TRICLOPYR BUTOXYETHYL ESTER

Analysis of Risks
to
Endangered and Threatened Salmon and Steelhead

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Summary

Triclopyr butoxyethyl ester (BEE) was registered on June 11, 1980 as a herbicide on non-crop areas and forestry to control broadleaf weeds and woody plants. Uses expanded in 1985 when triclopyr BEE was registered for use on rangeland and permanent grass pastures. Presently, triclopyr BEE is registered for use as a selective foliar and root-absorbed, translocated herbicide to control woody and broadleaf plants along rights-of-ways, in forests, on industrial lands, on grasslands, and parklands.

An endangered species risk assessment is developed for federally listed Pacific salmon and steelhead. This assessment applies the findings of the Office of Pesticide Programs's Environmental Risk Assessment developed for non-target fish and wildlife as part of the reregistration process to determine the potential risks to the 26 listed threatened and endangered Evolutionarily Significant Units (ESUs) of Pacific salmon and steelhead. The use of triclopyr BEE may affect but is not likely to adversely affect 10 ESUs when used according to labeled application directions and may effect 16 ESUs in this assessment.

Introduction

This analysis was prepared by the U.S. Environmental Protection Agency (EPA) Office of Pesticide Programs (OPP) to evaluate the risks of triclopyr BEE to threatened and endangered Pacific salmon and steelhead.

The environmental assessment presented in the 1998 “Triclopyr Reregistration Eligibility Decision” (RED) was the starting basis for this assessment (Attachment A). The RED evaluates three registered active ingredients: Triclopyr, Triclopyr triethylamine salt (TEA), and Triclopyr butoxyethyl ester (BEE). Currently, there are no registered uses for triclopyr.

Problem Formulation

The purpose of this analysis is to determine whether the registration of triclopyr BEE as a herbicide may affect threatened and endangered (T&E or listed) Pacific anadromous salmon and steelhead and their designated critical habitat.

Scope

Although this analysis is specific to listed Pacific anadromous salmon and steelhead and the watersheads in which they occur, it is acknowledged that triclopyr BEE is registered for uses that may occur outside their geographic scope and that additional analyses may be required to address other threatened and endangered species in the Pacific states as well as across the United States. We understand that any subsequent analyses, requests for consultation and resulting Biological Opinions may necessitate that Biological Opinions relative to this request be revisited, and could be modified.

Contents

1. Background

Under section 7 of the Endangered Species Act, the Office of Pesticide Programs (OPP) of the U. S. Environmental Protection Agency (EPA) is required to consult on actions that may affect Federally listed endangered or threatened species or that may adversely modify designated critical habitat. Situations where a pesticide may affect a fish, such as any of the salmonid species listed by the National Marine Fisheries Service (NMFS), include either direct or indirect effects on the fish. Direct effects result from exposure to a pesticide at levels that may cause harm.

Acute Toxicity - Relevant acute data are derived from standardized toxicity tests with lethality as the primary endpoint. These tests are conducted with what is generally accepted as the most sensitive life stage of fish, i.e., very young fish from 0.5-5 grams in weight, and with species that are usually among the most sensitive. These tests for pesticide registration include analysis of observable sublethal effects as well. The intent of acute tests is to statistically derive a median effect level; typically the effect is lethality in fish (LC50) or immobility in aquatic invertebrates (EC50). Typically, a standard fish acute test will include concentrations that cause no mortality, and often no observable sublethal effects, as well as concentrations that would cause 100% mortality. By looking at the effects at various test concentrations, a dose-response curve can be derived, and one can statistically predict the effects likely to occur at various pesticide concentrations; a well done test can even be extrapolated, with caution, to concentrations below those tested (or above the test concentrations if the highest concentration did not produce 100% mortality).

OPP typically uses qualitative descriptors to describe different levels of acute toxicity, the most likely kind of effect of modern pesticides (Table 1). These are widely used for comparative purposes, but must be associated with exposure before any conclusions can be drawn with respect to risk. Pesticides that are considered highly toxic or very highly toxic are required to have a label statement indicating that level of toxicity. The FIFRA regulations [40CFR158.490(a)] do not require calculating a specific LC50 or EC50 for pesticides that are practically non-toxic; the LC50 or EC50 would simply be expressed as >100 ppm. When no lethal or sublethal effects are observed at 100 ppm, OPP considers the pesticide will have "no effect" on the species.

Table 1. Qualitative descriptors for categories of fish and aquatic invertebrate toxicity (Zucker, 1985)

LC50 or EC50	Category description
< 0.1 ppm	Very highly toxic
0.1- 1 ppm	Highly toxic

>1 < 10 ppm	Moderately toxic
> 10 < 100 ppm	Slightly toxic
> 100 ppm	Practically non-toxic

Comparative toxicology has demonstrated that various species of scaled fish generally have equivalent sensitivity, within an order of magnitude, to other species of scaled fish tested under the same conditions. Exceptions are known to occur for only an occasional pesticide, as based on the several dozen fish species that have been frequently tested. Sappington et al. (2001), Beyers et al. (1994) and Dwyer et al. (1999), among others, have shown that endangered and threatened fish tested to date are similarly sensitive, on an acute basis, to a variety of pesticides and other chemicals as are their non-endangered counterparts.

Chronic Toxicity - OPP evaluates the potential chronic effects of a pesticide on the basis of several types of tests. These tests are often required for registration, but not always. If a pesticide has essentially no acute toxicity at relevant concentrations, or if it degrades very rapidly in water, or if the nature of the use is such that the pesticide will not reach water, then chronic fish tests may not be required [40CFR158.490]. Chronic fish tests primarily evaluate the potential for reproductive effects and effects on the offspring. Other observed sublethal effects are also required to be reported. An abbreviated chronic test, the fish early-life stage test, is usually the first chronic test conducted and will indicate the likelihood of reproductive or chronic effects at relevant concentrations. If such effects are found, then a full fish life-cycle test will be conducted. If the nature of the chemical is such that reproductive effects are expected, the abbreviated test may be skipped in favor of the full life-cycle test. These chronic tests are designed to determine a “no observable effect level” (NOEL) and a “lowest observable effect level” (LOEL). A chronic risk requires not only chronic toxicity, but also chronic exposure, which can result from a chemical being persistent and resident in an environment (e.g., a pond) for a chronic period of time or from repeated applications that transport into any environment such that exposure would be considered “chronic”.

As with comparative toxicology efforts relative to sensitivity for acute effects, EPA, in conjunction with the U. S. Geological Survey, has a current effort to assess the comparative toxicology for chronic effects also. Preliminary information indicates, as with the acute data, that endangered and threatened fish are again of similar sensitivity to similar non-endangered species.

Metabolites and Degradates - Information must be reported to OPP regarding any pesticide metabolites or Degradates that may pose a toxicological risk or that may persist in the environment [40CFR159.179]. Toxicity and/or persistence test data on such compounds may be required if, during the risk assessment, the nature of the metabolite or degradate and the amount that may occur in the environment raises a concern. If actual data or structure-activity analyses are not available, the requirement for testing is based upon best professional judgement.

Inert Ingredients - OPP does take into account the potential effects of what used to be termed "inert" ingredients, but which are beginning to be referred to as "other ingredients". OPP has classified these ingredients into several categories. A few of these, such as nonylphenol, can no longer be used without including them on the label with a specific statement indicating the potential toxicity. Based upon our internal databases, there are no products in which nonylphenol is now an ingredient. Many others, including such ingredients as clay, soybean oil, many polymers, and chlorophyll, have been evaluated through structure-activity analysis or data and determined to be of minimal or no toxicity. There exist also two additional lists, one for inerts with potential toxicity which are considered a testing priority, and one for inerts unlikely to be toxic, but which cannot yet be said to have negligible toxicity. Any new inert ingredients are required to undergo testing unless it can be demonstrated that testing is unnecessary.

The inerts efforts in OPP are oriented only towards toxicity at the present time, rather than risk. It should be noted, however, that very many of the inerts are in exceedingly small amounts in pesticide products. While some surfactants, solvents, and other ingredients may be present in fairly large amounts in various products, many are present only to a minor extent. These include such things as coloring agents, fragrances, and even the printers ink on water soluble bags of pesticides. Some of these could have moderate toxicity, yet still be of no consequence because of the negligible amounts present in a product. If a product contains inert ingredients in sufficient quantity to be of concern, relative to the toxicity of the active ingredient, OPP attempts to evaluate the potential effects of these inerts through data or structure-activity analysis, where necessary.

For a number of major pesticide products, testing has been conducted on the formulated end-use products that are used by the applicator. The results of fish toxicity tests with formulated products can be compared with the results of tests on the same species with the active ingredient only. A comparison of the results should indicate comparable sensitivity, relative to the percentage of active ingredient in the technical versus formulated product, if there is no extra activity due to the combination of inert ingredients. Note that the "comparable" sensitivity must take into account the natural variation in toxicity tests, which is up to 2-fold for the same species in the same laboratory under the same conditions, and which can be somewhat higher between different laboratories, especially when different stocks of test fish are used.

The comparison of formulated product and technical ingredient test results may not provide specific information on the individual inert ingredients, but rather is like a "black box" which sums up the effects of all ingredients. This approach is more appropriate than testing each individual inert and active ingredient because it incorporates any additivity, antagonism, and synergism effects that may occur and which might not be correctly evaluated from tests on the individual ingredients. We do not have aquatic data on most formulated products, although we often have testing on one or perhaps two formulations of an active ingredient.

Risk - An analysis of toxicity, whether acute or chronic, lethal or sublethal, must be combined with an analysis of how much will be in the water, to determine risks to fish. Risk is a combination of exposure and toxicity. Even a very highly toxic chemical will not pose a risk if there is no exposure, or very minimal exposure relative to the toxicity. OPP uses a variety of chemical fate and transport data to develop "estimated environmental concentrations" (EECs) from a suite of established models. The development of aquatic EECs is a tiered process.

The first tier screening model for EECs is with the GENEEC program, developed within OPP, which uses a generic site (in Yazoo, MS) to stand for any site in the U. S. The site choice was intended to yield a maximum exposure, or "worst-case," scenario applicable nationwide, particularly with respect to runoff. The model is based on a 10 hectare watershed that surrounds a one hectare pond, two meters deep. It is assumed that all of the 10 hectare area is treated with the pesticide and that any runoff would drain into the pond. The model also incorporates spray drift, the amount of which is dependent primarily upon the droplet size of the spray. OPP assumes that if this model indicates no concerns when compared with the appropriate toxicity data, then further analysis is not necessary as there would be no effect on the species.

It should be noted that prior to the development of the GENEEC model in 1995, a much more crude approach was used to determining EECs. Older reviews and Reregistration Eligibility Decisions (REDs) may use this approach, but it was excessively conservative and does not provide a sound basis for modern risk assessments. For the purposes of endangered species consultations, we will attempt to revise this old approach with the GENEEC model, where the old screening level raised risk concerns.

When there is a concern with the comparison of toxicity with the EECs identified in GENEEC model, a more sophisticated PRZM-EXAMS model is run to refine the EECs if a suitable scenario has been developed and validated. The PRZM-EXAMS model was developed with widespread collaboration and review by chemical fate and transport experts, soil scientists, and agronomists throughout academia, government, and industry, where it is in common use. As with the GENEEC model, the basic model remains as a 10 hectare field surrounding and draining into a 1 hectare pond. Crop scenarios have been developed by OPP for specific sites, and the model uses site-specific data on soils, climate (especially precipitation), and the crop or site. Typically, site-scenarios are developed to provide for a worst-case analysis for a particular crop in a particular geographic region. The development of site scenarios is very time consuming; scenarios have not yet been developed for a number of crops and locations. OPP attempts to match the crop(s) under consideration with the most appropriate scenario. For some of the older OPP analyses, a very limited number of scenarios were available. As more scenarios become available and are geographically appropriate to selected T&E species, older models used in previous analyses may be updated.

Finally, the applicability of the overall EEC scenario, i.e., the 10 hectare watershed draining into a one hectare farm pond, may not be appropriate for a number of T&E species living in rivers or lakes. This scenario is intended to provide a "worst-case" assessment of EECs, but very many T&E fish do not live in ponds, and very many T&E fish do not have all of the habitat surrounding their environment treated with a pesticide. OPP does believe that the EECs from the farm pond model do represent first order streams, such as those in headwaters areas (Effland, et al. 1999). In many agricultural areas, those first order streams may be upstream from pesticide use, but in other areas, or for some non-agricultural uses such as forestry, the first order streams may receive pesticide runoff and drift. However, larger streams and lakes will very likely have lower, often considerably lower, concentrations of pesticides due to more dilution by the receiving waters. In addition, where persistence is a factor, streams will tend to carry pesticides away from where they enter into the streams, and the models do not allow for this. The variables in size of streams, rivers, and lakes, along with flow rates in the llentic waters and seasonal variation, are large enough to preclude the development of applicable models to represent the diversity of T&E species' habitats. We can simply qualitatively note that the farm pond model is expected to overestimate EECs in larger bodies of water.

Indirect Effects - We also attempt to protect listed species from indirect effects of pesticides. We note that there is often not a clear distinction between indirect effects on a listed species and adverse modification of critical habitat (discussed below). By considering indirect effects first, we can provide appropriate protection to listed species even where critical habitat has not been designated. In the case of fish, the indirect concerns are routinely assessed for food and cover.

The primary indirect effect of concern would be for the food source for listed fish. These are best represented by potential effects on aquatic invertebrates, although aquatic plants or plankton may be relevant food sources for some fish species. However, it is not necessary to protect individual organisms that serve as food for listed fish. Thus, our goal is to ensure that pesticides will not impair populations of these aquatic arthropods. In some cases, listed fish may feed on other fish. Because our criteria for protecting the listed fish species is based upon the most sensitive species of fish tested, then by protecting the listed fish species, we are also protecting the species used as prey.

In general, but with some exceptions, pesticides applied in terrestrial environments will not affect the plant material in the water that provides aquatic cover for listed fish. Application rates for herbicides are intended to be efficacious, but are not intended to be excessive. Because only a portion of the effective application rate of an herbicide applied to land will reach water through runoff or drift, the amount is very likely to be below effect levels for aquatic plants. Some of the applied herbicides will degrade through photolysis, hydrolysis, or other processes. In addition, terrestrial herbicide applications are efficacious in part, due to the fact that the product will tend to stay in contact with the foliage or the roots and/or germinating plant parts, when soil applied. With aquatic exposures resulting from terrestrial applications, the pesticide is not placed in immediate contact with the aquatic plant, but rather reaches the plant indirectly after entering the water and being diluted. Aquatic exposure is likely to be transient in flowing waters. However, because of the exceptions where terrestrially applied herbicides could have effects on aquatic plants, OPP does evaluate the sensitivity of aquatic macrophytes to these herbicides to determine if populations of aquatic macrophytes that would serve as cover for T&E fish would be affected.

For most pesticides applied to terrestrial environment, the effects in water, even lentic water, will be relatively transient. Therefore, it is only with very persistent pesticides that any effects would be expected to last into the year following their application. As a result, and excepting those very persistent pesticides, we would not expect that pesticidal modification of the food and cover aspects of critical habitat would be adverse beyond the year of application. Therefore, if a listed salmon or steelhead is not present during the year of application, there would be no concern. If the listed fish is present during the year of application, the effects on food and cover are considered as indirect effects on the fish, rather than as adverse modification of critical habitat.

Designated Critical Habitat - OPP is also required to consult if a pesticide may adversely modify designated critical habitat. In addition to the indirect effects on the fish, we consider that the use of pesticides on land could have such an effect on the critical habitat of aquatic species in a few circumstances. For example, use of herbicides in riparian areas could affect riparian vegetation, especially woody riparian vegetation, which possibly could be an indirect effect on a listed fish. However, there are very few pesticides that are registered for use on riparian vegetation, and the specific uses that may be of concern have to be analyzed on a pesticide by pesticide basis. In considering the general effects that could occur and that could be a problem for listed salmonids, the primary concern would be for the destruction of vegetation near the stream, particularly vegetation that provides cover or temperature control, or that contributes woody debris to the aquatic environment. Destruction of low growing herbaceous material would be a concern if that destruction resulted in excessive sediment loads getting into the stream, but such increased sediment loads are insignificant from cultivated fields relative to those resulting from the initial cultivation itself. Increased sediment loads from destruction of vegetation could be a concern in uncultivated areas. Any increased pesticide load as a result of destruction of terrestrial herbaceous vegetation would be considered a direct effect and would be addressed through the modeling of estimated environmental concentrations. Such modeling can and does take into account the presence and nature of riparian vegetation on pesticide transport to a body of water.

Risk Assessment Processes - All of our risk assessment procedures, toxicity test methods, and EEC models have been peer-reviewed by OPP's Science Advisory Panel. The data from toxicity tests and environmental fate and transport studies undergo a stringent review and validation process in accordance with "Standard Evaluation Procedures" published for each type of test. In addition, all test data on toxicity or environmental fate and transport are conducted in accordance with Good Laboratory Practice (GLP) regulations (40 CFR Part 160) at least since the GLPs were promulgated in 1989.

The risk assessment process is described in "Hazard Evaluation Division - Standard Evaluation Procedure - Ecological Risk Assessment" by Urban and Cook (1986) (termed Ecological Risk Assessment SEP below), which has been separately provided to National Marine Fisheries Service staff. Although certain aspects and procedures have been updated throughout the years, the basic process and criteria still apply. In a very brief summary: the toxicity information for various taxonomic groups of species is quantitatively compared with the potential exposure information from the different uses and application rates and methods. A risk quotient of toxicity divided by exposure is developed and compared with criteria of concern.

The criteria of concern presented by Urban and Cook (1986) are presented in Table 2.

Table 2. Risk quotient criteria for direct and indirect effects on T&E fish

Test data	Risk quotient	Presumption
Acute LC_{50}	>0.5	Potentially high acute risk
Acute LC_{50}	>0.1	Risk that may be mitigated through restricted use classification
Acute LC_{50}	>0.05	Endangered species may be affected acutely, including sublethal effects
Chronic NOEC	>1	Chronic risk; endangered species may be affected chronically, including reproduction and effects on progeny
Acute invertebrate LC_{50}[a]	>0.5	May be indirect effects on T&E fish through food supply reduction
Aquatic plant acute EC_{50}[a]	>1[b]	May be indirect effects on aquatic vegetative cover for T&E fish

a. Indirect effects criteria for T&E species are not in Urban and Cook (1986); they were developed subsequently.
b. This criterion has been changed from our earlier requests. The basis is to bring the endangered species criterion for indirect effects on aquatic plant populations in line with EFED's concern levels for these populations.

The Ecological Risk Assessment SEP (pages 2-6) discusses the quantitative estimates of how the acute toxicity data, in combination with the slope of the dose-response curve, can be used to predict the percentage mortality that would occur at the various risk quotients. The discussion indicates that using a "safety factor" of 10, as applies for restricted use classification, one individual in 30,000,000 exposed to the concentration would be likely to die. Using a "safety factor" of 20, as applies to aquatic T&E species, would exponentially increase the margin of safety. It has been calculated by one pesticide registrant (without sufficient information for OPP to validate that number), that the probability of mortality occurring when the LC50 is 1/20th of the EEC is 2.39×10^{-9}, or less than one individual in ten billion. It should be noted that the discussion (originally part of the 1975 regulations for FIFRA) is based upon slopes of primarily organochlorine pesticides, stated to be 4.5 probits per log cycle at that time. As organochlorine pesticides were phased out, OPP undertook an analysis of more current pesticides based on data reported by Johnson and Finley (1980), and determined that the "typical" slope for aquatic toxicity tests for the "more current" pesticides was 9.95. Because the slopes are based upon logarithmically transformed data, the probability of mortality for a pesticide with a 9.95 slope is again exponentially less than for the originally analyzed slope of 4.5.

The above discussion focuses on mortality from acute toxicity. OPP is concerned about other direct effects as well. For chronic and reproductive effects, our criteria ensures that the EEC is below the no-observed-effect-level, where the "effects" include any observable sublethal effects. Because our EEC values are based upon "worst-case" chemical fate and transport data and a small farm pond scenario, it is rare that a non-target organism would be exposed to such concentrations over a period of time, especially for fish that live in lakes or in streams (best professional judgement). Thus, there is no additional safety factor used for the no-observed-effect-concentration, in contrast to the acute data where a safety factor is warranted because the endpoints are a median probability rather than no effect.

Sublethal Effects - With respect to sublethal effects, Tucker and Leitzke (1979) did an extensive review of existing ecotoxicological data on pesticides. Among their findings was that sublethal effects as reported in the literature did not occur at concentrations below one-fourth to one-sixth of the lethal concentrations, when taking into account the same percentages or numbers affected, test system, duration, species, and other factors. This was termed the "6x hypothesis". Their review included cholinesterase inhibition, but was largely oriented towards externally observable parameters such as growth, food consumption, behavioral signs of intoxication, avoidance and repellency, and similar parameters. Even reproductive parameters fit into the hypothesis when the duration of the test was considered. This hypothesis supported the use of lethality tests for use in assessing acute ecotoxicological risk, and the lethality tests are well enough established and understood to provide strong statistical confidence, which can not always be achieved with sublethal effects. By providing an appropriate safety factor, the concentrations found in lethality tests can therefore generally be used to protect from sublethal effects. As discussed earlier, the entire focus of the early-life-stage and life-cycle chronic tests is on sublethal effects.

In recent years, Moore and Waring (1996) challenged Atlantic salmon with diazinon and observed effects on olfaction as relates to reproductive physiology and behavior. Their work indicated that diazinon could have sublethal effects of concern for salmon reproduction. However, the nature of their test system, direct exposure of olfactory rosettes, could not be quantitatively related to exposures in the natural environment. Subsequently, Scholz et al. (2000) conducted a non-reproductive behavioral study using whole Chinook salmon in a model stream system that mimicked a natural exposure that is far more relevant to ecological risk assessment than the system used by Moore and Waring (1996). The Scholz et al. (2000) data indicate potential effects of diazinon on Chinook salmon behavior at very low levels, with statistically significant effects at nominal diazinon exposures of 1 ppb, with apparent, but non-significant effects at 0.1 ppb.

It would appear that the Scholz et al (2000) work contradicts the 6x hypothesis for acute effects. The research design, especially the nature and duration of exposure, of the test system used by Scholz et al (2000), along with a lack of dose-response, precludes comparisons with lethal levels in accordance with the 6x hypothesis as used by Tucker and Leitzke (1979). Nevertheless, it is known that olfaction is an exquisitely sensitive sense. And this sense may be particularly well developed in salmon, as would be consistent with its use by salmon in homing (Hasler and Scholz, 1983). So the contradiction of the 6x hypothesis is not surprising. As a result of these findings, the 6x hypothesis needs to be re-evaluated with respect to olfaction. At the same time, because of the sensitivity of olfaction and because the 6x hypothesis has generally stood the test of time otherwise, it would be premature to abandon the hypothesis for other acute sublethal effects until there are additional data.

2. Description of Triclopyr Butoxyethyl Ester:

A. Chemical Overview:

Common Name:	Triclopyr butoxyethyl ester (BEE)
Chemical Name:	Triclopyr core: Triclopyr [((3, 5, 6-trichloro-2-pyridinyl)oxy) acetic acid]
Chemical Family:	Pyridinyloxyacetic acids
CAS Registry Number:	64700-56-7
OPP Chemical Code:	116004
Empirical Formula:	$C_{19}H_{16}\ CL_2NO_4$
Basic Manufacturers:	Dow
Trade and Other Names:	Garlon, Crossbow

B. Registered Uses

Triclopyr butoxyethyl ester (BEE) is a non-restricted use herbicide. The registered forms of triclopyr BEE include formulation intermediate, emulsifiable concentrate, and ready-to-use liquid. Triclopyr BEE is a selective foliar and root absorbed, translocated herbicide used for controlling unwanted woody plants, annual and perennial broadleaf weeds in forest, and on non-crop areas including industrial sites, rights-of way (i.e., electrical power lines, communication lines, pipelines, roadsides, railroads), fence rows, non-irrigation ditch banks, and around farm buildings. Attachment A provides representative labels for the registered uses of triclopyr BEE.

C. Maximum Application Rates and Methods

Triclopyr BEE controls woody plants, annual and perennial broadleaf weeds, along with unwanted trees and brush. Application methods for triclopyr BEE include broadcast (ground or aerial equipment), high volume foliar, low volume foliar, and individual plant treatment. Application equipment for triclopyr BEE uses may involve an airplane, helicopter, ground spreader, or backpack sprayer. The EPA registration number (EPA Reg. No. #) refers to a representative registered label that cites the maximum application rate (national labels see Attachment B). For the Pacific-Northwest states and California, one state local needs label (SLN) is registered for use on abandoned orchards in Washington (SLN label see Attachment C).

<u>Forest Management</u>: The registered label (EPA Reg. No. 62719-40) describes the following forest management applications.

<u>Forest Site Preparation</u>: 6.0 pounds active ingredient per acre (lbs a.i./A) can be

applied as a broadcast treatment to control susceptible woody plants and broadleaf weeds, not for conifer release.

Conifer Release: 2.0 lbs a.i./A can be applied via broadcast in Pacific-Northwest states and California to control or suppress deciduous hardwoods such as vine maple, bigleaf maple, alder, scotch broom, or evergreen hardwoods.

Non-crop areas, Non-irrigation Ditchbanks, Roadsides, and Industrial Sites: 8.0 lbs a.i./A can be applied as a broadcast treatment using ground, aerial, and backpack or knapsack sprayer (EPA Reg. No. 62719-260).

Rangeland, Permanent Grass Pastures, Rights-of Way, Fence Rows, Conservation Reserve Program acres (CRP), and Grazing or Harvesting areas: 1.0 lb a.i./A per growing season may be applied by ground, aerial, and backpack or knapsack sprayer (EPA Reg. No. 62719-260).

Sod & Turf: 2.0 lbs a.i./A may treat commercial sod by broadcast application using ground equipment. The maximum application rate was derived, as stated on the registered label (EPA Reg. No. 62719-67), from four applications of 0.5 lbs a.i./A. Residential, commercial, and recreational turf may be treated with 1.0 lbs a.i./A by broadcast application consisting of two applications of 0.5 lbs a.i./A (EPA Reg. No. 62719-67).

Unwanted Trees in Abandoned Orchards: 4.0 lbs a.i./A may be applied by basal application, cut-stump treatment, or hack and squirt method to control unwanted trees or prevent regrowth from cut stumps in orchards that are abandoned or no longer managed for production. This treatment controls codling moth or other insects by removal of host trees that are a source of infestation to managed orchards (SLN WA010038).

D. Triclopyr BEE Usage

The Biological and Economic Analysis Division (BEAD), within the Office of Pesticide Programs (OPP), executed a Quantitative Usage Assessment (QUA) that includes triclopyr, triclopyr triethylamine salt (TEA), and triclopyr butoxyethyl ester (BEE) (Attachment D). The QUA is based on pesticide survey usage information for the years 1990 through 1999. The QUA states that for triclopyr, including the salt and ester, approximately 600,000 pounds of active ingredient was applied to approximately 1.0 million acres. The markets with the largest usages in terms of total pounds of active ingredient were woodland (21%), rice (16%), rights-of-way (15%), other hay (15%), railroads (8%), households (7%), and pasture (6%).

Table 3 presents the usage sites for which triclopyr BEE may be applied in either California, Idaho, Oregon, or Washington. According to the QUA, idle cropland, lots, farmstead, nut trees, other crops, railroads, and woodlands are site of high usage in Pacific-Northwest states and California. Note that the QUA is a survey of national usage for triclopyr acid, triclopyr TEA, and triclopyr BEE. The focus of this analysis is triclopyr BEE. Comparing the registered uses of triclopyr BEE with the QUA data suggests that lots and farmstead, railroads, and woodlands are sites of high usage.

Table 3. Usage of Triclopyr in California, Idaho, Oregon, and Washington from 1990 to 1999. Tabulated Values are Weighted Averages[1] (OPP/BEAD Quantitative Usage Analysis for Triclopyr 2001)

Site	Acres Grown	Acres Treated	% Crop Treated	lbs a.i. applied	States of Most Usage (% of total lbs a.i. used on the crop)
Idle cropland	7,461,000	3,000	0.0[2]	1,000	TN, IN, **WA**, **CA** 83%
Lots, farmsteads, etc	23,987,000	68,000	0.3	33,000	TX, **OR**, **CA**, AR, IN, MS 67%
Nut trees	712,000	2,000	0.3	1,000	**CA**, **OR** 94%
Other crops	2,515,000	0[2]	0.0[2]	0[2]	NJ, **OR**, 100%
Railroads	1,060,000	90,000	8.5	45,000	TX, **OR**, MS, IN, PA, IL 55%
Woodland	62,167,000	150,000	0.2	120,000	FL, **OR**, TX, OK, **WA** 83%

1 Weighted Average - The most recent years and more reliable data are weighted more heavily.
2 Numbers are displayed as rounded to the nearest 1,000 for acres treated or lbs. a.i. (therefore 0 = < 500); and to one decimal percentage point for % of crop treated.

We are not aware of any comprehensive sources of annual pesticide-usage information for Idaho, Oregon, or Washington.

Information for selected use site in California, Idaho, Oregon, and Washington is available from the United States Department of Agriculture's National Agricultural Statistics Service (USDA/NASS) in their "Agricultural Chemical Usage" reports (http://jan.mannlib.cornell.edu/reports/nassr/other/pcu-bb/), but the data are not reported at the county level. The reports document usage of triclopyr and do not document usage of triclopyr BEE. Table 4 presents the usage information from the USDA/NASS livestock and general farm summary. The data suggests that triclopyr usage is small compared to the total of all herbicides applied to the registered triclopyr BEE use sites.

Table 4. Usage of Triclopyr[1] as Reported by USDA/NASS in the Livestock and General Farm Summary (USDA/NASS 1997)

Site	Total Triclopyr[1] Applied in West[2] (lbs)	Total Triclopyr[1] Applied in United States (lbs)	Total of All Herbicides Applied in West[2] (lbs)	Total of All Herbicides Applied in United States (lbs)
General farm use	-	59,400	2.2 million	6.0 million
Buildings & structures	300	2,600	200,000	760,000

Roads, ditches & misc.	-	56,800	2.0 million	5.2 million

1 The data lists triclopyr and does not distinguish usage between triclopyr triethylamine salt and triclopyr butoxyethyl ester.
2 West = Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. The data does not identify usage amounts at the state level.
“-“ = Insufficient reports to publish data

The USDA/NASS nursery and floriculture summary report provides usage information about triclopyr, but does not distinguish usage among triclopyr TEA and triclopyr BEE. Table 5 suggests that triclopyr usage is relatively small, although the data reports usage information for only six states (California, Florida, Michigan, Oregon, Pennsylvania, and Texas).

Table 5. Usage of Triclopyr[1] as Reported by USDA/NASS in the Nursery and Floriculture Summary (USDA/NASS 2003)

Site	Total Applied in Program States[2] (lbs)	% Operations in California Using Triclopyr[1]	% Operations in Oregon Using Triclopyr[1]
All nursery & floriculture	2,900	1.0	10.0
All nursery	2,900	-	12.0
Coniferous evergreens	300	2.0	11.0
Christmas trees	2,500	0	11.0

1 The data lists triclopyr and does not distinguish usage between triclopyr triethylamine salt and triclopyr butoxyethyl ester.
2 Program States includes California, Florida, Michigan, Oregon, Pennsylvania, and Texas.
“-“ Data was not published.

Additional data compiled in the 1990s is available from the United States Geological Survey (USGS). The USGS estimated county pesticide use for the conterminous United States by combining: (1) state-level information on pesticide use rates available from the National Center for Food and Agricultural Policy from pesticide use information collected by state and federal agencies over a 3-year period (1995-1998), and (2) county-level information on harvested crop acreage from the 1997 Census of Agriculture. The average annual pesticide use, the total amount of pesticide applied (in pounds), and the corresponding area treated (in acres) were compiled for over 200 pesticide compounds that are applied to crops in the conterminous United States. Pesticide use was ranked by compound and crop on the basis of the amount of each compound applied to 86 selected crops. The data indicates that the agricultural crops of highest triclopyr usage during the mid-1990s were pasture (~ 398,000 lbs a.i.), rice (171,919 lbs a.i.), and other hay (10,810 lbs a.i.). These crops account for 100% of the total national usage of triclopyr in the mid-1990s. Please note that the usage information lists triclopyr and does not distinguish usage amounts among triclopyr TEA and triclopyr BEE. USGS also mapped the triclopyr usage for the selected crops (Attachment E; URL http://ca.water.usgs.gov/cgi-bin/pnsp/pesticide_use_maps_1997.pl?map=W1988). The map is included as a visual depiction of triclopyr usage on agricultural crops. However, the map should not be used for any quantitative analysis because it is based on 1997 crop acreage data along with 1995-1998 statewide estimates of use without consideration of local practices and usage.

The latest information for California pesticide usage is for the year 2002 (URL: http://www.cdpr.ca.gov/docs/pur/purmain.htm). The information reported to the County Agricultural Commissioners includes pounds used, acres treated for agricultural and certain other uses, and the specific location treated. The pounds and acres are reported to the state, but the specific location information is retained at the county level and is not readily available. Data on usage trends for triclopyr BEE in California are not available. Table 6 presents the usage of triclopyr BEE in California as surveyed by the California Department of Pesticide Regulation (CA DPR). Forest (timberland), landscape maintenance, and rights-of-way are sites with the largest amounts of triclopyr BEE applied. As reported in table 6, the total amount of triclopyr BEE usage in California for 2002 was 84,601.1 pounds applied on 20,214 acres (approximately 4.2 lbs/acre).

Table 6. Usage of Triclopyr Butoxyethyl Ester by Crop in California (CA DPR)

	2002			**2001**		
Crop or Site	**lbs a.i. applied**	**Number of Applications**	**Acres Treated**	**lbs a.i. applied**	**Number of Applications**	**Acres Treated**
Animal premise				12		17
Avocado	0.5	1	1			
Commodity fumigation	24					
Forest, timberland	17,312	343	11,916	26,626	313	12,942
Fumigation, other	0.6					
Grape	8	5	20	4	2	2
Industrial site	53		79	12		28
Kiwi	4	1	2			
Landscape maintenance	33,744			25,706		
Lumber, treated	166	2	45			
N-outdoor flower	160	5	116	61	17	347

N-outdoor plants in container	1,449	92	1,089	1,522	66	1,163
N-outdoor transplants	8	2	800	78	2	8
Orange	1	1	4			
Pastureland	90	24	166	216	40	670
Rangeland	497	57	1,663	394	37	1,286
Regulatory pest control	6,362			7,150		
Research commodity	2					
Rights of way	20,230			18,892		
Structural pest control	233			573		
Turf / sod	2,831	144	2,036	1,766	102	1,358
Uncultivated agriculture	161	2	247	410	4	582
Uncultivated non-agriculture	1,047	13	1,864	9,936	11	2,340
Unknown				0.3	1	0.1
Vertebrate control	38			137		
Water area	180	1	166	274	147	
TOTAL	84,601.1	693	20,214	93,769.3	742	20743.1

The Washington State Department of Agriculture (WSDA) provided information on the acreage of major triclopyr BEE sites and additional details on amounts used for certain sites (WSDA, 2004). The Washington usage data is in table 7; the full report prepared by WSDA is included as attachment F. According to the WSDA data, the sites of major usage include pasture and rangeland, conservation reserve program (CRP), and forestry.

Table 7. Major Usage of Triclopyr Butoxyethyl Ester (BEE) in Washington (WSDA, 2004)

Site	WASS[1] 2002 Est. Acres	Est. % Acres Treated	Est. lbs a.i./Acre	# of Apps.	Est. Acres Treated	Est. lbs a.i. Applied

Conservation Reserve Program (CRP)[2]	2,900,000	1	0.5	1		
Forestry	4,300,000					
Non-cropland & Rights-of-way[2]						
Orchard, abandoned[2]						
Pasture & rangeland[2]	7,000,000	1	0.5	1	70,000	35,000
Turfgrass, lawn & sod[2]						

1 Washington Agricultural Statistics Service
2 The data for these commodities has not been peer reviewed.

Based on the abovementioned resources, including the USDA/NASS, QUA, CA DPR, and WSDA data, the only uses of concern in California, Idaho, Oregon, and Washington are pasture and rangeland, forests, landscape maintenance, rights-of-way.

3. General Aquatic Risk Assessment for Endangered Species and Threatened Salmon and Steelhead

A. Aquatic Toxicity of Triclopyr Butoxyethyl Ester (BEE)

There is a modest amount of aquatic toxicity data on Triclopyr BEE. Data from the RED is presented in tables 8 through 12. Data submitted to support registration was generated in accordance with Good Laboratory Practice regulations and have been through OPP's rigorous validation requirements for data used in assessments; these data are used in preference to other data.

i. Freshwater Fish, Acute

Two freshwater fish toxicity studies using the technical grade of the active ingredient are required to establish the toxicity of a pesticide to fish. The preferred test species are rainbow trout (a coldwater fish) and bluegill sunfish (a warmwater fish). Results of these tests are tabulated below. There is currently no required amphibian acute toxicity test, it is assumed that the required guideline fish tests are protective of amphibians.

Table 8 indicates that the technical grade LC_{50} ranges from 0.36 ppm to 1.46 ppm for bluegill sunfish. Several tests with formulations were reported. The data indicates that triclopyr BEE is moderately to highly toxic to freshwater fish on an acute basis.

Table 8. Acute Toxicity of Triclopyr BEE (RED)

Species	Scientific Name	% a.i.	LC_{50} (ppm)	Toxicity Category
Technical Grade				

Rainbow trout	*Oncorhynchus mykiss*	96.98	0.65	highly toxic
Bluegill sunfish	*Lepomis macrochirus*	96.95	0.36	highly toxic
Coho salmon	*Oncorhyncus kissutch*	99	Yolk-sac fry: 0.45-0.47; Juvenile fry: 1.4	Yolk-sac fry: highly toxic; Juvenile fry: moderately toxic
Fathead minnow	*Pimephales promelas*	96.4	24-hour 2.4	moderately toxic
Fathead minnow	*Pimephales promelas*	96	24-hour 2.31	moderately toxic
Formulated				
Rainbow trout	*Oncorhynchus mykiss*	Form.	1.29	moderately toxic
Rainbow trout	*Oncorhynchus mykiss*	62.9	24-hour 0.77-2.7	highly to moderately toxic
Bluegill sunfish	*Lepomis macrochirus*	Form.	1.46	moderately toxic
Bluegill sunfish	*Lepomis macrochirus*	62.9	24-hour 1.3	moderately toxic

ii. Freshwater Fish, Chronic

Early-life stage and life-cycle studies denote the no observable effects concentration (NOEC) and the lowest observable effects concentration (LOEC). The fish early life-stage test is an in-laboratory test designed to estimate the highest quantity of a substance in water required which will not adversely effect the reproductive capabilities of a test population of fish (NOEC) and the lowest quantity of a substance in water which will adversely effect the reproductive capabilities of the test population (LOEC). There are no life-cycle tests for freshwater fish.

There are no early-life stage or life-cycle studies for triclopyr BEE.

iii. Freshwater Invertebrates, Acute

A freshwater aquatic invertebrate toxicity test using the technical grade of the active ingredient is necessary to assess the toxicity of a pesticide to invertebrates. Table 9 presents that triclopyr BEE is slightly to moderately toxic to freshwater invertebrates on an acute basis.

Table 9. Acute Toxicity of Triclopyr BEE to Freshwater Invertebrates (RED)

Species	Scientific Name	% a.i.	LC50 / EC50 (ppm)	Toxicity Category
Technical Grade				
Waterflea	*Daphnia magna*	96.4	1.7 (nominal conc.)	moderately toxic

Waterflea	*Daphnia magna*	96.4	12.0	slightly toxic

iv. Freshwater Invertebrates, Chronic (Life-Cycle Toxicity)

There are no chronic life-cycle toxicity studies for freshwater invertebrate studies for triclopyr BEE.

v. Estuarine and Marine Fish, Acute

Estuarine and marine acute toxicity testing is necessary because of forestry, rights-of-way, and turf uses for triclopyr BEE. Table 10 presents the acute toxicity data for estuarine and marine fish. The data denotes that triclopyr BEE is highly toxic to estuarine and marine fish.

Table 10. Acute Toxicity of Triclopyr BEE to Estuarine and Marine Fish (RED)

Species	Scientific Name	% a.i.	LC_{50} / EC_{50} (ppm)	Toxicity Category
Technical Grade				
Tidewater silverside	*Menidia beryllina*	96.1	0.45	highly toxic
Formulations				
Tidewater silverside	*Menidia beryllina*	62.9	0.76	highly toxic

vi. Estuarine and Marine Invertebrates, Acute

Table 11 presents the acute toxicity data for estuarine and marine invertebrates as reported in the RED. The data indicates that triclopyr BEE is moderately to highly toxic to estuarine and marine invertebrates on an acute basis.

Table 11. Acute Toxicity of Triclopyr BEE to Estuarine and Marine Invertebrates (RED)

Species	Scientific Name	% a.i.	LC50 / EC50 (ppm)	Toxicity Category
Technical Grade				
Estuarine (grass) shrimp	*Palaemonestes pugio*	96.1	2.47	moderately toxic
Formulations				
Eastern oyster (shell deposition)	*Crassostrea virginica*	62.9	0.32	highly toxic
Estuarine (grass) shrimp	*Palaemonetes pugio*	62.4	1.7	moderately toxic

vii. Estuarine and Marine Animals, Chronic

The RED states that chronic estuarine and marine animal studies were not required because triclopyr BEE is not expected to be continuous or recurrent in the estuarine and marine ecosystem.

viii. Toxicity to Aquatic Plants

The RED includes aquatic plant studies for triclopyr BEE because aerial application and outdoor non-residential use will expose non-target aquatic plants to triclopyr BEE. Table 12 notes that exposure levels of 0.88 ppm active ingredient or greater of triclopyr BEE may cause detrimental effects to the growth and reproduction of vascular aquatic plant species. Also, algae or diatoms may be affected from exposure levels of greater than 0.10 ppm active ingredient of triclopyr BEE.

Table 12. Non-Target Aquatic Plant Toxicity for Triclopyr BEE (RED)

Species	% a.i.	EC_{50} (ppm)	EC_{50} or NOEC (ppm)
Technical Grade			
Lemna gibba	96.98	0.88	$\leq$ 0.16
Skeletonema costatum	96.98	1.17	0.209
Anabaena flos-aquae	96.98	1.97	0.52
Navicula pelliculosa	96.98	0.10	0.002
Formulations			
Kirchneria subcapitata (Selenastrum capicornutum)	61.3	3.40	2.3

ix. AQUIRE database

Additional aquatic toxicity data for triclopyr BEE is available from EPA's AQUIRE database (http://www.epa.gov/ecotox/). Data from the AQUIRE database is presented in table 13. We did not look at the original papers, but report the toxicity values for the toxicity test periods that are analogous to those required by OPP testing requirements as a means of comparison. The AQUIRE reference numbers for each reported value are provided. The data corroborate the toxicity values reported in EFED's database and the triclopyr RED. The range of acute toxicity values for the active ingredient from AQUIRE are 1,200 ppb to 4,200 ppb for freshwater fish and 70 ppb to 370,000 ppb for freshwater invertebrates compared to 360 ppb to 2,310 ppb and 1,700 ppb to 12,000 ppb for freshwater fish and freshwater invertebrates, respectively, from OPP data. Most of the data in AQUIRE is reported from studies conducted with formulated products, however, the types of formulations and percentage of active ingredient were not reported. Therefore, it is difficult to compare these data with those reported by OPP.

Table 13. Summary of Acute Toxicity Data from the EPA AQUIRE Database

Species	Scientific Name	Test Chemical[1]	96-hr LC_{50} (ug/L)	Reference #
Freshwater Fish				
Pink salmon	*Oncorhynchus gorbuscha*	Active	24-hour 1,900	12605
Pink salmon	*Oncorhynchus gorbuscha*	Active	48-hour 1,300	12605
Pink salmon	*Oncorhynchus gorbuscha*	Active	72-hour 1,200	12605
Pink salmon	*Oncorhynchus gorbuscha*	Active	1,200	12605
Chum salmon	*Oncorhynchus keta*	Active	24-hour 2,100	12605
Chum salmon	*Oncorhynchus keta*	Active	48-hour 1,800	12605
Chum salmon	*Oncorhynchus keta*	Active	72-hour 1,700	12605
Chum salmon	*Oncorhynchus keta*	Active	1,700	12605
Coho salmon, silver salmon	*Oncorhynchus kisutch*	Active	24-hour 2,100	12605
Coho salmon, silver salmon	*Oncorhynchus kisutch*	Active	48-hour 2,100	12605
Coho salmon, silver salmon	*Oncorhynchus kisutch*	Active	72-hour 2,100	12605
Coho salmon, silver salmon	*Oncorhynchus kisutch*	Active	2,100	12605
Rainbow trout, donaldson trout	*Oncorhynchus mykiss*	Active	24-hour 4,100	12605
Rainbow trout, donaldson trout	*Oncorhynchus mykiss*	Active	48-hour 2,900	12605
Rainbow trout, donaldson trout	*Oncorhynchus mykiss*	Active	72-hour 2,700	12605
Rainbow trout, donaldson trout	*Oncorhynchus mykiss*	Active	2,700	12605
Rainbow trout, donaldson trout	*Oncorhynchus mykiss*	Form.	2,400	3593
Sockeye salmon	*Oncorhynchus nerka*	Active	24-hour 2,500	12605

Sockeye salmon	*Oncorhynchus nerka*	Active	48-hour 1,500	12605
Sockeye salmon	*Oncorhynchus nerka*	Active	72-hour 1,400	12605
Sockeye salmon	*Oncorhynchus nerka*	Active	1,400	12605
Chinook salmon	*Oncorhynchus tshawytscha*	Active	24-hour 4,200	12605
Chinook salmon	*Oncorhynchus tshawytscha*	Active	48-hour 2,700	12605
Chinook salmon	*Oncorhynchus tshawytscha*	Active	72-hour 2,700	12605
Chinook salmon	*Oncorhynchus tshawytscha*	Active	2,700	12605
Freshwater Invertebrate				
Stonefly	*Acroneuria abnormis*	Form.	1-hour > 320,000	5970
Caddisfly	*Dolophilodes distincta*	Form.	1-hour 70 - 1,270	5970
Mayfly	*Epeorus vitrea*	Form.	1-hour > 320,000	5970
Mayfly	*Heptagenia flavescens*	Form.	1-hour 320,000	5970
Caddisfly	*Hydropsyche sp.*	Form.	1-hour 310,000	5970
Stonefly	*Isogenoides sp.*	Form.	1-hour 21,800 - 126,000	5970
Mayfly	*Isonychia sp.*	Form.	1-hour > 320,000	5970
Dragonfly	*Ophiogomphus carolus*	Form.	1-hour > 320,000	5970
Stonefly	*Pteronarcys sp.*	Form.	1-hour > 290,000	5970
Caddisfly	*Pycnopsyche guttifer*	Form.	1-hour > 290,000	5970
Blackfly	*Simulium sp.*	Form.	1-hour 249,300 - 370,000	5970

1 Form. = Test was conducted with formulated products. The product composition and percent active ingredient were not reported. Active = Test was conducted with the active ingredient, but the percent triclopyr BEE was not

reported.

The AQUIRE database is not always reliable documenting whether the study was conducted with a formulation or the active ingredient (i.e., technical material); unless the test indicates an active ingredient, it is recorded in AQUIRE as formulation testing. However, we have seen values reported in Mayer & Ellersiech (1996) as the technical material and reported in AQUIRE as a formulation test. We report the information on formulation versus active ingredient and note that it is not completely reliable.

x. Field Effects

The mobility section of the RED describes field dissipation studies for triclopyr, triclopyr TEA, and triclopyr BEE (see pages 58-59).

There are currently no registered uses of triclopyr, thus no field dissipation studies for the acid are discussed in the RED. Terrestrial field studies of triclopyr BEE are provided in the RED. One terrestrial study applied 8.1 lbs a.i./A triclopyr BEE to a bareground plot of sandy loam soil in North Carolina. Researchers noted that triclopyr BEE degrades to triclopyr acid with a calculated half-life of 1.1 days. Triclopyr BEE was detected at a depth of 0 cm to 7.5 cm until 7 days post-treatment. A second study observed the half-life of triclopyr BEE by applying 6.4 lbs ae/A to a bare ground loam soil plot in California. The half-life of triclopyr BEE was reported to be approximately 2 weeks.

The RED discusses a forestry study whereby triclopyr BEE was aerially applied by a helicopter to clear-cut timberland in southwest Washington at a rate of 6.0 lbs ae/A in 1991. Total triclopyr residues (triclopyr BEE and triclopyr acid/anion) and its degradates (3,5,6-trichloro-2-pyridinol (TCP) and 3,5,6-trichloro-2-methoxypyridine (TMP)) were detected on the foliage, leaf litter, pond sediment, and in scarified and litter-covered soil. The researchers measured total triclopyr residues and TCP in stream sediment, but did not specifically analyze for triclopyr BEE. Only total triclopyr residues were detected in the pond and stream waters. The half-life for total triclopyr was estimated to be 96 days in exposed soil and 37 days in unexposed soil. In the litter covered soil, there were sporadic detections of triclopyr acid through 12-30 inch soil depth with no detections below 30 inches.

B. Environmental Fate and Transport

The environmental fate and transport of triclopyr BEE is discussed in the environmental fate section of the RED (see pages 50-69).

According to the RED, triclopyr BEE does not persist in the environment. In aerobic soil and water, the primary degradation pathway is hydrolysis to triclopyr acid/anion and 2-butoxyethanol, with hyrdolysis occurring more rapidly at higher pHs. In aqueous systems, the hydrolysis of triclopyr BEE is base-catalyzed and varies from stable at acidic conditions (half-life of 84 days in sterile pH 5 solution) with decreased stability (half-life of 7 hours) observed under basic (pH 9) conditions. Since triclopyr BEE degrades rapidly to the acid in natural waters (half-life 0.5 days), it can also be assumed to not bioaccumulate.

i. Degradate of Triclopyr BEE: 2-butoxyethanol

The degradate 2-butoxyethanol of triclopyr BEE rapidly degrades to 2-butoxyacetic acid through microbial processes (aerobic soil and aquatic). Characteristics of 2-butoxyacetic acid include a half-life of 0.375 - 0.058 days in soil and a half-life of 0.6 - 3.4 days in a sediment/water mixture, with the final degradate as CO_2. In anaerobic aquatic conditions, 2-butoxyethanol and 2-butoxyacetic acid are more persistent, half-lives of 1.4 and 73.3 respectively in an anaerobic sediment/water mixture, with the final degradate as CO_2. 2-butoxyethanol (also known as ethylene glycol monobutyl ether) has a perceptible vapor pressure, 0.76 mm, however, because of the rapid microbial degradation, it is not expected that volatilization will contribute significantly to the dissipation of 2-butoxyethanol. Nor is it expected that photodegration or bioaccumulation in fish will contribute significantly to the dissipation of butoxyethanol (half-life of 0.6-3.4 days in water) with the final degradate being CO_2.

ii. Degradate of Triclopyr BEE: Triclopyr Acid/Anion

The degradate triclopyr acid/anion is somewhat persistent and very mobile in the environment. The predominant degradation pathway for triclopyr acid/anion in water is photodegradation. Triclopyr acid is stable to hydrolysis and anaerobic aquatic metabolism; it degrades slowly under aerobic aquatic conditions. Triclopyr acid does not bioaccumulate in aquatic organisms. Triclopyr acid is a weak acid which will dissociate completely to the triclopyr anion at pH > 5 (dissociation constant pka 2.93). Therefore, the triclopyr anion will be the major moiety present in the environment with products containing triclopyr BEE.

In aquatic environments, photolysis is a predominant degradation mechanism. The photodegration of triclopyr acid is rapid with the half-life reported to be less than 1 day in sterile solutions and approximately 1 day in natural water. In sterile solutions, the major photo-degradation product observed was 5-chloro-3,6-dihydroxy-2-pyridinoloxyacetic acid (TCP); oxamic acid was the major degradation product in natural river water. Factors that could affect the rate of aqueous photolysis degradation include vegetative cover, type of vegetation, depth of the plot, and suspended sediment.

In soil, the predominant degradation mechanisms for triclopyr acid is biotic metabolism. Triclopyr acid degrades in aerobic soil with half-lives of 8 to 18 days to the intermediate degradates 3,5,6-tricloro-2-pyridinol (TCP) and 3,5,6-trichloro-2-methoxypyridine (TMP); the ultimate degradate is CO_2. Triclopyr acid and TCP are considered to be very mobile in soils, but triclopyr acid is not expected to reach significant concentrations in ground water and it is not toxic. TCP is relatively mobile, persistent, and has the potential to contaminate groundwater. Triclopyr acid and TCP do not absorb to soil and sediment particles, and may be transported in surface runoff water.

C. Incidents

OPP maintains two databases of reported incidents. The Ecological Incident Information System (EIIS) contains information on environmental incidents which are provided voluntarily to OPP by state and federal agencies and others. There have been periodic solicitations for information to the states and the U.S. Fish and Wildlife Service (FWS). The second database is a compilation of incident information known to pesticide registrants and any data conducted by them that shows results differing from those contained in studies provided to support registration. These data and studies (together termed incidents) are required to be submitted to OPP under regulations implementing FIFRA section 6(a)(2).

We are aware of six incident reports for triclopyr BEE. The reports document incidents to terrestrial plants. There are no incident reports indicating that triclopyr BEE was considered the causative agent in harming fish, invertebrates, or aquatic plants.

D. Estimated and Actual Concentrations of Triclopyr Butoxyethyl Ester in Water

i. United States Geological Survey - National Water Quality Assessment Data (NAWQA)

Monitoring data on triclopyr BEE is available from the NAWQA program as obtained from the "USGS data warehouse" (URL: http://infotred.er.usgs.gov/servlet/page?_pageid=543&_dad=portal30&_schema=PORTAL30). Table 14 presents a summary of the NAWQA monitoring data for the entire United States (national), the Pacific-Northwest states, and California that are habited by Pacific salmon and steelhead. The table summarizes data collected from 1984 to 2004 as retrieved from the USGS data warehouse on November 21, 2004. The data includes sites sampled many times over several years, as well as sites sampled only once or twice. Note that statistics reported for detection frequency may be skewed due to false negatives and concentrations could be higher. On a national scale, there were 4,435 samples containing triclopyr during the time period. Note that the USGS data warehouse lists triclopyr and does not distinguish between triclopyr TEA and triclopyr BEE. The maximum residue reported was 4.6 ug/L taken on July 3, 1996 in Washington county Mississippi.

Table 14. Triclopyr Residues: Detection Frequency and Maximum Amounts (USGS/NAWQA)

State	# Samples	% Detects	Max. Residue (ug/L)	# > 1.0 ug/L
National	4,435	6.4	4.6	19
California	227	11.5	3.35	3
Idaho	0	0	0	0
Oregon	139	47.4	2.87	2

Washington	297	2.0	1.3	1

Please note that the NAWQA sampling data, while considered high quality, are not targeted to sites and times where triclopyr is used. Even regular sampling according to a predetermined schedule may not detect peak residues unless the samples happen to be taken shortly afterwards and adjacent to sites treated with triclopyr. It seems likely, but may not be correct, that when thousands of samples are taken, the highest NAWQA residues may actually represent peaks that occur in natural waters.

Table 15 depicts data collected by California's Department of Pesticide Regulation (CA DPR) (http://www.cdpr.ca.gov/docs/sw/surfdata.htm) from August 1990 to September 2003. The data denotes that triclopyr was detected in four California counties. Please note that the CA DPR data lists triclopyr and not does distinguish between triclopyr TEA and triclopyr BEE.

Table 15. California Department of Pesticide Regulation Residue Concentrations for Triclopyr in Surface Waters (August 1990 - September 2003)

Site	# of Samples	% Detects	Max. Residue (ug/L)	# > 1.0 ug/L
California[1]	150	47	14.5	40
Colusa	45	87	14.5	34
Sacramento	64	19	0.62	0
Sutter	20	75	2.12	5
Yolo	21	5	1.08	1

1 Only the counties in the ESUs are referenced in the table, however the California total includes all available data.

ii. Targeted Studies

The RED indicates that limited surface water monitoring data exists for triclopyr BEE. One study based on an aerial application of triclopyr BEE at a rate of 3.84 kg ae/ha to forested sites in Ontario, Canada reported a maximum observed concentration of 0.35 ppm for triclopyr BEE. The study collected residues from water as triclopyr BEE and from sediment as triclopyr acid. The degradate TCP was detected on foliage and in the soil, litter, aquatic plants, and fish. Note that TCP was not detected in water.

A journal article by Thompson and others in 1995 discussed the environmental fate and ecological effects of triclopyr BEE as observed in a first-order forest stream located in Ontario, Canada. The researchers noted a maximum concentration of triclopyr BEE in stream water samples to be 0.848 ug/mL and 0.949 ug/mL after 10 and 20 minutes, respectively, from direct injection of triclopyr BEE into a stream. Within 70 minutes of the application, the concentration of triclopyr BEE in stream water was reported to be below 0.1 ug/mL. The article concluded that flowing water streams such as in a forested watershed would result in rapid dissipation of triclopyr BEE and triclopyr acid.

E. Existing Protections

i. U.S. Fish and Wildlife Service Biological Opinions

The U.S. Fish and Wildlife Service has not issued a biological opinion regarding usage of triclopyr BEE.

ii. Protection Statements on the National (section 3) and the State and Local Need (section 24c) Labels

The current registered labels for triclopyr BEE state in the environmental hazards section:

- "This product is toxic to fish. Drift or runoff may adversely affect fish and nontarget plants. Do not apply directly to water, to areas where surface water is present, or to intertidal area below the mean high water mark. Do not contaminate water when disposing of equipment washwaters."

iii. California Department of Pesticide Regulation Bulletins

Triclopyr BEE is also included in bulletins for California. There, the CA DPR in the California Environmental Protection Agency creates county bulletins consistent with those developed by OPP. However, California also has a system of County Agricultural Commissioners responsible for pesticide regulation, and all agricultural and commercial applicators must get a permit for the use of any restricted use pesticide and must report all pesticide use, restricted or not. The California bulletins for protecting endangered species have been in use for approximately 5 years. Although they are currently "voluntary" in nature, the Agricultural Commissioners strongly promote their use by pesticide applicators. Triclopyr BEE is currently included in these bulletins for the protection of aquatic organisms. The specific limitations are:

- "Do not use in currently occupied habitat except: (1) as specified in Habitat Descriptors, (2) in organized habitat recovery programs, or (3) for selective control of invasive exotic plants."

- "For sprayable or dust formulations: when the air is calm or moving away from habitat, commence applications on the side nearest the habitat and proceed away from the habitat. When air currents are moving toward habitat, do not make applications within 200 yards by air or 40 yards by ground upwind from occupied habitat. The county agricultural commissioner may reduce or waive buffer zones following a site inspection, if there is an adequate hedgerow, windbreak, riparian corridor or other physical barrier that substantially reduce the probability of drift."

Agricultural and other commercial applicators are well sensitized to the need for protecting endangered and threatened species. CA DPR believes that the vast majority of agricultural applicators in California are following the limitations in these bulletins (Richard Marovich, 2002).

OPP currently has proposed (67 *Federal Register* 231, 71549-71561, December 2, 2002) a final implementation program that includes labeling products to require pesticide applicators to follow provisions in county bulletins. The comment period has closed, and a final *Federal Register* notice is under development and is anticipated to be published in March 2005. After this notice becomes final, it is expected that pesticide registrants will be required, as appropriate, to put on their products label statements mandating that applicators follow the label and county bulletins. It is also anticipated that these will be enforceable under FIFRA, including the California bulletins. Any measures necessary to protect T&E salmon and steelhead from triclopyr BEE would most likely be promulgated through this system.

F. Discussion and General Risk Conclusions for Triclopyr Butoxyethyl Ester (BEE)

i. Estimated Environmental Concentrations (EECs) of Triclopyr Butoxyethyl Ester (BEE) in the Environment

In the RED, triclopyr BEE aquatic EECs were estimated using the tier 1 GENeric Expected Environmental Concentration Program (GENEEC). The resultant EECs assess acute and chronic risks to aquatic organisms. GENEEC uses a chemical's soil/water partition coefficient and various degradation and metabolic half-life values to estimate runoff from a 10-hectare field and a 1-hectare water body that is 2 meters deep. GENEEC also considers reduction in dissolved pesticide concentration due to soil incorporation, degradation in soil before a rainfall event, adsorption of pesticide to soil or sediment, and degradation of the pesticide within the water body. GENEEC also accounts for direct deposition of spray drift onto the water body.

The GENEEC simulation for triclopyr BEE assumed a single application at the maximum registered use rate for a site with no soil incorporation. In addition, spray drift at 100 feet downwind is assumed to be 1% of the application rate for ground applications and 5% of the application rate for aerial applications. The RED denotes the following values were used for input into the GENEEC program for triclopyr BEE:

- Soil Organic Carbon Partitioning Coefficient (Koc): 560
- Aerobic soil metabolism half-life: Stable (GENEEC input = 0)
- Aerobic aquatic metabolism half-life: No available data (GENEEC input = 0)
- Abiotic hydrolysis half-life (at pH 7): 8.7 days
- Photolysis half-life: 6.6 days
- Water solubility: 6.84 ppm

The RED notes that an essential data input value, the aerobic soil metabolism half-life, was not available for triclopyr BEE. The EECs calculated reflect the assumption that triclopyr BEE was stable to aerobic soil metabolism despite data indicating that triclopyr BEE degrades in soil to triclopyr acid/anion with a half-life of less than a day. Thus, the calculated peak EEC values for triclopyr BEE are higher than what would be expected to occur in the environment. In addition, any decrease in the estimated aquatic concentrations of triclopyr BEE with time would be due only to abiotic hydrolysis and photodegradation. It is known that triclopyr BEE hyrdolyzes to triclopyr acid/anion very rapidly in natural waters in the dark (half-life of 0.5 day). Therefore, triclopyr BEE is not expected to remain in a model water body after a few days.

The RED indicates that acute risk assessments are performed using either 0-day EEC values (single application) or peak (EEC) values (multiple applications). The chronic risk values are determined by using 21-day EECs for invertebrates and 56-day EECs for fish. However, as discussed in the environmental fate and transport section of this analysis, we do not expect any triclopyr BEE to remain in the water longer than a few days. Therefore, only acute estimated environmental concentration (EEC) values were calculated for triclopyr BEE. The EECs presented in table 16 are based on values reported in the RED by adjusting maximum application rates to correspond to the current registered label uses.

Table 16. Estimated Environmental Concentrations (EECs) (ppm) for Aquatic Exposure Modeled with GENEEC (RED[1])

Site	Application Method	Maximum Application Rate (lbs ae/A)	Initial (PEAK) EEC (ppm)
agricultural/farm structure/buildings and equipment, fencerows/hedgerows, non-agricultural rights-of-way, non-agriculture uncultivated areas/soils	ground	8.0	0.152
pastures, rangeland, industrial areas (outdoor), non-agricultural rights-of-ways/fencerows/hedgerows, non-agriculture uncultivated areas/soils		1.0	0.019
ornamental lawns and turf		2.0	0.038
non-agricultural rights-of-ways/fencerows/hedgerows	aerial	8.0	0.152
pastures, rangeland, industrial areas (outdoor), non-agricultural rights-of-ways/fencerows/hedgerows, non-agriculture uncultivated areas/soils	aerial	1.0	0.02
DIRECT APPLICATION TO 6 INCHES OF WATER			
forest tree management/forest pest management	aerial, ground	2.0	1.47[2]
forest tree management/forest pest management (unwanted trees in abandoned orchard)	aerial, ground	4.0	2.94[2]

forest tree management/forest pest management	aerial, ground	6.0	4.40[2]
forest trees (all or unspecified)	ground	8.0	5.87[2]
drainage system	aerial	1.0	0.73[2]
	ground	8	5.87[2]
streams/rivers/channeled water	ground	8	5.87[2]

1 The EECs in Table 16 are based on values reported in the RED. Since the RED publication in 1998, the application rates for several triclopyr BEE uses have changed. Thus, the EEC values were adjusted accordingly to correspond with the current application rates.
2 EECs are based on one direct application to 6 inches of water. EEC = use rate in lbs ae/A x 734 pbb. Note: Calculations are based on *L. macrochirus* LC50 = 0.36 ppm ai, equivalent to 0.25 ppm ae. Factor for conversion of ai to ae is 0.7192, based upon the ratio of percentages of active ingredient to acid equivalents as specified on product labels.

The GENEEC model is conservative for salmon and steelhead. While first order streams may be reasonably predicted for a single application, salmon and steelhead (except sockeye) occur primarily in streams and rivers where natural flow of water, and any contaminants in the water column, will move downstream precluding continued exposure from a single application.

ii. Risk Quotients for Triclopyr BEE

Risk characterization integrates the results of the exposure and ecotoxicity data to evaluate the likelihood of adverse ecological effects. Table 17 reports the risk quotients calculated for triclopyr BEE. Based solely on the most sensitive species and maximum estimated environmental concentrations (EECs), the criteria of concern (RQ > 0.05) for triclopyr BEE is exceeded for direct acute effects on fish from all model uses. With respect to indirect effects that triclopyr BEE may have on invertebrate food sources for threatened and endangered salmon and steelhead, the criteria of concern (RQ > 0.5) for acute effects are exceeded for all use sites (forestry and non-agricultural ditchbanks) where direct application to water may occur. Non-target aquatic plants may be exposed to triclopyr BEE through runoff or spray drift from adjacent treated sites. For indirect effects on aquatic vegetative cover for threatened and endangered salmon and steelhead, the criteria of concern (RQ > 1.0) for acute effects are exceeded for all use sites (forestry and non-agricultural ditchbanks) where direct application of triclopyr BEE may occur.

Table 17. Risk Quotients (RQs) for Freshwater Fish, Freshwater Invertebrates, and Aquatic Plants

Site	Peak EEC (ppm ae)	Acute Fish RQ[1]	Acute Invertebrate RQ[2]	Acute Plant RQ[3]
agricultural/farm structure/buildings and equipment, fencerows/hedgerows, non-agricultural rights-of-way, non-agriculture uncultivated areas/soils	0.152	0.61	0.02	< 0.75

pastures, rangeland, industrial areas (outdoor), non-agricultural rights-of-ways/fencerows/hedgerows, non-agriculture uncultivated areas/soils	0.019	0.07	0.00	< 0.75
ornamental lawns and turf	0.038	0.16	0.00	< 0.75
non-agricultural rights-of-ways/fencerows/hedgerows	0.152	0.61	0.02	< 0.75
pastures, rangeland, industrial areas (outdoor), non-agricultural rights-of-ways/fencerows/hedgerows, non-agriculture uncultivated areas/soils	0.03	0.07	0.00	< 0.75
DIRECT APPLICATION TO 6 INCHES OF WATER[4]				
forest tree management/forest pest management	1.47	5.88	0.17	2.34
forest tree management/forest pest management (unwanted trees in abandoned orchard)	2.94	11.7	0.35	4.67
forest tree management/forest pest management	4.40	17.6	0.51	7.0
forest trees (all or unspecified)	5.87	23.5	0.68	8.93
drainage system	0.734	2.93	0.09	1.13
	5.87	23.5	0.68	48.9
streams/rivers/channeled water	5.87	23.5	0.68	48.9

1 EEC = use rate in lbs ae/A x 734 pbb. Note: Calculations are based on *L. macrochirus* LC50 = 0.36 ppm ai, equivalent to 0.25 ppm ae. Factor for conversion of ai to ae is 0.7192, based upon the ratio of percentages of active ingredient to acid equivalents as specified on product labels.
2 Calculations are based on *Daphnia magna* LC50 = 12.0 ppm a.i.; equivalent to 8.6 ppm a.e. EEC = use rate in lbs ae/A x 734 pbb. Factor for conversion of a.i. to a.e. is 0.7192, based upon the ratio of percentages of active ingredient to acid equivalents as specified on product labels.
3 Factor for conversion of a.i. to ae is 0.7192 lb a.e./A, based upon the ratio of percentages of active ingredients to acid equivalents as specified on product labels. Calculations are based upon a duckweed, *Lemna gibba*, EC_{50} of 0.88 ppm a.i. (equivalent to 0.63 ppm a.e.). The acute RQ is calculated from the EEC/EC_{50}.
4 EECs are based on one direct application to 6 inches of water.

Fish

With a most sensitive fish LC_{50} of 0.36 ppm, the Level of Concern for direct acute effects for endangered species would be exceeded when triclopyr BEE concentrations in water exceed 0.018 ppm [RQ for direct effects to endangered species = concentration of triclopyr BEE / LC50 of most sensitive fish; 0.05 = concentration of triclopyr BEE / 0.36 ppm]. For all modeled uses, the acute levels of concern for fish were exceeded with the highest RQ values reported for non-agricultural streams, rivers, and channeled water.

Invertebrates

For freshwater invertebrates, the acute endangered species level of concern is exceeded for all modeled uses that include the potential for direct application to water. Aquatic invertebrates, which may serve as a food source for threatened and endangered fish, are more sensitive to triclopyr BEE when application involves direct contact with water.

Aquatic Plants

Non-target aquatic plants may be exposed to triclopyr BEE through runoff or spray drift from adjacent treated sites. For aquatic vascular plants, an aquatic plant risk assessment is generally based on the surrogate duckweed *Lemna gibba*. As documented in the RED, GENEEC included runoff and drift exposure in the aquatic plant models. Also, for aerial application to forestry, drainage systems, and rights-of-way, direct application to six inches of water was assumed. The indirect effects on aquatic vegetative cover are exceeded for all use sites in which a direct application to 6 inches of water may occur.

Conclusions

The GENEEC model is a conservative model for the registered uses of triclopyr BEE. More realistic models for these registered uses are under-development. The use of a farm pond to model exposure to specie that inhabit fast-flowing streams and the use of triclopyr BEE at rates less than the modeled maximum label rates suggests that the EEC values used to calculate risk are greater than would normally be expected in salmonid bearing waters. The models indicated an exceedance of the direct acute risks to endangered and threatened fish for all registered uses of triclopyr BEE. Acute risks to invertebrates and aquatic plants was indicated for all uses that involve a direct application to six inches of water such as forest tree management and weed control to non-irrigation ditchbanks.

4. Description of Pacific salmon and steelhead Evolutionarily Significant Units (ESU) Relative to Triclopyr Butoxyethyl Ester (BEE)

Please note that OPP will be transmitting a separate analysis of ESU locations and their critical habitat to NMFS. We have noted this in previous consultation requests, but this process is taking somewhat longer than anticipated. This analysis will include what we perceive to be the most appropriate boundaries for designated critical habitat. We will be requesting comments from NMFS on the counties to be included. Depending upon NMFS comments, we will make any corrections and then will compare the results with those consultation packages previously transmitted. We do not believe that any corrections will materially change the risk assessments. However, adjustments may result in changes on where protective measures need to be taken after consultation is completed. We are not asking for comments on ESU locations as part of this particular package.

(a) Chinook salmon

Chinook salmon, *Oncorhynchus tshawytscha*, is the largest salmon species; adults weighing over 120 pounds have been caught in North American waters. Like other Pacific salmon, chinook salmon are anadromous and die after spawning.

Juvenile stream- and ocean-type chinook salmon have adapted to different ecological niches. Ocean-type chinook salmon, commonly found in coastal streams, tend to utilize estuaries and coastal areas more extensively for juvenile rearing. They typically migrate to sea within the first three months of emergence and spend their ocean life in coastal waters. Summer and fall runs predominate for ocean-type chinook. Stream-type chinook are found most commonly in headwater streams and are much more dependent on freshwater stream ecosystems because of their extended residence in these areas. They often have extensive offshore migrations before returning to their natal streams in the spring or summer months. Stream-type smolts are much larger than their younger ocean-type counterparts and are therefore able to move offshore relatively quickly.

Coast wide, chinook salmon typically remain at sea for 2 to 4 years, with the exception of a small proportion of yearling males (called jack salmon) which mature in freshwater or return after 2 or 3 months in salt water. Ocean-type chinook salmon tend to migrate along the coast, while stream-type chinook salmon are found far from the coast in the central North Pacific. They return to their natal streams with a high degree of fidelity. Seasonal “runs” (i.e., spring, summer, fall, or winter), which may be related to local temperature and water flow regimes, have been identified on the basis of when adult chinook salmon enter freshwater to begin their spawning migration. Egg deposition must occur at a time to ensure that fry emerge during the following spring when the river or estuary productivity is sufficient for juvenile survival and growth.

Adult female chinook will prepare a spawning bed, called a redd, in a stream area with suitable gravel composition, water depth and velocity. After laying eggs in a redd, adult chinook will guard the redd from 4 to 25 days before dying. Chinook salmon eggs will hatch, depending upon water temperatures, between 90 to 150 days after deposition. Juvenile chinook may spend from 3 months to 2 years in freshwater after emergence and before migrating to estuarine areas as smolts, and then into the ocean to feed and mature. Historically, chinook salmon ranged as far south as the Ventura River, California, and as far north as the Russian Far East.

(1) California Coastal Chinook Salmon ESU

The California coastal chinook salmon ESU was proposed as threatened in 1998 (63FR11482-11520, March 9, 1998) and listed on September 16, 1999 (64FR50393-50415). Critical habitat was designated February 16, 2000 (65FR7764-7787) to encompass all river reaches and estuarine areas accessible to listed chinook salmon from Redwood Creek (Humboldt County, California) to the Russian River (Sonoma County, California), inclusive.

The hydrologic units and upstream barriers are Mad-Redwood, Upper Eel (upstream barrier - Scott Dam), Middle Fort Eel, Lower Eel, South Fork Eel, Mattole, Big-Navarro-Garcia, Gualala-Salmon, Russian (upstream barriers - Coyote Dam; Warm Springs Dam), and Bodega Bay. Counties included within this ESU are Humboldt, Trinity, Mendocino, Sonoma, and Marin. A small portion of Glenn County is also included in the Critical Habitat. A small portion of Lake

County contains habitat for this ESU, but is entirely within the Mendocino National Forest.

Table 1 in attachment G shows the cropping information where triclopyr BEE can be used in California counties where the California Coastal Chinook Salmon ESU is located. In this table, if there is no acreage given for a specific crop, this means that there are too few growers in the area for CA DPR to make the data available.

There is a modest amount, approximately 13,256 pounds, of triclopyr BEE applied to 11,978 acres in this entire ESU. Triclopyr BEE is applied to only 0.1% of the more than 9.6 million acres within this ESU. Many applications may occur at less than the maximum legal use rates. Most waterways contain flowing water that dilutes and disperses triclopyr from its application site, as well. Regardless of the above observations, we do not have crop usage data on a smaller scale than the county level. Therefore, our effects determinations are based on conservative GENEEC modeling performed by EFED using data on the smallest scale available. Given the modest amount of triclopyr BEE usage, I conclude that the use may affect, but is not likely to adversely affect, the California Coastal Chinook Salmon ESU.

(2) Central Valley Spring-run Chinook Salmon ESU

The Central Valley Spring-run chinook salmon ESU was proposed as threatened in 1998 (63FR11482-11520, March 9, 1998) and listed on September 16, 1999 (64FR50393-50415). Critical habitat was designated February 16, 2000 (65FR7764-7787) to encompass all river reaches accessible to listed chinook salmon in the Sacramento River and its tributaries in California, along with the downstream river reaches into San Francisco Bay, north of the Oakland Bay Bridge, and to the Golden Gate Bridge.

Hydrologic units and upstream barriers within this ESU are the Sacramento-Lower Cow-Lower Clear, Lower Cottonwood, Sacramento-Lower Thomes (upstream barrier - Black Butte Dam), Sacramento-Stone Corral, Lower Butte (upstream barrier - Centerville Dam), Lower Feather (upstream barrier - Oroville Dam), Lower Yuba, Lower Bear (upstream barrier – Camp Far West Dam), Lower Sacramento, Sacramento-Upper Clear (upstream barriers – Keswick Dam, Whiskeytown dam), Upper Elder-Upper Thomes, Upper Cow-Battle, Mill-Big Chico, Upper Butte, Upper Yuba (upstream barrier - Englebright Dam), Suisin Bay, San Pablo Bay, and San Francisco Bay. Salmon and steelhead habitat are located in the counties of Shasta, Tehama, Butte, Glenn, Colusa, Sutter, Yolo, Yuba, Placer, Sacramento, Solano, Nevada, Contra Costa, Napa, Alameda, Marin, Sonoma, San Mateo, and San Francisco.

Table 2 in attachment G show the cropping information for California counties where the Central Valley Spring-Run for Chinook ESU is located. In these tables, if there is no acreage given for a specific crop, this means that there are too few growers in the area for the CA DPR to make the data available.

There is a modest amount, approximately 23,187 pounds, of triclopyr BEE applied to 8,116 acres in this ESU. Only 0.1% of the acreage within this ESU receives triclopyr BEE applications. Many applications may occur at less than the maximum legal use rate. Most waterways contain flowing water that dilutes and disperses triclopyr BEE from its application site, as well. Use of triclopyr BEE at the maximum registered label rate may pose acute risk to fish. Given the modest amount of acres treated, I conclude that triclopyr BEE may affect, but is not likely to adversely affect the Central Valley Spring-Run of Chinook ESU.

(3) Lower Columbia River Chinook Salmon ESU

The Lower Columbia River chinook salmon ESU was proposed as threatened in 1998 (63FR11482-11520, March 9, 1998) and listed a year later (64FR14308-14328, March 24, 1999). Critical habitat was designated February 16, 2000 (65FR7764-7787) to encompass all river reaches accessible to listed chinook salmon in Columbia River tributaries between the Grays and White Salmon Rivers in Washington and the Willamette and Hood River in Oregon, inclusive, along with the lower Columbia River reaches to the Pacific Ocean.

The hydrologic units and upstream barriers are the Middle Columbia-Hood (upstream barriers - Condit Dam, The Dalles Dam), Lower Columbia-Sandy (upstream barrier - Bull Run Dam 2), Lewis (upstream barrier - Merlin Dam), Lower Columbia-Clatskanie, Upper Cowlitz, Lower Cowlitz, Lower Columbia, Clackamas, and the Lower Willamette. Salmon habitat is located in the counties of Hood River, Wasco, Clatsop, Columbia, Clackamas, Marion, Multnomah, and Washington in Oregon, and Klickitat, Skamania, Clark, Cowlitz, Lewis, Wahkiakum, Pierce, and Pacific in Washington.

The maximum legal use rates of triclopyr BEE to control weeds are predicted to pose risk to freshwater fish, freshwater invertebrates, and aquatic plants, which leads to both direct and indirect effects on salmonids. Due to the lack of smaller-scale data, we must assume that all non-irrigation ditchbanks and forest management sites throughout all the counties in this ESU are treated with triclopyr BEE. Therefore, due to possible direct and indirect effects on salmonids, we conclude that triclopyr BEE use to control weeds may effect T&E salmonids in this ESU.

(4) Puget Sound Chinook Salmon ESU

The Puget Sound chinook salmon ESU was proposed as threatened in 1998 (63FR11482-11520, March 9, 1998) and listed a year later (64FR14308-14328, March 24, 1999). Critical habitat was designated February 16, 2000 (65FR7764-7787) to encompass all marine, estuarine, and river reaches accessible to listed chinook salmon in Puget Sound and its tributaries, extending out to the Pacific Ocean.

The hydrologic units and upstream barriers are the Strait of Georgia, San Juan Islands, Nooksack, Upper Skagit, Sauk, Lower Skagit, Stillaguamish, Skykomish, Snoqualmie (upstream barrier - Tolt Dam), Snohomish, Lake Washington (upstream barrier – Landsburg Diversion), Duwamish, Puyallup, Nisqually (upstream barrier - Alder Dam), Deschutes, Skokomish, Hood Canal, Puget Sound, Dungeness-Elwha (upstream barrier - Elwha Dam). Affected counties in Washington are Skagit, Whatcom, San Juan, Island, Snohomish, King, Pierce, Thurston, Lewis, Grays Harbor, Mason, Clallam, Jefferson, and Kitsap.

The maximum legal use rates of triclopyr BEE to control weeds are predicted to pose risk to freshwater fish, freshwater invertebrates, and aquatic plants, which leads to both direct and indirect effects on salmonids. Due to the lack of smaller-scale data, we must assume that all non-irrigation ditchbanks and forest management sites throughout all the counties in this ESU are treated with triclopyr BEE. Therefore, due to possible direct and indirect effects on salmonids, we conclude that triclopyr BEE use to control weeds may effect T&E salmonids in this ESU.

(5) Sacramento River Winter-run Chinook Salmon ESU

The Sacramento River Winter-run chinook was emergency listed as threatened with critical habitat designated in 1989 (54FR32085-32088, August 4, 1989). This emergency listing provided interim protection and was followed by (1) a proposed rule to list the winter-run on March 20, 1990, (2) a second emergency rule on April 20, 1990, and (3) a formal listing on November 20, 1990 (59FR440-441, January 4, 1994). A somewhat expanded critical habitat was proposed in 1992 (57FR36626-36632, August 14, 1992) and made final in 1993 (58FR33212-33219, June 16, 1993). In 1994, the winter-run was reclassified as endangered because of significant declines and continued threats (59FR440-441, January 4, 1994).

Critical Habitat has been designated to include the Sacramento River from Keswick Dam, Shasta County (river mile 302) to Chipps Island (river mile 0) at the west end of the Sacramento-San Joaquin delta, and then westward through most of the fresh or estuarine waters, north of the Oakland Bay Bridge, to the ocean. Estuarine sloughs in San Pablo and San Francisco bays (including Santa Clara County) are excluded (58FR33212-33219, June 16, 1993). Counties containing habitat include Alameda, Butte, Colusa, Contra Costa, Glenn, Marin, Sacramento, San Francisco, San Mateo, Shasta, Solano, Sonoma, Sutter, Tehama, and Yolo. Spawning and growth habitat are also located in Shasta and Tehama counties.

Table 5 in attachment G shows the cropping information for crops treated with triclopyr BEE in California where the Sacramento River Winter-run Chinook Salmon ESU is located. Less than 0.1 of the acreage within this ESU receives triclopyr applications.

Many applications may occur at less than the maximum legal use rate. Most waterways contain flowing water that dilutes and disperses triclopyr BEE from its application site, as well. Furthermore, crops in the counties of this ESU may not drain into or be found near the waterways that T&E salmonids use. Regardless of the above observations, we do not have crop usage data on a smaller scale than the county level, nor do we have weed control usage data on a county-level or smaller scale. Therefore, our effects determinations are based on conservative GENEEC modeling performed by EFED using data on the smallest scale available. Given the less than 25,000 pounds of triclopyr BEE that is applied to this entire ESU, I conclude that triclopyr BEE may effect, but is not likely to adversely effect T&E salmonids in this ESU.

(6) Snake River Fall-run Chinook Salmon ESU

The Snake River fall-run chinook salmon ESU was proposed as threatened in 1991 (56FR29547-29552, June 27, 1991) and listed about a year later (57FR14653-14663, April 22, 1992). Critical habitat was designated on December 28, 1993 (58FR68543-68554) to include all tributaries of the Snake and Salmon Rivers accessible to Snake River fall-run chinook salmon, except reaches above impassable natural falls and Dworshak and Hells Canyon Dams. The Clearwater River and Palouse River watersheds are included for the fall-run ESU, but not for the spring/summer run.

This chinook ESU was proposed for reclassification on December 28, 1994 (59FR66784-57403) as endangered because of critically low levels, based on very sparse runs. However, because of increased runs in subsequent years, this proposed reclassification was withdrawn (63FR1807-1811, January 12, 1998).

In 1998, NMFS proposed to revise the Snake River fall-run chinook to include those stocks using the Deschutes River (63FR11482-11520, March 9, 1998). The John Day, Umatilla, and Walla Walla Rivers would be included; however, fall-run chinook in these rivers are believed to have been extirpated. It appears that this proposal has yet to be finalized.

Hydrologic units with spawning and rearing habitat for this fall-run chinook are the Clearwater, Hells Canyon, Imnaha, Lower Grande Ronde, Lower North Fork Clearwater, Lower Salmon, Lower Snake-Asotin, Lower Snake-Tucannon, and Palouse. The proposed revision of the ESU adds the Lower Deschutes, Trout, Lower John Day, Upper John Day, North Fork - John Day, Middle Fork - John Day, Willow, Umatilla, and Walla Walla hydrologic units. It appears that no additions have been proposed for Washington tributaries to the Columbia River. In this ESU, spawning and growth habitat are located in Idaho in Adams, Benewah, Clearwater, Idaho, Latah, Lewis, Nez Perce, Shoshone, and Valley counties; in Washington state in Adams, Asotin, Columbia, Franklin, Garfield, Lincoln, Spokane, Walla Walla, and Whitman counties; and in Oregon in Union and Wallowa counties. Migration corridors are located in Washington in Benton, Clark, Cowlitz, Klickitat, Pacific, Skamania, Wahkiakum, and Walla Walla counties; and in Oregon in Clatsop, Columbia, Gilliam, Hood River, Morrow, Multnomah, Sherman, Umatilla, and Wasco counties.

The maximum legal use rates of triclopyr BEE to control weeds are predicted to pose risk to freshwater fish, freshwater invertebrates, and aquatic plants, which leads to both direct and indirect effects on salmonids. Due to the lack of smaller-scale data, we must assume that all non-irrigation ditchbanks and forest management sites throughout all the counties in this ESU are treated with triclopyr BEE. Therefore, due to possible direct and indirect effects on salmonids, we conclude that triclopyr BEE use to control weeds may effect T&E salmonids in this ESU.

(7) Snake River Spring/Summer-run Chinook Salmon

The Snake River Spring/Summer-run chinook salmon ESU was proposed as threatened in

1991 (56FR29542-29547, June 27, 1991) and listed about a year later (57FR14653-14663, April 22, 1992). Critical habitat was designated on December 28, 1993 (58FR68543-68554) to include all tributaries of the Snake and Salmon Rivers (except the Clearwater River) accessible to Snake River spring/summer chinook salmon. Like the fall-run chinook, the spring/summer-run chinook ESU was proposed for reclassification on December 28, 1994 (59FR66784-57403) as endangered because of critically low levels, based on very sparse runs. However, because of increased runs in subsequent years, this proposed reclassification was withdrawn (63FR1807-1811, January 12, 1998).

Hydrologic units in the potential spawning and rearing areas include Hells Canyon, Imnaha, Lemhi, Little Salmon, Lower Grande Ronde, Lower Middle Fork Salmon, Lower Salmon, Lower Snake-Asotin, Lower Snake-Tucannon, Middle Salmon-Chamberlain, Middle Salmon-Panther, Pashimerol, South Fork Salmon, Upper Middle Fork Salmon, Upper Grande Ronde, Upper Salmon, and Wallowa. Areas above Hells Canyon Dam are excluded, along with unnamed "impassable natural falls." Napias Creek Falls, near Salmon, Idaho, was later named an upstream barrier (64FR57399-57403, October 25, 1999). The Grande Ronde, Imnaha, Salmon, and Tucannon subbasins, and Asotin, Granite, and Sheep Creeks were specifically named in the Critical Habitat Notice.

Spawning and rearing counties include Union, Wallowa, and Baker counties in Oregon; Adams, Custer, Idaho, Lemhi, Lewis, Nez Perce, and Valley counties in Idaho; and Asotin, Columbia, Franklin, Garfield, and Whitman counties in Washington. Other counties within migratory corridors are all of those down stream from the confluence of the Snake and Columbia Rivers: Umatilla, Morrow, Gilliam, Sherman, Wasco, Hood River, Multnomah, Columbia, and Clatsop Counties in Oregon; and Klickitat, Skamania, Clark, Cowlitz, Wahkiakum, Benton, and Walla Walla Counties in Washington. Salmon habitat is also located in Blaine County in Idaho.

The maximum legal use rates of triclopyr BEE to control weeds are predicted to pose risk to freshwater fish, freshwater invertebrates, and aquatic plants, which leads to both direct and indirect effects on salmonids. Due to the lack of smaller-scale data, we must assume that all non-irrigation ditchbanks and forest management sites throughout all the counties in this ESU are treated with triclopyr BEE. Therefore, due to possible direct and indirect effects on salmonids, we conclude that triclopyr BEE use to control weeds may effect T&E salmonids in this ESU.

(8) Upper Columbia River Spring-run Chinook Salmon ESU

The Upper Columbia River Spring-run Chinook Salmon ESU was proposed as endangered in 1998 (63FR11482-11520,March 9,1998) and listed a year later (64FR14308-14328, March 24, 1999). Critical habitat was designated February 16, 2000 (65FR7764-7787) to encompass all river reaches accessible to listed chinook salmon in Columbia River tributaries upstream of the Rock Island Dam and downstream of Chief Joseph Dam in Washington, excluding the Okanogan River, as well as all down stream migratory corridors to the Pacific Ocean. Hydrologic units and their upstream barriers are Chief Joseph (Chief Joseph Dam), Similkameen, Methow, Upper

Columbia-Entiat, Wenatchee, Upper Columbia-Priest Rapids, Middle Columbia-Lake Wallula, Middle Columbia-Hood, Lower Columbia-Sandy, Lower Columbia-Clatskanie, Lower Columbia, and Lower Willamette. Counties in which spawning and rearing occur are Chelan, Douglas, Okanogan, Grant, Benton, and Kittitas Counties in Washington.. Migratory corridors include Clatsop, Columbia, Gilliam, Hood River, Morrow, Multnomah, Sherman, Umatilla, and Wasco Counties in Oregon; and Clark, Cowlitz, Franklin, Klickitat, Pacific, Skamania, Wahkiakum, Walla Walla, and Yakima Counties in Washington.

The maximum legal use rates of triclopyr BEE to control weeds are predicted to pose risk to freshwater fish, freshwater invertebrates, and aquatic plants, which leads to both direct and indirect effects on salmonids. Due to the lack of smaller-scale data, we must assume that all non-irrigation ditchbanks and forest management sites throughout all the counties in this ESU are treated with triclopyr BEE. Therefore, due to possible direct and indirect effects on salmonids, I conclude that triclopyr BEE use to control weeds may effect T&E salmonids in this ESU.

(9) Upper Willamette River Chinook Salmon ESU

The Upper Willamette River Chinook Salmon ESU was proposed as threatened in 1998 (63FR11482-11520, March 9, 1998) and listed a year later (64FR14308-14328, March 24, 1999). Critical habitat was designated February 16, 2000 (65FR7764-7787) to encompass all river reaches accessible to listed chinook salmon in the Clackamas River and the Willamette River and its tributaries above Willamette Falls, in addition to all down stream river reaches of the Willamette and Columbia Rivers to the Pacific Ocean.

The hydrologic units included are the Lower Columbia-Sandy, Lower Columbia-Clatskanie, Lower Columbia, Middle Fork Willamette, Coast Fork Willamette (upstream barriers - Cottage Grove Dam, Dorena Dam), Upper Willamette (upstream barrier - Fern Ridge Dam), McKenzie (upstream barrier - Blue River Dam), North Santiam (upstream barrier – Big Cliff Dam), South Santiam (upstream barrier - Green Peter Dam), Middle Willamette, Yamhill, Molalla-Pudding, Tualatin, Clackamas, and Lower Willamette. Spawning and rearing habitat is in the Oregon counties of Clackamas, Douglas, Lane, Benton, Linn, Polk, Marion, Yamhill, and Washington. Migration corridors include Multnomah, Columbia, and Clatsop Counties in Oregon, and Clark, Cowlitz, Wahkiakum, and Pacific Counties in Washington. Other habitat is located in Lincoln and Tillamook Counties in Oregon.

The maximum legal use rates of triclopyr BEE to control weeds are predicted to pose risk to freshwater fish, freshwater invertebrates, and aquatic plants, which leads to both direct and indirect effects on salmonids. Due to the lack of smaller-scale data, we must assume that all non-irrigation ditchbanks and forest management sites throughout all the counties in this ESU are treated with triclopyr BEE. Therefore, due to possible direct and indirect effects on salmonids, we conclude that triclopyr BEE use to control weeds may effect T&E salmonids in this ESU.

(b) Chum Salmon

Chum salmon, *Oncorhynchus keta*, have the widest natural geographic and spawning distribution of any Pacific salmonid, primarily because its range extends farther along the shores of the Arctic Ocean. Chum salmon have been documented to spawn from Asia around the rim of the North Pacific Ocean to Monterey Bay in central California. Presently, major spawning populations are found only as far south as Tillamook Bay on the northern Oregon coast.

Most chum salmon mature between 3 and 5 years of age, usually at 4, with younger fish being more predominant in southern parts of their range. Chum salmon usually spawn in coastal areas, typically within 100 km of the ocean, where they do not have to surmount river blockages and falls. However, in the Skagit River, Washington, they migrate at least 170 km. During the spawning migration, adult chum salmon enter natal river systems from June to March, depending on characteristics of the population or geographic location. In Washington, a variety of seasonal runs are recognized, including summer, fall, and winter populations. Fall-run fish predominate, but summer runs are found in Hood Canal, the Strait of Juan de Fuca, and in southern Puget Sound, and winter runs occur in two rivers in southern Puget Sound.

Redds are usually dug in the mainstream or in side channels of rivers. Juveniles migrate out to seawater almost immediately after emerging from the gravel that covers their redds. This means that survival and growth in juvenile chum salmon depend less on freshwater conditions than on favorable estuarine and marine conditions.

(1) Columbia River Chum Salmon ESU

The Columbia River chum salmon ESU was proposed for listing as threatened, and critical habitat was proposed, in 1998 (63FR11774-11795, March 10, 1998). The final listing was published a year later (63FR14508-14517, March 25, 1999), and critical habitat was designated in 2000 (65FR7764-7787).

Critical habitat for the Columbia River chum salmon ESU encompasses all accessible reaches and adjacent riparian zones of the Columbia River (including estuarine areas and tributaries) downstream from Bonneville Dam, excluding Oregon tributaries upstream of Milton Creek at river km 144 near the town of St. Helens. These areas are the hydrologic units of Lower Columbia-Sandy (upstream barrier - Bonneville Dam), Lewis (upstream barrier – Merlin Dam), Lower Columbia-Clatskanie, Lower Cowlitz, Lower Columbia, and Lower Willamette in the counties of Clark, Skamania, Cowlitz, Wahkiakum, Pacific, and Lewis in Washington; and Multnomah, Clatsop, Columbia, and Washington in Oregon. It appears that there are three extant populations in Grays River, Hardy Creek, and Hamilton Creek.

The maximum legal use rates of triclopyr BEE to control weeds are predicted to pose risk to freshwater fish, freshwater invertebrates, and aquatic plants, which leads to both direct and indirect effects on salmonids. Due to the lack of smaller-scale data, we must assume that all non-irrigation ditchbanks and forest management sites throughout all the counties in this ESU are treated with triclopyr BEE. Therefore, due to possible direct and indirect effects on salmonids, we conclude that triclopyr BEE use to control weeds may effect T&E salmonids in this ESU.

(2) Hood Canal Summer-run Chum Salmon ESU

The Hood Canal summer-run chum salmon ESU was proposed for listing as threatened, and critical habitat was proposed, in 1998 (63FR11774-11795, March 10, 1998). The final listing was published a year later (63FR14508-14517, March 25, 1999), and critical habitat was designated in 2000 (65FR7764-7787).

Critical habitat for the Hood Canal ESU includes Hood Canal, Admiralty Inlet, and the straits of Juan de Fuca, along with all river reaches accessible to listed chum salmon draining into Hood Canal as well as Olympic Peninsula rivers between Hood Canal and Dungeness Bay, Washington. The hydrologic units are Skokomish (upstream boundary - Cushman Dam), Hood Canal, Puget Sound, Dungeness-Elwha, in the counties of Mason, Clallam, Jefferson, Kitsap, Island, and Grays Harbor. Grays Harbor County was excluded because the very small amount of habitat is within the Olympic National Forest.

Streams specifically mentioned, in addition to Hood Canal, in the proposed critical habitat Notice include Union River, Tahuya River, Big Quilcene River, Big Beef Creek, Anderson Creek, Dewatto River, Snow Creek, Salmon Creek, Jimmy Comelately Creek, Duckabush 'stream,' Hamma Hamma 'stream,' and Dosewallips 'stream.'

The maximum legal use rates of triclopyr BEE to control weeds are predicted to pose risk to freshwater fish, freshwater invertebrates, and aquatic plants, which leads to both direct and indirect effects on salmonids. Due to the lack of smaller-scale data, we must assume that all non-irrigation ditchbanks and forest management sites throughout all the counties in this ESU are treated with triclopyr BEE. Therefore, due to possible direct and indirect effects on salmonids, we conclude that triclopyr BEE use to control weeds may effect T&E salmonids in this ESU.

(c) Coho Salmon

Coho salmon, *Oncorhynchus kisutch*, were historically distributed throughout the North Pacific Ocean from central California to Point Hope, AK, through the Aleutian Islands into Asia. Historically, this species probably inhabited most coastal streams in Washington, Oregon, and central and northern California. Some populations may once have migrated hundreds of miles inland to spawn in tributaries of the upper Columbia River in Washington and the Snake River in Idaho.

Coho salmon generally exhibit a relatively simple, 3-year life cycle. Adults typically begin their freshwater spawning migration in the late summer and fall, spawn by mid-winter, then die. Southern populations migrate somewhat later and spend much less time in the river prior to spawning than do northern coho. Homing fidelity in coho salmon is generally strong; however their small tributary habitats experience relatively frequent, temporary blockages, and there are a number of examples in which coho salmon have rapidly recolonized vacant habitat that had only recently become accessible to anadromous fish.

After spawning in late fall and early winter, eggs incubate in redds for 1.5 to 4 months, depending upon the temperature, before hatching as alevins. Following yolk sac absorption, alevins emerge and begin actively feeding as fry. Juveniles rear in fresh water for up to 15 months, then migrate to the ocean as smolts in the spring. Coho salmon typically spend two growing seasons in the ocean before returning to their natal stream. They are most frequently recovered from ocean waters in the vicinity of their spawning streams, with a minority being recovered at adjacent coastal areas, decreasing in number with distance from the natal streams. However, those coho released from Puget Sound, Hood Canal, and the Strait of Juan de Fuca are caught at high levels in Puget Sound, an area not entered by coho salmon from other areas.

(1) Central California Coast Coho Salmon ESU

The Central California Coast Coho Salmon ESU includes all coho naturally reproduced in streams between Punta Gorda, Humboldt County, CA and San Lorenzo River, Santa Cruz County, CA, inclusive. This ESU was proposed in 1995 (60FR38011-38030, July 25, 1995) and listed as threatened, with critical habitat designated, on May 5, 1999 (64FR24049-24062). Critical habitat consists of accessible reaches along the coast, including Arroyo Corte Madera Del Presidio and Corte Madera Creek, tributaries to San Francisco Bay.

Hydrologic units within the boundaries of this ESU are: San Lorenzo-Soquel (upstream barrier - Newell Dam), San Francisco Coastal South, San Pablo Bay (upstream barrier – Phoenix Dam-Phoenix Lake), Tomales-Drake Bays (upstream barriers - Peters Dam-Kent Lake; Seeger Dam-Nicasio Reservoir), Bodega Bay, Russian (upstream barriers - Warm springs dam-Lake Sonoma; Coyote Dam-Lake Mendocino), Gualala-Salmon, and Big-Navarro-Garcia. California counties included are Santa Cruz, San Mateo, Marin, Napa, Sonoma, and Mendocino. San Francisco County lies within the north-south boundaries of this ESU, but was not named in the Critical Habitat FR Notice, presumably because there are no coho salmon streams in the county, therefore it is excluded.

Table 12 in attachment G show the cropping information where triclopyr BEE can be used in California counties where the Central California Coho ESU is located. In this table, if there is no acreage give for a specific crop, this means that there are too few growers in the area for CA DPR to make the data available.

There is a modest amount, 3,915 pounds, of triclopyr BEE applied to approximately 5,226 acres of this ESU. Approximately 0.1% of the total ESU acreage is treated with triclopyr BEE. The GENEEC modesl indicated risk to freshwater fish, freshwater invertebrates, and aquatic plants from triclopyr BEE use. Given the modest of triclopyr BEE applied to this ESU, I conclude that triclopyr BEE may affect, but is not likely to adversely affect the Central California Coho ESU.

(2) Oregon Coast coho salmon ESU

The Oregon coast coho salmon ESU was first proposed for listing as threatened in 1995 (60FR38011-38030, July 25, 1995), and listed several years later (63FR42587-42591, August 10,
1998). Critical habitat was proposed in 1999 (64FR24998-25007, May 10, 1999) and designated on February 16, 2000 (65FR7764-7787).

This ESU includes coastal populations of coho salmon from Cape Blanco, Curry County, Oregon to the Columbia River. Spawning is spread over many basins, large and small, with higher numbers further south where the coastal lake systems (e.g., the Tenmile, Tahkenitch, and Siltcoos basins) and the Coos and Coquille Rivers have been particularly productive. Critical Habitat includes all accessible reaches in the coastal hydrologic reaches Necanicum, Nehalem, Wilson-Trask-Nestucca (upstream barrier - McGuire Dam), Siletz-Yaquina, Alsea, Siuslaw, Siltcoos, North Umpqua (upstream barriers - Cooper Creek Dam, Soda Springs Dam), South Umpqua (upstream barrier - Ben Irving Dam, Galesville Dam, Win Walker Reservoir), Umpqua, Coos (upstream barrier - Lower Pony Creek Dam), Coquille, Sixes. Related Oregon counties are Josephine, Douglas, Lane, Coos, Curry, Benton, Lincoln, Polk, Tillamook, Yamhill, Washington, Columbia, and Clatsop.

The maximum legal use rates of triclopyr BEE to control weeds are predicted to pose risk to freshwater fish, freshwater invertebrates, and aquatic plants, which leads to both direct and indirect effects on salmonids. Due to the lack of smaller-scale data, we must assume that all non-irrigation ditchbanks and forest management sites throughout all the counties in this ESU are treated with triclopyr BEE. Therefore, due to possible direct and indirect effects on salmonids, we conclude that triclopyr BEE use to control weeds may effect T&E salmonids in this ESU.

(3) Southern Oregon/Northern California Coast Coho Salmon ESU

The Southern Oregon/Northern California coastal coho salmon ESU was proposed as threatened in 1995 (60FR38011-38030, July 25, 1995) and listed on May 6, 1997 (62FR24588-24609). Critical habitat was proposed later that year (62FR62741-62751, November 25, 1997) and finally designated on May 5, 1999 (64FR24049-24062) to encompass accessible reaches of all rivers (including estuarine areas and tributaries) between the Mattole River in California and the Elk River in Oregon, inclusive.

The Southern Oregon/Northern California Coast coho salmon ESU occurs between Punta Gorda, Humboldt County, California and Cape Blanco, Curry County, Oregon. Major basins with this salmon ESU are the Rogue, Klamath, Trinity, and Eel river basins, while the Elk River, Oregon, and the Smith and Mad Rivers, and Redwood Creek, California are smaller basins within the range. Hydrologic units and the upstream barriers are Mattole, South Fork Eel, Lower Eel, Middle Fork Eel, Upper Eel (upstream barrier - Scott Dam-Lake Pillsbury), Mad-Redwood, Smith, South Fork Trinity, Trinity (upstream barrier - Lewiston Dam-Lewiston Reservoir), Salmon, Lower Klamath, Scott, Shasta (upstream barrier - Dwinnell Dam-Dwinnell Reservoir), Upper Klamath (upstream barrier - Irongate Dam-Irongate Reservoir), Chetco, Illinois (upstream barrier - Selmac Dam-Lake Selmac), Lower Rogue, Applegate (upstream barrier – Applegate Dam-Applegate Reservoir), Middle Rogue (upstream barrier - Emigrant Lake Dam-Emigrant Lake), Upper Rogue (upstream barriers - Agate Lake Dam-Agate Lake; Fish Lake Dam-Fish Lake; Willow Lake Dam-Willow Lake; Lost Creek Dam-Lost Creek Reservoir), and Sixes. Related counties are Humboldt, Mendocino, Trinity, Lake, and Del Norte in California and Curry, Jackson, Josephine, Klamath, and Douglas in Oregon.

Note: We previously included Klamath County, OR in this ESU, but have now omitted it because it appears to be entirely upstream of various named barriers. Again we will submit more details in a separate transmittal to NMFS.

Table 14 in attachment G shows the cropping information where triclopyr BEE can be used in California counties where the Southern Oregon / Northern California Coast Coho ESU is located. In this table, if there is no acreage given for a specific crop, this means that there are too few growers in the area for CA DPR to make the data available.

For the California portion of the ESU, there is a modest amount, 12,518 pounds, of triclopyr BEE applied to 7,869 acres in this ESU. Less than 0.1% of the total acreas in this ESU are treated with triclopyr BEE. The likelihood for effects from triclopyr BEE uses seems low, especially in conjunction with the California county bulletins. The maximum legal use rates of triclopyr BEE to control weeds are predicted to pose risk to freshwater fish, freshwater invertebrates, and aquatic plants, which leads to both direct and indirect effects on salmonids. Due to the lack of smaller-scale data, we must assume that all non-irrigation ditchbanks and forest management sites throughout all the counties in this ESU are treated with triclopyr BEE. A majority of the acres in this ESU are located in California counties. Even if maximum application rates are used to treat non-irrigation ditchbanks and forest management sites in the Oregon ESU counties, the amount of triclopyr BEE applied will be modest. Therefore, given the modest amount of triclopyr BEE applied in California and Oregon counties, I conclude that triclopyr BEE may affect, but is not likely to adversely affect the Southern Oregon / Northern California Coasts Coho Salmon ESU.

(d) Sockeye Salmon

Sockeye salmon, *Oncorhynchus nerka*, are the third most abundant species of Pacific salmon, after pink and chum salmon. Sockeye salmon exhibit a wide variety of life history patterns that reflect varying dependency on the fresh water environment. The vast majority of sockeye salmon typically spawn in inlet or outlet tributaries of lakes or along the shoreline of lakes, where their distribution and abundance is closely related to the location of rivers that provide access to the lakes. Some sockeye, known as kokanee, are non-anadromous and have been observed on the spawning grounds together with their anadromous counterparts. Some sockeye, particularly the more northern populations, spawn in mainstem rivers. Growth is influenced by competition, food supply, water, temperature, thermal stratification, and other factors, with lake residence time usually increasing the farther north that a nursery lake is located. In Washington and British Columbia, lake residence is normally 1 or 2 years. Incubation, fry emergence, spawning, and adult lake entry often involve intricate patterns of adult and juvenile migration and orientation not seen in other *Oncorhynchus* species.

Upon emergence from the substrate, lake-type sockeye salmon juveniles move either downstream or upstream to rearing lakes, where the juveniles rear for 1 to 3 years prior to migrating to sea. Smolt migration typically occurs beginning in late April and extending through early July.

Once in the ocean, sockeye salmon feed on copepods, euphausiids, amphipods, crustacean larvae, fish larvae, squid, and pteropods. They will spend from 1 to 4 years in the ocean before returning to freshwater to spawn. Adult sockeye salmon home precisely to their natal stream or lake. River- and sea-type sockeye salmon have higher straying rates within river systems than lake-type sockeye salmon.

(1) Ozette Lake Sockeye Salmon ESU

The Ozette Lake sockeye salmon ESU was proposed for listing, along with proposed critical habitat, in 1998 (63FR11750-11771, March 10, 1998). It was listed as threatened on March 25, 1999 (64FR14528-14536), and critical habitat was designated on February 16, 2000 (65FR7764-7787). This ESU spawns in Lake Ozette, Clallam County, Washington, as well as in its outlet stream and the tributaries to the lake. It has the smallest distribution of any listed Pacific salmon.

The maximum legal use rates of triclopyr BEE to control weeds are predicted to pose risk to freshwater fish, freshwater invertebrates, and aquatic plants, which leads to both direct and indirect effects on salmonids. Due to the lack of smaller-scale data, we must assume that all non-irrigation ditchbanks and forest management sites throughout all the counties in this ESU are treated with triclopyr BEE. Therefore, due to possible direct and indirect effects on salmonids, we conclude that triclopyr BEE use to control weeds may effect T&E salmonids in this ESU.

(2) Snake River Sockeye Salmon ESU

The Snake River sockeye salmon was the first salmon ESU in the Pacific Northwest to be listed. It was proposed and listed in 1991 (56FR14055-14066, April 5, 1991 & 56FR58619-58624, November 20, 1991). Critical habitat was proposed in 1992 (57FR57051-57056, December 2, 1992) and designated a year later (58FR68543-68554, December 28, 1993) to include river reaches of the mainstem Columbia River, Snake River, and Salmon River from its confluence with the outlet of Stanley Lake down stream, along with Alturas Lake Creek, Valley Creek, and Stanley, Redfish, Yellow Belly, Pettit, and Alturas lakes (including their inlet and outlet creeks).

Spawning and rearing habitats are considered to be all of the above-named lakes and creeks, even though at the time of the critical habitat Notice, spawning only still occurred in Redfish Lake. These habitats are in Custer and Blaine counties in Idaho. Migration corridors occur in the counties of Asotin, Benton, Clark, Columbia, Cowlitz, Franklin, Farfield, Klickitat, Pacific, Skamania, Wahkiakum, Walla, Walla, and Whitman in Washington; Clatsop, Columbia, Gilliam, Hood River, Morrow, Multnomah, Sherman, Umatilla, Wallowa, and Wasco in Oregon; and Lewis, Idaho, Lemhi, and Nez Perce in Idaho.

The maximum legal use rates of triclopyr BEE to control weeds are predicted to pose risk to freshwater fish, freshwater invertebrates, and aquatic plants, which leads to both direct and indirect effects on salmonids. Due to the lack of smaller-scale data, we must assume that all non-irrigation ditchbanks and forest management sites throughout all the counties in this ESU are treated with triclopyr BEE. Therefore, due to possible direct and indirect effects on salmonids, we conclude that triclopyr BEE use to control weeds may effect T&E salmonids in this ESU.

(e) Steelhead

Steelhead, *Oncorhynchus mykiss*, exhibit one of the most complex suites of life history traits of any salmonid species. Steelhead may exhibit anadromy or freshwater residency. Resident forms are usually referred to as “rainbow” or “redband” trout, while anadromous life forms are termed “steelhead.” The relationship between these two life forms is poorly understood; however, the scientific name was recently changed to represent that both forms are a single species.

Steelhead typically migrate to marine waters after spending 2 years in fresh water. They then reside in marine waters for typically 2 or 3 years prior to returning to their natal stream to spawn as 4-or 5-year-olds. Unlike Pacific salmon, they are capable of spawning more than once before they die. However, it is rare for steelhead to spawn more than twice before dying; most that do so are females. Steelhead adults typically spawn between December and June.

Depending on water temperature, steelhead eggs may incubate in redds (spawning beds) for 1.5 to 4 months before hatching as alevins. Following yolk sac absorption, alevins emerge as fry and begin actively feeding. Juveniles rear in fresh water from 1 to 4 years, then migrate to the ocean as smolts.

Biologically, steelhead can be divided into two reproductive ecotypes. “Stream maturing” or “summer steelhead” enter fresh water in a sexually immature condition and require several months to mature and spawn. “Ocean maturing” or “winter steelhead” enter fresh water with well-developed gonads and spawn shortly after river entry. There are also two major genetic groups, applying to both anadromous and nonanadromous forms: a coastal group and an inland group, separated approximately by the Cascade crest in Oregon and Washington. California is thought to have only coastal steelhead while Idaho has only inland steelhead.

Historically, steelhead were distributed throughout the North Pacific Ocean from the

Kamchatka Peninsula in Asia to the northern Baja Peninsula, but they are now known only as far south as the Santa Margarita River in San Diego County. Many populations have been extirpated.

(1) Central California Coast Steelhead ESU

The Central California coast steelhead ESU was proposed for listing as endangered on August 9, 1996 (61FR41541-41561) and the listing was made final, as threatened, a year later (62FR43937-43954, August 18, 1997). Critical Habitat was proposed February 5, 1999 (64FR5740-5754) and designated on February 16, 2000 (65FR7764-7787). This coastal steelhead ESU occupies California river basins from the Russian River, Sonoma County, to Aptos Creek, Santa Cruz County, (inclusive), and the drainages of San Francisco and San Pablo Bays eastward to the Napa River (inclusive), Napa County. The Sacramento-San Joaquin River Basin of the Central Valley of California is excluded. Steelhead in most tributary streams in San Francisco and San Pablo Bays appear to have been extirpated, whereas most coastal streams sampled in the central California coast region do contain steelhead.

Only winter steelhead are found in this ESU and those to the south. River entry ranges from October in the larger basins, late November in the smaller coastal basins, and continues through June. Steelhead spawning begins in November in the larger basins, December in the smaller coastal basins, and can continue through April with peak spawning generally in February and March. Hydrologic units in this ESU include Russian (upstream barriers - Coyote Dam, Warm Springs Dam), Bodega Bay, Suisun Bay, San Pablo Bay (upstream barriers – Phoenix Dam, San Pablo Dam), Coyote (upstream barriers - Almaden, Anderson, Calero, Guadelupe, Stevens Creek, and Vasona Reservoirs, Searsville Lake), San Francisco Bay (upstream barriers - Calveras Reservoir, Chabot Dam, Crystal Springs Reservoir, Del Valle Reservoir, San Antonio Reservoir), San Francisco Coastal South (upstream barrier - Pilarcitos Dam), and San Lorenzo-Soquel (upstream barrier - Newell Dam). Affected counties include Alameda, Contra Costa, Marin, Mendocino, Napa, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, and Sonoma.

Table 17 in attachment G shows the cropping information for California counties where the Central California Coast Steelhead ESU is located. In this table, if there is no acreage given for a specific crop, this means that there are too few growers in the area for CA DPR to make the data available.

There is a modest amount, 12,562 pounds, of triclopyr BEE applied to approximately 5,599 acres in this ESU. Approximately 0.1% of the total acres in this ESU are treated with triclopyr BEE. The GENEEC modes indicated potential risk to freshwater fish, freshwater invertebrates, and aquatic plants from use of triclopyr BEE. Given the modest amount of triclopyr BEE applied in this ESU, I conclude that triclopyr BEE may affect, but is not likely to adversely affect the Central California Coast Steelhead ESU.

(2) California Central Valley Steelhead ESU

The California Central Valley steelhead ESU was proposed for listing as endangered on August 9, 1996 (61FR41541-41561) and the listing was made final in 1998 (63FR 13347-13371, March 18, 1998). Critical Habitat was proposed February 5, 1999 (64FR5740-5754) and designated on February 16, 2000 (65FR7764-7787).

This ESU includes populations ranging from Shasta, Trinity, and Whiskeytown areas, along with other Sacramento River tributaries in the North, down the Central Valley along the San Joaquin River to and including the Merced River in the South, and then into San Pablo and San Francisco Bays. Counties at least partly within this area are Alameda, Amador, Butte, Calaveras, Colusa, Contra Costa, Glenn, Marin, Merced, Nevada, Placer, Sacramento, San Francisco, San Joaquin, San Mateo, San Francisco, Shasta, Solano, Sonoma, Stanislaus, Sutter, Tehama, Tuloumne, Yolo, and Yuba. A large proportion of this area is heavily agricultural, but there are also large amounts of urban and suburban areas.

Usage of triclopyr BEE in counties where the California Central Valley Steelhead ESU occurs is presented in table 18 of attachment G. In this table, if there is no acreage given for a specific crop, this means that there are too few growers in this area for CA DPR to make the data available. Less than 0.1% of the total acres within this ESU recieves triclopyr BEE applications. A modest amount, 26,724 pounds, of triclopyr BEE is applied to approximately 9,028 acres within this ESU. The GENEEC model indicated that usage of triclopyr BEE at maximum registered application rates may pose risk to freshwater fish, freshwater invertebrates, and aquatic plants. Given the modest amount of triclopyr BEE applied within this ESU, I conclude that triclopyr BEE may affect, but is not likely to adversely affect the Central Valley California Steelhead ESU.

(3) Lower Columbia River Steelhead ESU

The Lower Columbia River steelhead ESU was proposed for listing as endangered on August 9, 1996 (61FR41541-41561) and the listing was made final a year later (62FR43937-43954, August 18, 1997). Critical Habitat was proposed February 5, 1999 (64FR5740-5754) and designated on February 16, 2000 (65FR7764-7787).

This ESU includes all tributaries from the lower Willamette River (below Willamette Falls) to Hood River in Oregon, and from the Cowlitz River up to the Wind River in Washington. These tributaries would provide the spawning and presumably the growth areas for the young steelhead. It is not clear if the young and growing steelhead in the tributaries would use the nearby mainstem of the Columbia prior to downstream migration. If not, the spawning and rearing habitat would occur in Hood River, Clackamas, and Multnomah counties in Oregon, and Skamania, Clark, and Cowlitz counties in Washington. Tributaries of the extreme lower Columbia River, e.g., Grays River in Pacific and Wahkiakum counties, Washington and John Day River in Clatsop county, Oregon, are not discussed in the Critical Habitat FRNs; because they are not “between” the specified tributaries, they do not appear part of the spawning and rearing habitat for this steelhead ESU. The mainstem of the Columbia River from the mouth to Hood River constitutes the migration corridor. This would additionally include Columbia and

Clatsop counties, Oregon, and Pacific and Wahkiakum counties, Washington. Other habitat is located in Lewis County, Washington and in Marion and Washington Counties in Oregon.

Hydrologic units for this ESU are Middle Columbia-Hood, Lower Columbia-Sandy (upstream barrier - Bull Run Dam 2), Lewis (upstream barrier - Merlin Dam), Lower Columbia-Clatskanie, Lower Cowlitz, Lower Columbia, Clackamas, and Lower Willamette.

The maximum legal use rates of triclopyr BEE to control weeds are predicted to pose risk to freshwater fish, freshwater invertebrates, and aquatic plants, which leads to both direct and indirect effects on salmonids. Due to the lack of smaller-scale data, we must assume that all non-irrigation ditchbanks and forest management sites throughout all the counties in this ESU are treated with triclopyr BEE. Therefore, due to possible direct and indirect effects on salmonids, we conclude that triclopyr BEE use to control weeds may effect T&E salmonids in this ESU.

(4) Middle Columbia River Steelhead ESU

The Middle Columbia River steelhead ESU was proposed for listing as threatened on March 10, 1998 (63FR11798-11809) and the listing was made final a year later (64FR14517-14528, March 25, 1999). Critical Habitat was proposed February 5, 1999 (64FR5740-5754) and designated on February 16, 2000 (65FR7764-7787).

This steelhead ESU occupies "the Columbia River Basin and tributaries from above the Wind River in Washington and the Hood River in Oregon (exclusive), upstream to, and including, the Yakima River, in Washington." The Critical Habitat designation indicates the downstream boundary of the ESU to be Mosier Creek in Wasco County, Oregon; this is consistent with Hood River being "excluded " in the listing notice. No downstream boundary is listed for the Washington side of the Columbia River, but if Wind River is part of the Lower Columbia steelhead ESU, it appears that Collins Creek, Skamania County, Washington would be the last stream down river in the Middle Columbia River ESU. Dog Creek may also be part of the ESU, but White Salmon River certainly is, since the Condit Dam is mentioned as an upstream barrier.

The only other upstream barrier, in addition to Condit Dam on the White Salmon River, is the Pelton Dam on the Deschutes River. As an upstream barrier, this dam would preclude steelhead from reaching the Metolius and Crooked Rivers as well the upper Deschutes River and its tributaries.

The Oregon counties then that appear to have spawning and rearing habitat are Gilliam, Morrow, Umatilla, Sherman, Wasco, Crook, Grant, Wheeler, and Jefferson counties in Oregon. Washington counties providing spawning and rearing habitat include Columbia, Benton, Franklin, Kittitas, Klickitat, Skamania, Walla Walla, and Yakima. Only small portions of Franklin and Skamania Counties intersect with the spawning and rearing habitat of this ESU.

Migratory corridors include Hood River, Multnomah, Columbia, and Clatsop counties in

Oregon, and Skamania, Clark, Cowlitz, Wahkiakum, and Pacific Counties in Washington. Additional habitat is located in Wallowa, Harney, and Union Counties in Oregon.

The maximum legal use rates of triclopyr BEE to control weeds are predicted to pose risk to freshwater fish, freshwater invertebrates, and aquatic plants, which leads to both direct and indirect effects on salmonids. Due to the lack of smaller-scale data, we must assume that all non-irrigation ditchbanks and forest management sites throughout all the counties in this ESU are treated with triclopyr BEE. Therefore, due to possible direct and indirect effects on salmonids, we conclude that triclopyr BEE use to control weeds may effect T&E salmonids in this ESU.

(5) Northern California Steelhead ESU

The Northern California steelhead ESU was proposed for listing as threatened on February 11, 2000 (65FR6960-6975) and the listing was made final on June 7, 2000 (65FR36074-36094). Critical Habitat has not yet been officially established. This Northern California coastal steelhead ESU occupies river basins from Redwood Creek in Humboldt County, CA to the Gualala River, inclusive, in Mendocino County, CA. River entry ranges from August through June and spawning from December through April, with peak spawning in January in the larger basins and in late February and March in the smaller coastal basins. The Northern California ESU has both winter and summer steelhead, including what is presently considered to be the southernmost population of summer steelhead, in the Middle Fork Eel River. Counties included appear to be Humboldt, Mendocino, Trinity, and Lake.

Table 21 in attachment G shows the cropping information for California counties where the Northern California Steelhead ESU is located. In this table, if there is no acreage given for a specific crop, this means that there are too few growers in the area for CA DPR to make the data available.

There is a modest amount, 11,492 pounds, of triclopyr BEE applied to approximately 7,212 acres in this entire ESU. Triclopyr BEE is applied to approximately 0.1% acres of more than 7.4 million acres that comprise this ESU. The GENEEC model indicated that use of triclopyr BEE may pose risk to freshwater fish, freshwater invertebrates, and aquatic plants. Given the modest amount of triclopyr BEE applied to this ESU, I conclude that triclopyr BEE may affect, but is not likely to adversely affect the Northern California Steelhead ESU.

(6) Snake River Basin Steelhead ESU

The Snake River Basin steelhead ESU was proposed for listing as endangered on August 9, 1996 (61FR41541-41561) and the listing was made final a year later (62FR43937-43954, August 18, 1997). Critical Habitat was proposed February 5, 1999 (64FR5740-5754) and designated on February 16, 2000 (65FR7764-7787).

Spawning and early growth areas of this ESU consist of all areas upstream from the confluence of the Snake River and the Columbia River as far as fish passage is possible. Hells Canyon Dam on the Snake River and Dworshak Dam on the Clearwater River, along with Napias Creek Falls near Salmon, Idaho, are named as impassable barriers. These areas include the counties of Wallowa and Union; Asotin, Garfield, Columbia, Whitman, Franklin, Adams, and Walla Walla in Washington; and Adams, Idaho, Nez Perce, Custer, Lemhi, Valley, Lewis, Clearwater, and Latah in Idaho.

Note: We are uncertain about the inclusion of Adams, Lincoln and Spokane counties in Washington in this ESU. They are not named in the Critical Habitat FR Notice, but they appear to include waters in the listed hydrologic unit. We have included them below, but will be seeking NMFS guidance in a separate request.

Critical Habitat also includes the migratory corridors of the Columbia River from the confluence of the Snake River to the Pacific Ocean. Additional counties in the migratory corridors are Umatilla, Gilliam, Morrow, Sherman, Wasco, Hood River, Multnomah, Columbia, and Clatsop in Oregon; and Walla Walla, Benton, Klickitat, Skamania, Clark, Cowlitz, Wahkiakum, and Pacific in Washington. Other habitat is included in Blaine and Boise Counties in Idaho, and Baker County, Oregon.

The maximum legal use rates of triclopyr BEE to control weeds are predicted to pose risk to freshwater fish, freshwater invertebrates, and aquatic plants, which leads to both direct and indirect effects on salmonids. Due to the lack of smaller-scale data, we must assume that all non-irrigation ditchbanks and forest management sites throughout all the counties in this ESU are treated with triclopyr BEE. Therefore, due to possible direct and indirect effects on salmonids, we conclude that triclopyr BEE use to control weeds may effect T&E salmonids in this ESU.

(7) South Central California Steelhead ESU

The South Central California steelhead ESU was proposed for listing as endangered on August 9, 1996 (61FR41541-41561) and the listing was made final, as threatened, a year later (62FR43937-43954, August 18, 1997). Critical Habitat was proposed February 5,1999 (64FR5740-5754) and designated on February 16, 2000 (65FR7764-7787). This coastal steelhead ESU occupies rivers from the Pajaro River, Santa Cruz County, to (but not including) the Santa Maria River, San Luis Obispo County. Most rivers in this ESU drain the Santa Lucia Mountain Range, the southernmost unit of the California Coast Ranges (62FR43937-43954, August 18, 1997). River entry ranges from late November through March, with spawning occurring from January through April.

This ESU includes the hydrologic units of Pajaro (upstream barriers - Chesbro Reservoir, North Fork Pachero Reservoir), Estrella, Salinas (upstream barriers - Nacimiento Reservoir, Salinas Dam, San Antonio Reservoir), Central Coastal (upstream barriers - Lopez Dam, Whale Rock Reservoir), Alisal-Elkhorn Sloughs, and Carmel. Counties of occurrence include Santa Cruz, Santa Clara, San Benito, Monterey, and San Luis Obispo.

Table 23 in attachment G shows the cropping information for California counties where the South-Central California Coast Steelhead ESU is located. In this table, if there is no acreage given for a specific crop, this means that there are too few growers in the area for CA DPR to make the data available.

There is a modest amount, 4,948 pounds, of triclopyr BEE applied to approximately 214 acres in this ESU. The GENEEC model indicated that triclopyr BEE use may pose risk to freshwater fish, freshwater invertebrates, and aquatic plants. Given the modest amount of triclopyr BEE applied within this ESU, I conclude that triclopyr BEE may affect, but is not likely to adversely affect the South-Central Calfornia Coast Steelhead ESU.

(8) Southern California Steelhead ESU

The Southern California steelhead ESU was proposed for listing as endangered on August 9, 1996 (61FR41541-41561) and the listing was made final a year later (62FR43937-43954, August 18, 1997). Critical Habitat was proposed February 5, 1999 (64FR5740-5754) and designated on February 16, 2000 (65FR7764-7787). This ESU ranges from the Santa Maria River in San Luis Obispo County south to San Mateo Creek in San Diego County. Steelhead from this ESU may also occur in Santa Barbara, Ventura and Los Angeles counties, but this ESU apparently is no longer considered to be extant in Orange County (65FR79328-79336, December 19, 2000). Hydrologic units in this ESU are Cuyama (upstream barrier - Vaquero Dam), Santa Maria, San Antonio, Santa Ynez (upstream barrier - Bradbury Dam), Santa Barbara Coastal, Ventura (upstream barriers - Casitas Dam, Robles Dam, Matilja Dam, Vern Freeman Diversion Dam), Santa Clara (upstream barrier - Santa Felicia Dam), Calleguas, and Santa Monica Bay (upstream barrier - Rindge Dam). Counties comprising this ESU show a very high percentage of declining and extinct populations.

River entry ranges from early November through June, with peaks in January and February. Spawning primarily begins in January and continues through early June, with peak spawning in February and March.

Within San Diego County, the San Mateo Creek runs through Camp Pendleton Marine Base and into the Cleveland National Forest. While there are agricultural uses of pesticides in other parts of California within the range of this ESU, it would appear that there are no such uses in the vicinity of San Mateo Creek. Within Los Angeles County, this steelhead occurs in Malibu Creek and possibly Topanga Creek. Neither of these creeks drain agricultural areas.

Table 24 in attachment G shows the cropping information for California counties where the Southern California Steelhead ESU is located. In this table, if there is no acreage given for a specific crop, this means that there are too few growers in the area for CA DPR to make the data available.

There is a modest amount, 19,164 pounds, of triclopyr BEE applied to 1,134 acres within this ESU. Less than 0.1% acres of the ESU are treated with triclopyr BEE. The GENEEC model indicated that use of triclopy BEE may pose risk to freshwater fish, freshwater invertebrates, and aquatic plants. Given the modest amount of triclopyr BEE applied within this ESU, I conclude that triclopyr BEE may affect, but is likely to not adversely affect the Southern California Steelhead ESU.

(9) Upper Columbia River Steelhead ESU

The Upper Columbia River steelhead ESU was proposed for listing as endangered on August 9, 1996 (61FR41541-41561) and the listing was made final a year later (62FR43937-43954, August 18, 1997). Critical Habitat was proposed February 5, 1999 (64FR5740-5754) and designated on February 16, 2000 (65FR7764-7787).

The Upper Columbia River steelhead ESU ranges from several northern rivers close to the Canadian border in central Washington (Okanogan and Chelan counties) to the mouth of the Columbia River. The primary area for spawning and growth through the smolt stage of this ESU is from the Yakima River in south Central Washington upstream. Hydrologic units within the spawning and rearing habitat of the Upper Columbia River steelhead ESU and their upstream barriers are Chief Joseph (upstream barrier - Chief Joseph Dam), Oanogan, Similkameen, Methow, Upper Columbia-Entiat, Wenatchee, Moses-Coulee, and Upper Columbia-Priest Rapids. Within the spawning and rearing areas, counties are Chelan, Douglas, Okanogan, Grant, Benton, Franklin, Kittitas, and Yakima, all in Washington.

Note: Adams County, WA was not one of the counties named in the critical habitat FR Notice, but appears to be included in a hydrologic unit named in that notice. We have included it here, but seek NMFS guidance for future efforts.

Areas downstream from the Yakima River are used for migration. Additional counties through which the ESU migrates are Walla Walla, Klickitat, Skamania, Clark, Cowlitz, Wahkiakum, and Pacific in Washington; and Gilliam, Morrow, Sherman, Umatilla, Wasco, Hood River, Multnomah, Columbia, and Clatsop in Oregon. Other habitat is located in Columbia County in Washington.

The maximum legal use rates of triclopyr BEE to control weeds are predicted to pose risk to freshwater fish, freshwater invertebrates, and aquatic plants, which leads to both direct and indirect effects on salmonids. Due to the lack of smaller-scale data, we must assume that all non-irrigation ditchbanks and forest management sites throughout all the counties in this ESU are treated with triclopyr BEE. Therefore, due to possible direct and indirect effects on salmonids, we conclude that triclopyr BEE use to control weeds may effect T&E salmonids in this ESU.

(10) Upper Willamette River steelhead ESU

The Upper Willamette River steelhead ESU was proposed for listing as threatened on March 10, 1998 (63FR11798-11809) and the listing was made final a year later (64FR14517-

14528, March 25, 1999). Critical Habitat was proposed February 5, 1999 (64FR5740-5754) and designated on February 16, 2000 (65FR7764-7787). Only naturally spawned, winter steelhead trout are included as part of this ESU; where distinguishable, summer-run steelhead trout are not included.

Spawning and rearing areas are river reaches accessible to listed steelhead in the Willamette River and its tributaries above Willamette Falls up through the Calapooia River. This includes most of Benton, Linn, Polk, Clackamas, Marion, Yamhill, and Washington counties.

Hydrologic units where spawning and rearing occur are Upper Willamette, North Santiam (upstream barrier - Big Cliff Dam), South Santiam (upstream barrier - Green Peter Dam), Middle Willamette, Yamhill, Molalla-Pudding, and Tualatin. The areas below Willamette Falls and downstream in the Columbia River are considered migration corridors, and include Multnomah, Columbia, and Clatsop counties in Oregon and Clark, Cowlitz, Wahkiakum, and Pacific counties in Washington. Other habitat is located in Columbia County in Washington and in Lincoln and Tillamook Counties in Oregon.

The maximum legal use rates of triclopyr BEE to control weeds are predicted to pose risk to freshwater fish, freshwater invertebrates, and aquatic plants, which leads to both direct and indirect effects on salmonids. Due to the lack of smaller-scale data, we must assume that all non-irrigation ditchbanks and forest management sites throughout all the counties in this ESU are treated with triclopyr BEE. Therefore, due to possible direct and indirect effects on salmonids, we conclude that triclopyr BEE use to control weeds may effect T&E salmonids in this ESU.

5. Specific Conclusions for Pacific Salmon and Steelhead ESUs

Table 18 depicts the summary conclusions on specific ESUs of salmon and steelhead for triclopyr BEE use in the Pacific-Northwest and California. Based on this analysis, it is my professional judgment that for 10 of the 26 salmon and steelhead ESUs triclopyr BEE may affect, but is not likely to adversely affects these T&E species. Legal use of triclopyr BEE may affect salmon and steelhead species in the remaining 16 ESUs located in the Pacific-Northwest and California. Little information exists about the usage of triclopyr BEE to control weeds on non-irrigation ditchbanks and forest management areas. As a result I cannot perform a detailed analysis of which ESUs may be adversely affected by this usage of triclopyr BEE. The GENEEC model indicates that use of triclopyr BEE to control weeds on non-irrigation ditchbanks and forest management areas may pose risk to freshwater fish, freshwater invertebrates, and aquatic plants. Therefore, it is my professional judgment that when triclopyr BEE is used in this manner, Pacific salmon and steelhead in these ESUs could be adversely affects.

Table 18. Summary Conclusions on Specific ESUs of Salmon and Steelhead for Triclopyr BEE Uses

ESU	Finding
Chinook Salmon	
California Coastal	may affect, but not likely to adversely affect
Central Valley Spring-Run	may affect, but not likely to adversely affect
Lower Columbia	may effect
Puget Sound	may effect
Sacramento River Winter-Run	may affect, but not likely to adversely affect
Snake River Fall-Run	may effect
Snake River Spring/Summer-Run	may effect
Upper Columbia Spring-Run	may effect
Upper Willamette	may effect
Chum Salmon	
Columbia River	may effect
Hood Canal Summer-Run	may effect
Coho Salmon	
Central California	may affect, but not likely to adversely affect
Oregon Coast	may effect
Southern Oregon / Northern California Coast	may affect, but not likely to adversely affect
Sockeye Salmon	
Ozette Lake	may effect
Snake River	may effect
Steelhead	
Central California Coast	may affect, but not likely to adversely affect
Central Valley, California	may affect, but not likely to adversely affect
Lower Columbia River	may effect
Middle Columbia River	may effect
Northern California	may affect, but not likely to adversely affect
Snake River Basin	may effect
South-Central California	may affect, but not likely to adversely affect
Southern California	may affect, but not likely to adversely affect

Upper Columbia River	may effect
Upper Willamette River	may effect

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