecological Incident Information System (EIIS) database as several thousand fish were reported killed outside of the targeted treatment area. Additionally, both inerts (e.g., naphthalene and toluene) and a manufacturing contaminant (i.e., trichloroethylene) were contentious issues that the agency was notified about at the time of the incident and have continued to raise public concerns relative to the use of rotenone.

Comments received from AFS during Phase 1 of reregistration were not responded to directly since Phase 1 is reserved exclusively for technical registrant comments. However, since these comments were nearly identical to those of Prentiss, EFED's response would also be identical. The reader is therefore referred to EFED's response to Phase 1 comments (DP Barcode D307390).

In the following sections, EFED has reviewed the four studies included with the AFS submission. In general, the studies provide useful information on water/sediment concentrations of rotenone and its major degradate (rotenolone) following application of rotenone to alpine streams. Additionally, there is useful information on benthic macroinvertebrate monitoring in treated streams. The data indicate that under the conditions studied, rotenone was relatively well confined to the targeted treatment area through the use of potassium permanganate deactivation and in circumstances where residues were detected outside of the treatment area, rotenone concentrations were near the minimum limit of detection. At the treatment concentrations used, rotenone did not kill all of the benthic macroinvertebrates; although, invertebrate abundance and diversity were affected; indices appeared to recover over time. The ecological risk assessment of rotenone has been revised to include some of these data qualitatively in the ecological risk characterization discussion.

California Department of Game and Fish Water and Sediment Monitoring Study: Silver Creek.

Water and sediment monitoring data (Pesticide Laboratory Report No P-1839; dated 11/12/95)[3] *were collected by the State of California Department of Game and Fish from rotenone treatments of Silver Creek (Mono County, CA) before, during and after application of NusynNoxfish® (2.5% active ingredient [a.i.]) in 1996. Silver Creek (water temperature: 7 – 12°C; pH: 7.4 – 7.7; alkalinity: 10 – 25 mg/L as $CaCO_3$) and its minor tributaries were treated at a target concentration of 1 mg formulated product/L (25 μg a.i./L) using a combination of drip stations and hand spraying for 4 hours. A potassium permanganate ($KMnO_4$) drip station was established downstream of the treatment area and was run continuously for 28 hours. Rotenone concentrations 2-miles upstream of the detoxification station peaked*

[2] Email dated 05/02/06 from Robert Stewart on behalf of TIFA

[3] Trumbo, J. 1995. Pesticide Laboratory Report to the California Regional Water Quality Control Board: Lahontan Region. State of California Department of Fish and Game, 1701 Nimbus Road, Suite F, Rancho Cordova, CA. Lab No. P-1839.

at roughly 50 μg/L after 6 hours; rotenolone concentrations peaked at the same time with concentrations of roughly 56 μg/L/. In a 1-mile transect of the treatment area during the last hour of treatment total residues (rotenone plus rotenolone) concentrations ranged from roughly 20 μg/L to 150 μg/L; however, in general, half of the water samples were between 60 and 80 μg/L. Measurable residues (minimum detectable level (LOD)≥2 μg/L) of rotenone were detected immediately upstream of the detoxification station for 18 hours after application. Measurable residues (LOD≥2 μg/L) of rotenolone were detected for roughly 24 hours just upstream of the detoxification station. Rotenone residues at the limit of detection were reported in the water column a 15-minute [walking] distance downstream of the detoxification site 2 hours post-treatment; however, neither rotenone nor rotenolone were detected in the water or sediment downstream of the detoxification station from 1 to 7 days post-treatment. At no time were two of the inerts (methyl naphthalene and xylene) or the manufacturing contaminant trichloroethylene detected just above or downstream of the detoxification station; however, naphthalene (LOD≥0.5 μg/L) was detected (1.7 to 5.2 μg/L) immediately upstream of the detoxification station roughly 5 hours post-treatment. No naphthalene residues were detected downstream of the detoxification station during the sampling period. It is not clear why the report is dated (11/12/95) prior to when samples were received (9/96).

California Department of Game and Fish Water and Sediment Monitoring Study: Silver King Creek

Additional monitoring data were provided (Pesticide Laboratory Report No. P-1638; dated 2/1/94)[4] from an earlier (1993) rotenone treatment of Silver King Creek (water temperature: 1 – 10°C; pH: 7.19 – 7.78; alkalinity: 16 – 26 mg/L as $CaCO_3$) and its tributaries above Llewellyn Falls (Alpine County, CA). Rotenone (NusynNoxfish®; 2.5% active ingredient) was applied at a target concentration of 0.5 mg/L (12.5 μg a.i./L) using a combination of drip stations and hand spraying. A second application was conducted the following day using drip stations alone on a downstream portion of the drainage and on a tributary (Fourmile Canyon Creek) to Silver King Creek. A detoxification station using $KMnO_4$ was located just upstream of Llewellyn Falls and was run for 10 hours during the first application with target treatment concentrations ranging from 1 to 3 mg/L.During the second treatment, KMnO4 concentrations were maintained at roughly 1 mg/L. Rotenone concentrations during the first treatment ranged from 3.1 to 20 μg/L (mean=10.6 μg/L); during the second treatment, rotenone concentrations averaged 11.8 μg/L. Rotenone residues were detected a 30-minute travel time downstream of the detoxification station on three sampling occasions; however, residues (range: 2.2 – 4.0 μg/L) were close to the detection limit of 2 μg/L. None of the sediment samples collected either 20-ft up-stream or 30-min travel time downstream of the detoxification station had measurable residues of either rotenone or rotenolone. No rotenone or rotenolone were detected in any of the sediment samples collected above or below the detoxification station. Water samples were analyzed for volatile and semi-volatile organic compounds and revealed xylene (0.56 – 1.3 μg/L), ethyl benzene (0.9 μg/L), 1, 2, 4-trimethylbenzene (0.9 μg/L) and trichloroethylene (0.53 - 0.76 μg/L); these detections were limited in number and were close to the limit of detection (0.5 μg/L for each of the compounds). Naphthalene and methyl naphthalene concentrations in the treatment area ranged from 0.9 to 52μg/L and 30 to 50 μg/L, respectively; naphthalene and methyl naphthalene concentrations as high as 36.2 and 40 μg/L, respectively, were measured below the detoxification station during the first treatment. According to the report, rotenone concentrations along with any of the measured constituents of the formulated product in the treatment area were below detectable levels by 16-hours post-treatment.

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[4] Trumbo, J. 1994. Pesticide Laboratory Report to the California Regional Water Quality Control Board: Lahontan Region. State of California Department of Fish and Game, 1701 Nimbus Road, Suite F, Rancho Cordova, CA. Lab No. P-1638.

Although rotenone residues were detected downstream of the detoxification station, the report concluded that "these detections were near the analytical detection limit of 2.0 µg/L and were below levels know to cause toxicity . . . and therefore do not represent biologically significant concentrations" as evidenced by the lack of [fish] mortality (wild or caged) below the treatment area during or after application of rotenone. Additionally, the detection of naphthalene and methyl naphthalene was attributed by the report author to the low water temperature (1 – 10°C) that was believed to have reduced the volatility of these compounds. The report indicated that lower water temperatures reduced the efficacy of rotenone while increasing its persistence in water in spite of efforts to decontaminate the compound with potassium permanganate.

California Department of Game and Fish Benthic Macroinvertebrate Monitoring Study: Silver King Creek

Also included with the AFS submission is a report by the State of California Department of Fish and Game entitled "Impacts of Rotenone on Benthic Macroinvertebrate Populations in Silver King Creek, 1990 through 1996"[5] discussing three consecutive years (1991 – 1993) of rotenone applications to remove hybridized rainbow trout (Oncorhynchus mykiss) and Lahonton cutthroat trout (O. clarkii henshawi) so that native Paiute cutthroat trout (O. clarkia seleniris) could be reintroduced. Monitoring of macroinvertebrate populations was conducted "the year before treatment (1990), before and after treatment during each treatment year (1991 – 1993) and for three consecutive years following the treatments (1994 – 1996)." Macroinvertebrate biomass, total number, total taxa, percent dominant taxa and total number of stonefly (Plecoptera spp.) taxa were determined to quantify abundance and diversity, overall stream health, and potential impacts to Plecopterans that were considered a vulnerable indicator species for gauging the environmental health of aquatic ecosystems. Additionally, the Biotic Condition Index (BCI), the Ephemeroptera, Plecoptera and Trichoptera index (EPT) and the dominance and taxa diversity index (DAT) were calculated.

Reference sites were located either on upstream portions of Silver King Creek or on tributaries (Fourmile Canyon Creek) to the creek. Invertebrate sampling using a modified Surber (1 ft^2) sampler was conducted 1 to 4 weeks prior to treatment and approximately 1 week after treatment; in non-treatment years, sampling was conducted once per year.

Over the three-year treatment period, 24-hr grand mean rotenone concentrations were 10.98 (1991), 10.29 (1992) and 11.2 µg a.i./L. Total biomass was identical between reference and treatment sites during pretreatment sampling in 1990. During the first two treatment years, total biomass declined in both the reference and treatment sites; however, in 1993 (considered anomalous by the authors), the reference site increased in biomass by 18% while the treatment site declined by 15%. By the third year of post-treatment sampling mean biomass for reference and treated sites had increased to 2 g/m^2 and 1.4 g/m^2, respectively. Based on Figure 2 in the report showing total biomass though, it appears that across all sampling years other than 1995, the total biomass of invertebrates at reference sites either equaled or exceeded the total biomass at rotenone-treated sites.

Pretreatment mean total number of macroinvertebrates in both the reference (9,971) and treated (9,572) sites declined over the next three treatment years; post-treatment years exhibited marked fluctuations in the mean total number of macroinvertebrates in both reference and treatment sites. However, based on the report graph of total number of macroinvertebrates (Figure 3), except for sampling results in two

[5] Trumbo, J., S. Siepmann and B. Finlayson. 2000. Impacts of Rotenone on Benthic Macroinvertebrate Populations in Silver King Creek, 1990 through 1996. State of California Department of Fish and Game, Pesticide Investigation Unit, 1701 Nimbus Rd, Suite F, Rancho Cordova, CA 95670. Administrative Report 00-5.

year (pre 1991 and 1995), the total number of macroinvertebrates at reference sites exceeded that at rotenone-treated sites.

BCI values for both reference and treated sites were classified as "excellent" during the pretreatment year; although both sites experienced declines in BCI over the treatment period (1991 – 1993), declines in BCI values were consistently greater at treated sites. Mean BCI values at the reference sites eventually surpassed the pretreatment level by the final year of sampling; however, treated sites had mean BCI values 11.2% less than the pretreatment mean.

Mean number of taxa at reference (32) and treated (37) both experienced declines during the treatment years; however, according to the report, the declines observed at treated sites were consistently greater (by a factor of 2) than at reference sites in 1991 and 1992. In 1993, both the reference and treated sites experienced roughly similar declines. By the end of the study, the mean number of taxa for reference and treated sites were 41.9% and 12.7%, respectively, higher than pre-treatment values.

Mean percent dominant taxa values increased by 46% relative to pretreatment values at treated sites and decreased by 13% at reference sites in 1991, increased at both sites by relatively similar percentages in 1992 and only the treated site increased again in 1993. Although pretreatment values for both reference and treated sites were around 20%, each had increased to between 65 and 72%, respectively, for the reference and treated sites by the end of the study.

The mean DAT index values were considered "excellent" for reference and treated sites during pretreatment sampling. During the treatment years, index values declined for both sites; however, during 1993, rotenone-treated sites increased by 45% while the reference site declined by 25%. By the end of the study, the reference and treated sites exceeded pretreatment DAT values by 52 and 13.6%, respectively.

The EPT index during the first year of treatment declined by 76% of the pretreatment value while the reference site declined by 25%, while in the second year, the pattern was reversed with treated sites showing a 29% decline and reference sites showing a 58% decline. In 1993, the reference and treated sites had mean declines of 27% and 49%, respectively. According to the report, during the post-treatment sampling period, mean reference site values were consistently lower than treatment site values by 27.5 to 181%. In comparison to pretreatment (1990) values, the final (1996) EPT index mean had increased from 36 to 46 at reference sites and had increased from 52 to 59 at treated sites.

The total number of stonefly taxa at control (7) and treated (8) sites were roughly similar in 1990; in 1991, the reference and treated sites had declines of 33 and 44%, respectively. By the second year of treatment, the reference site was unchanged but the treated site had decreased by 42% and by 1993, the reference and treated sites had declines of 29 and 24%, respectively. At the end of the sampling period, reference and treated sites had 10 and 6 taxa, respectively, representing roughly a 43% increase for the reference site and a 27% decrease for treated sites. Additionally, the total number of stoneflies decreased following each treatment. In 1991, the number of stoneflies at reference sites had increased by 83% while at treatment sites, they had decreased by roughly 49%; in 1992, the total number decreased by 16% at reference sites and by 52% at treated sites; in 1993, there was a 40% decrease in the number at reference sites while there was a 58% decrease at treated sites. By the end of the study, the mean number of stoneflies at reference sites had increased by 215% of the pretreatment value while the treated site mean had increased by 31%.

The report concluded that a comparison of measured concentrations of rotenone in the water with toxicity values for aquatic invertebrates would have "predicted little, if any, impact to aquatic invertebrates in

Silver King Creek and that the results of the study were consistent with this prediction. Further, the report concluded that while there may be short-term impacts to the total number of taxa, the percent dominant taxa, the EPT index and the total number of stonefly taxa, impacts to abundance metrics (biomass and total number of invertebrates) were not indicated.

In presenting these data, no statistical analyses were applied. Whether the mean values reported in the text or interpreted from graphs are statistically different has not been determined. Based on a subjective review however, the data suggest that while there may not have been long-term effects on species abundance [as concluded by the report authors], species diversity may have been impacted. It is possible that repeated applications of rotenone selected for more tolerant species. Although the report authors present toxicity data on aquatic invertebrates that suggest that invertebrates are less sensitive (96-hr LC_{50} range: 12 – 107 μg a.i./L) to rotenone than rainbow trout (96-hr LC_{50}=2.3 μg a.i./L), the EFED ecological risk assessment presents data indicating that freshwater invertebrates can exhibit roughly similar sensitivity to rotenone as freshwater fish. It would be presumptuous to think that laboratory test species are representative of the full range of sensitivities that may exist in the wild and it is likely that more sensitive species do exist. The report does indicate that cladocerans, copepods and other planktonic microcrustaceans can be sensitive to rotenone; however, the authors suggest that these invertebrates inhabit lakes. The marked declines in stonefly numbers at treated stream sites suggest that they were also relatively sensitive to rotenone and that while the number of stoneflies recovered to pretreatment levels, the total number observed at rotenone treated sites was not as great as that at reference sites.

As with many field studies, the current study exhibits a considerable amount of variability that makes it difficult to interpret what may be treatment-related effects. Whether changes observed in aquatic macro and microinvertebrate populations within treated systems are due to the direct effects of rotenone, a secondary effect due to reductions in the number of predators (fish and zooplankton), or whether the effects are do to some unrelated environmental factor is uncertain. However, in spite of the variability, there appear to be some treatment related effects on macroinvertebrate populations. Given the species abundance and diversity upstream of the treated sites though, it is reasonable to anticipate that the treated sites could recover to pretreatment conditions through immigration/drift over time. In spite of this opportunity to immigrate/relocate into treated areas, the decreased Biotic Condition Index appeared to be a treatment-related effect that did not recover during the study period. Potential impact trends were also noted for the total number of taxa, the percent dominant taxa, the EPT index and the total number of stonefly taxa; however, the significance of these effects could not be established in the current study.

The report discusses long-term effects on species diversity observed from the rotenone-treatment of Strawberry Reservoir (Utah) and points out the treatment concentrations used on Silver King Creek were lower and that less of the water-shed was treated. As stated previously, the extent to which treated waters can be repopulated by immigration and/or restocking will likely determine the extent to which sensitive species will recover.

California Department of Game and Fish Benthic Macroinvertebrate Monitoring Study: Silver Creek

In a second report by the State of California Department of Game and Fish, the impact of rotenone on benthic macroinvertebrate populations in Silver Creek[6] (Mono County, CA) is examined. Silver Creek

[6] Trumbo, J., S. Siepmann and B. Finlayson. 2000. Impacts of Rotenone on Benthic Macroinvertebrate Populations in Silver King Creek, 1994 through 1998. State of California Department of Fish and Game, Pesticide Investigation Unit, 1701 Nimbus Rd, Suite F, Rancho Cordova, CA 95670. Administrative Report 00-7.

(water temperature: 4.7 – 10.5°C) was treated with rotenone over three consecutive years (1994 to 1996) to remove competing brook trout (Salvelinus fontinalis) so that Lahontan cutthroat trout could be introduced. Nusyn-Noxfish® (2.5% a.i.) was applied at a rate of 1 mg/L (25 µg a.i./L).

According to the report, benthic macroinvertebrates were monitored before and after treatment (1994 – 1996) and for two consecutive years following treatments (1997 and 1998). The same metrics as those discussed above for Silver King Creek were measured on Silver Creek. Invertebrate sampling using a modified Surber (1 ft^2) sampler was conducted 1 to 4 weeks prior to treatment and approximately 1 week after treatment; in non-treatment years, sampling was conducted once per year. The major difference between the two studies was that reference sites were identified for the study on Silver King Creek; no reference sites were identified for the Silver Creek study.

Over the three-year treatment period, 24-hr mean rotenone concentrations were 3.5 (1994), 17.9 (1995) and 10.4 µg a.i./L (1996). Compared to pretreatment values, total biomass increased by 6.2 and 20% following the first two rotenone treatments; however, total biomass declined by 23.5% after the third rotenone treatment. Only a single post-treatment (1997) sample was collected and mean total biomass was 37.5% higher than the pretreatment value.

The total number of macroinvertebrates increased by roughly 39 and 42% following treatments in 1994 and 1995, respectively; however, in 1996 total biomass decreased by 54%. During post-treatment sampling, mean values were 11.5% and 32.3% lower than the pretreatment value.

Prior to treatment, the mean BCI (81.5) was categorized as "good" by the authors. Following each of the treatments, the BCI declined by 8.3%, 4.2% and 7.6% in 1994, 1995, and 1996, respectively. During the post-treatment sampling, the BCI in 1997 and 1998 exceeded the pretreatment mean by 1.2% and 6.1%, respectively.

During the pretreatment sampling, the percent dominant taxa was 70.5% and during the first two years of treatment in 1994 and 1995 the value increased by 15.3% and 1.4%, respectively; however, after the third year of treatment, the metric decreased by 0.1%. During the post-treatment years, the value increased by roughly 3% in 1997 over the pretreatment conditions; however, in 1998 the percent dominant taxa had declined by 54% of the pretreatment value.

The DAT index was 15.7 prior to the use of rotenone and decreased by 7.9%, 16.1% and 1.1% in 1994, 1995, and 1996, respectively, following application of rotenone. During the post-treatment sampling, the mean value in 1997 was 14.1; the metric was not determined for 1998.

The mean EPT index was 43.1 prior to use of rotenone and decreased by 51.4%, 45.1% and 32.3% of the pretreatment mean following application of rotenone in 1994, 1995 and 1996, respectively. During the post-treatment sampling the mean values exceeded the pretreatment value by 40% in 1997 and by 56% in 1998.

The mean total number of stonefly taxa in pretreatment sampling was 6.5 and decreased by 23% in 1994, 14% in 1995 and 38% in 1996. In 1997, the mean number of stoneflies was 12% lower than the pretreatment value; however, in 1998, the mean number was 3% higher than the pretreatment value.

The mean total number of stoneflies in pretreatment samples was 543 and decreased by roughly 75%, 47% and 77% in 1994, 1995 and 1996, respectively, following treatments with rotenone. In 1997, the mean number increased to roughly 246% of the pretreatment level; however, in 1998, the metric decreased by 67% of the pretreatment value.

The report concluded that monitoring did not provide "any evidence that rotenone use had affected macroinvertebrate abundance; however there was an indication rotenone treatments had affected macroinvertebrate diversity and the total number of stonefly taxa as well as the total number of stoneflies. Efforts to assess recovery were confounded by a lack of reference sites and limited sample size; however, according to the authors, "all of the metrics did return to pre-treatment (1994) levels at least once before the end of the project period in 1998.

Unlike the Silver King Creek report, figures in the Silver Creek report provided vertical bars depicting the upper and lower 95% confidence intervals around the mean. These measures of dispersion illustrate the broad range of variability associated with the measured indices. Without reference sites it is difficult to determine whether measured changes can be attributed to rotenone treatments or "normal" fluctuations in aquatic animal numbers due to environmental conditions.

Although treatment concentrations were selected to target brook trout and have little to no impact on macroinvertebrates, the data suggest that stoneflies are relatively sensitive to rotenone. This is consistent with what was observed on Silver King Creek. Additionally, Ephemeroptera, Plecoptera and Trichoptera also appeared sensitive to rotenone; however, based on at least one of the post-treatment sampling years, representative indices appeared to recover to or exceed pretreatment levels. As with the Silver King Creek data, while overall abundance of macroinvertebrates did not appear to decline substantially following rotenone treatment, the diversity of the macroinvertebrate populations did appear to be affected. The marked changes in several of the indices in the final year (1998) of the study and the failure to measure all of the indices during that year make it difficult to determine the extent of macroinvertebrate recovery in the rotenone-treated streams.

In general, the monitoring data on macroinvertebrate populations Silver King Creek and Silver Creek provide useful information on the potential effects of rotenone on non-target aquatic animals. This information will be included in the revised risk assessment as an appendix and will be discussed in the risk characterization.

The AFS also included in their comments a reprint of an article entitled "Rotenone Use in North America (1988 – 1997)[7]*. Information contained in this article has already been included in the ecological risk assessment chapter; therefore, this article will not be included in this response to comments.*

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[7] McClay, W. 2000. Rotenone Use in North America (1988 - 1997). Pages 15-27 in Finlayson, B. J., R. A. Schnick, R. L. Cailteux, L. DeMong, W. D. Horton, W. McClay, C. W. Thompson and G. J. Tichacek (authors), Rotenone Use in Fisheries Management: Administrative and Technical Guidelines Manual. American Fisheries Society, Bethesda, Maryland.

Comment Letter 7

From: Julia Olson <jaoearth@aol.com>
To: <HSinger@waterboards.ca.gov>, Bruce Warden <BWarden@waterboards.ca.gov>
CC: Patty Clary <patty@alt2tox.org>, George Nickas <gnickas@wildernesswatch....
Date: 3/22/2010 8:16 PM
Subject: Silver King Creek Draft NPDES Permit Hearing
Attachments: letter.Singer.extend hearing. 10.03.pdf; Part.002

Please see the attached letter. Thank you.

JULIA A. OLSON
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March 22, 2010

Harold Singer, Executive Officer
Lahontan Regional Water Quality Control Board
2501 Lake Tahoe Blvd
So Lake Tahoe, CA 96158

Attn: BWarden@waterboards.ca.gov

RE: Proposed Waste Discharge Requirements and NPDES Permit (Order) for California Department of Fish and Game Paiute Cutthroat Trout Restoration Project, Alpine County.

Dear Mr. Warden and Mr. Singer,

I write on behalf of my clients Californians for Alternatives to Toxics and Wilderness Watch to request that the hearing in front of the Lahontan Regional Water Quality Control Board be set for the June Lahontan Board meeting in South Lake Tahoe, rather than the April meeting.

Moving the hearing is necessary in order to allow the public an opportunity to fully review the Joint EIR/EIS that was just recently released and to allow time for USFWS and the Forest Service to issue their Record of Decision under NEPA. Until that happens, we will not know the ultimate decision of the federal agencies. The Final
EIR/EIS appears to have changed in some significant respects from the Draft EIR/EIS, 1
but without an opportunity to fully review that document, my clients (and I) cannot be expected to submit substantive comments on the proposed NPDES permit. Notably, for many of my clients, the Final EIR/EIS is only available online and is quite time consuming to review. Some do not have access to fast internet service and cannot in one week's time be expected to review such a large document.

This is a significant project on which we have submitted comments every step of the way, including many comments to the Lahontan Board. The public is entitled to meaningful participation at this last stage prior to the Board deciding whether to permit poisoning of aquatic habitat in wilderness. In fact, DFG's letter of June 15, 2009 indicated that the Final EIS/EIR would be released prior to any NPDES permit or hearing on such. Yet, to date, no decision has been made by the federal agencies on the Final EIS/EIR.

Thank you for considering our request. I look forward to hearing from you.

Sincerely,
/s/
Julia A. Olson
Counsel for CATs and Wilderness Watch