1,3-Dichloropropene

Analysis of Risks
to
Endangered and Threatened Salmon and Steelhead

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Summary

1,3-Dichloropropene (1,3-D) is a soil fumigant used to control nematodes and certain soil diseases. 1,3-D is registered for use on soils to be planted with all food and feed crops. Most 1,3-D use involves injecting the fumigant into soil at depths from 12-18" deep, followed by soil sealing such as compaction, a water seal or tarp. The soil seal is used to minimize the amount of 1,3-D which volatilizes into the atmosphere after application. 1,3-D is formulated as a Liquid-Ready to Use at concentrations of 78.3 to 94.0%. 1,3-D is a restricted use pesticide and as such can only be applied by certified applicators. There are no homeowner uses of 1,3-D.

An endangered species risk assessment is developed for federally listed Pacific salmon and steelhead. This assessment applies the findings of the Office of Pesticide Program'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 1,3-Dichloropropene may affect but is not likely to adversely affect 11 ESUs when used according to labeled application directions and will have no effect on 15 ESUs in this assessment.

Introduction

This analysis was prepared by the U.S. Environmental Protection Agency (EPA) Office of Pesticides Programs (OPP) to evaluate the risks of 1,3-Dichloropropene to threatened and endangered Pacific salmon and steelhead. The format of this analysis is the same as for previous analyses. The background section explaining the risk assessment process is the same as was presented in a previous assessment for diazinon, except that we have updated our criteria for indirect effects on aquatic plant cover to bring this in line with the acute risk concerns used by the Environmental Fate and Effects Division of OPP (EFED). Several other minor wording changes have also been made that have no bearing on the technical analysis.

The general aquatic risk assessment presented in the " Reregistration Eligibility Decision (RED) 1,3-Dichloropropene" issued in December 1998 was the starting basis for this assessment (Attachment A). This document (US EPA, 1998) is on line under the name Telone® at: http://cfpub.epa.gov/oppref/rereg/status.cfm?show=rereg#T.

Problem Formulation: The purpose of this analysis is to determine whether the registration of 1,3-Dichloropropene as a soil fumigant used to control nematodes and certain soil diseases for use on various treatment sites 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 watersheds in which they occur, it is acknowledged that 1,3-Dichloropropene is registered for uses that may occur outside this geographic scope and that additional analyses may be required to address other T&E 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

Attachments:

E. Aquatic Exposure Assessment
F. Representative Labels
G. Application Equipment Figures

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 (from 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. 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 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, we can find no product 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. We 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. We consider this approach to be 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 note, however, that 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.

One area of significant weakness in modeling EECs relates to residential uses, especially by homeowners, but also to an extent by commercial applicators. There are no usage data in OPP that relate to pesticide use by homeowners on a geographic scale that would be appropriate for an assessment of risks to listed species. For example, we may know the maximum application rate for a lawn pesticide, but we do not know the size of the lawns, the proportion of the area in lawns, or the percentage of lawns that may be treated in a given geographic area. There is limited information on soil types, slopes, watering practices, and other aspects that relate to transport and fate of pesticides. We do know that some homeowners will attempt to control pests with chemicals and that others will not control pests at all or will use non-chemical methods. We would expect that in some areas, few homeowners will use pesticides, but in other areas, a high percentage could. As a result, OPP has insufficient information to develop a scenario or address the extent of pesticide use in a residential area. It is also important to note that pesticides used in urban areas can be expected to transport considerable distances if they should run off on to concrete or asphalt, such as with streets (e.g., TDK Environmental, 1991). This makes any quantitative analysis very difficult to address aquatic exposure from home use. It also indicates that a no-use or no-spray buffer approach for protection, which we consider quite viable for agricultural areas, may not be particularly useful for urban areas.

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 lotic 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 fish and aquatic invertebrates

Test data	Risk quotient	Presumption
Acute LC50	>0.5	Potentially high acute risk
Acute LC50	>0.1	Risk that may be mitigated through restricted use classification
Acute LC50	>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 LC50	>0.5	May be indirect effects on T&E fish through food supply reduction

Test data	Risk quotient	Presumption
Aquatic plant acute EC50	>1.0	May be indirect effects on aquatic vegetative cover for T&E fish

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 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.

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. 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 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 sublethal effects until there are additional data.

2. Description and use of 1,3-Dichloropropene

a. Chemical Overview

Common Name: 1,3-Dichloropropene
Chemical Name: 1,3-Dichloropropene
Trade and Other Names: 1,3-D, Telone®, Trilone, Pic-Clor, Tri-Form
Chemical Family: Chlorinated Hydrocarbon
CAS Registry Number: 542-75-6
OPP Chemical Code: 029001
Empirical Formula: $C_3H_4Cl_2$
Basic Manufacturer: Dow AgroSciences
Molecular Weight: 110.98
Physical State: liquid under pressure, volatile
Odor: sweet, pungent, penetrating

Water Solubility: 2,180 mg/L for cis isomer; 2,320 mg/L for trans isomer
Vapor Pressure: 34.3 mm Hg for cis isomer at 25° C 23.0 mm Hg for trans isomer at 25°C
Boiling Point: 104C for cis isomer, 112.6 C for trans isomer
Specific Gravity: 1.209 g/mL at 25° C

The active ingredient 1,3-dichloropropene (1,3-D, or Telone®) is a soil fumigant used preplant to control root-knot nematodes and other soil pests and diseases. 1,3-D is a mixture of isomers; the trans isomer is on the left, and cis on the right.

b. Registered Uses

1,3-D is registered for use on all crops at rates depending on soil type. Thus, the use sites include all vegetable, fruit and nut crops, all forage crops (grasses, legumes and other non-grass forage crops), tobacco, all fiber crops and all nursery crops (ornamental, non-bearing fruit/nut trees and forestry crops). 1,3-D is classified as a non-food use pesticide (and thus there are no tolerances or exemptions from the requirement of a tolerance).

c. Application rates and methods

1,3-D is applied as a soil fumigation, broadcast and/or row treatments, and individual tree planting site treatments. Soil injection equipment (chisel, Nobel plow, or plow-sole) and deep drip irrigation (6 or more inches deep) are used to apply 1,3-D. The application of 1,3-D requires the use of a containment measure such as the use of a tarp, water or soil seal after injection to minimize volatilization.

1,3-D is applied by injection below the soil surface at a minimum of 12 inches. The liquid 1,3-D then diffuses through the soil spaces. 1,3-D may be degraded while in the soil or it may volatilize. 1,3-D is applied to soil by two methods: row and broadcast. With both methods, 1,3-D is injected 12-18 inches below the final sealed soil surface. The broadcast method uses one chisel, Nobel (sweep) plow or plow-sole application equipment with one or more fumigant outlets. The broadcast method requires the formation of a raised bed after the application. The row method consists of either one or two chisels per plant row to treat a band of soil where the crop is to be planted. The row method involves forming beds at the time of application so that the fumigant is placed at least 12 inches from the nearest soil/air interface.

Table 3. Registered crops and label application rates for 1,3-Dichloropropene

Product	% 1,3-D	lb/gal	Crop	Soil type	App rate (gal/acre)	avg. lbs/ acre
Telone EC	93.6	9.45	Field crops & Vegetable corps	Mineral	9-18	85.05 - 226.8

			Fruit crops	Mineral	9-24	
InLine	60.8	6.57	Field & vegetable crops	Mineral	13-20.5	85.41-369.92
			Strawberries		29-38.4	
			Pineapples		29-56	
Tri-Form 40/60	37.6	4.5	Vegetable	Mineral	19.5-31.5	87.75-346.50
				Muck or Peat	50.5-55.0	
			Field crops	Mineral	19.5-31.5	
				Muck or Peat	39.5	
			Fruit & Nuts	all	59.5-77.0	
Tri-Cal Trilone II	94	9.4	Vegetable	Mineral	9-12	84.60-329.00
				Muck or Peat	25	
			Field crops	Mineral	9-12	
				Muck or Peat	18	
			Fruit & Nuts	all	27-35	
Telone II CA	97.5	9.7	Vegetable	Mineral	9-12	87.30-339.50
				Muck or Peat	25	
			Field crops	Mineral	9- 12	
				Muck or Peat	18	
			Fruit & Nuts	all	27-35	

Telone C-17 CA	81.2	8.6	Vegetable	Mineral	10.8-17.1	92.8-362.2
				Muck or Peat	27.4	
			Field crops	Mineral	10.8-17.1	
				Muck or Peat	21.6	
			Fruit & Nuts	all	32.4- 42	
Telone C-35 CA	63.4	7.1	Vegetable	Mineral	13 -20.5	92.3-355.0
				Muck or Peat	33- 36	
			Field crops	Mineral	13 - 20.5	
				Muck or Peat	26	
			Fruit & Nuts	all	39- 50	
Telone C-15	82.9	8.7	Vegetable	Mineral	10.5-16.5	91.4-356.7
				Muck or Peat	26.5-28.5	
			Field crops	Mineral	10.5-16.5	
				Muck or Peat	21	
			Fruit & Nuts	all	31.5-41	
Tri-form 35	63.4	7.1	Vegetable	Mineral	13- 21	92.3-365.7
				Muck or Peat	33.5-36.5	
			Field crops	Mineral	13- 21	
				Muck or Peat	26.5	

			Fruit & Nuts	all	39.5-51.5	
Tri-form 30	68.2	7.5	Vegetable	Mineral	12-19.5	90.0-360.0
				Muck or Peat	31-34	
			Field crops	Mineral	12-19.5	
				Muck or Peat	24.5	
			Fruit & Nuts	all	37- 48	
Pic-Clor 60	39	4.7	Vegetable	Mineral	19.5-31.5	91.7-361.9
				Muck or Peat	50.5-55.0	
			Field crops	Mineral	19.5-31.5	
				Muck or Peat	39.5	
			Fruit & Nuts	all	59.5-77.0	
Pic- Clor 15	82.9	8.7	Vegetable	Mineral	10.5-16.5	91.4-356.7
				Muck or Peat	26.5-29.5	
			Field crops	Mineral	10.5-16.5	
				Muck or Peat	21	
			Fruit & Nuts	all	31.5- 41	
Pic -Clor 30	68.2	7.5	Vegetable	Mineral	12.0-19.5	90.0-360.0
				Muck or Peat	31.0-34.0	
			Field crops	Mineral	12.0-19.5	
				Muck or Peat	24.5	

			Fruit & Nuts	all	37- 48	

d. 1,3-Dichloropropene Usage

The latest information for California pesticide use is for the year 2002 [URL: http://www.cdpr.ca.gov/docs/pur/purmain.htm]. The reported information 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.

Table 4. Reported use of 1,3-Dichloropropene in California, 1993-2002 (lb/ai)

1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
47,694	2,122	409,821	1,956,846	2,457,170	3,011,057	3,130,745	4,446,910	4,135,583	5,359,193

Table 5. Use of 1,3-Dichloropropene by crop or site in California in 2002

Crop	Total Pounds of Active Ingredient Used [2]	Number of Applications	Acres treated
Almond	334,925	72	1,498
Apple	774	2	6
Apricot	8,504	4	27
Artichoke, Globe	5,858	3	52
Barley	711	1	25
Bean, Dried	3,280	2	24
Beet	8,177	30	75
Blackberry	919	2	9
Broccoli	18,194	13	192
Brussels sprout	48,705	50	835
Cabbage	5,895	8	72
Cantaloupe	113,378	14	1,603
Carrot	980,856	214	10,872
Celery	10,277	3	105
Cherry	95,334	36	305

Chinese Cabbage	1,732	2	21
Cotton	299	2	6
Eggplant	842	3	3
Grape	162,844	32	927
Grape, Wine	295,995	74	997
Landscape maintenance[1]	0.13	N.R.	N.R.
Lemon	3,083	4	31
Lettuce, Head	52,201	31	559
Lettuce, Leaf	17,247	6	166
Melon	41,913	14	930
Mustard	1,667	2	15
N-outdr flower	8,769	40	101
N-outdr transplants	146,635	55	517
Nectarine	112,477	41	516
Onion, Dry	38,618	13	481
Orange	8,155	5	30
Parsley	59,338	8	614
Peach	328,696	117	1,169
Pepper, Fruiting	112,159	57	2,268
Pepper, Spice	4,219	5	206
Plum	62,450	18	218
Potato	150,242	33	1,860
Prune	43,674	13	141
Pumpkin	8,768	6	177
Raspberry	22,732	33	181
Soil Fumigation/ Preplant	450,488	144	2,148
Spinach	8126	7	75

Squash, summer	974	3	11
Strawberry	440,338	202	2472
Sweet Potato	641,470	172	5268
Tomato	22,946	10	295
Tomato, processing	34,100	6	504
Uncultivated ag	102,442	19	451
Walnut	151,140	42	570
Watermelon	114,518	39	1930
Wheat	6,535	1	80
Wheat (forage-fodder)	5,509	2	18
Total	5,412,502	1719	41,382

[1] 1,3-D use was not reported in the number of acres treated and number of applications

[2] California database only reports total number of pounds used. This number should be divided by the application rate to calculated the actual amount used/ application.

The Washington State Department of Agriculture (WSDA) has provided information on the acreage of major 1,3-Dichloropropene treated crops and additional details on amounts used for certain of these crops (WSDA 2004). These are in table 6 ; additional information is in the full report, which is included as Attachment B.

Table 6. Major usage of 1,3-Dichloropropene in Washington (WSDA 2004)

CROP	WASS [1] 2002 EST. ACRES	EST. % ACRES TREATED	EST. LBS. A.I./ACRE	# OF APPS	EST. ACRES TREATED	EST. LBS. A.I. APPLIED
Carrot	7,500	65.0	181.80	1	4,900	891,000
Grape	49,800	< 5.0	277.75	1	2,250	625,000
Mint	33,900	-	-	1	-	-
Onion	17,100	-	-	1	-	-
Orchard	220,000	NA	See narrative for use detail.			
Potato	163,000	12.4	157.83	1	19,560	3,189,000
Strawberry	1,800	-	-	1	-	-
Raspberry	9.500	NA	See narrative for use detail.			

1. Information for carrot, grape, mint, onion, and strawberry crops have not been peer reviewed
"-" indicates information that was not provided by Washington State
There are limited data available on the amount of 1,3-D used for Oregon and for "less than major" crops in Washington.

According to WSDA 1,3-D is not a high use pesticide because of the specialized equipment (as seen in the attached pictures) needed for application and weather, soil and pest conditions that need to exist for the most effective application. 1,3-D is only used in specific instances such as when old orchards are uprooted and replanted with new trees which occurs between 25- 50 years. Recent land trends in the Pacific Northwest have suggested that when old orchards are uprooted the land is likely to be used for development than replanted, and in this instance 1,3-d would not be a factor in toxicity or exposure. For other registered crops, 1,3-D is only used when previously used land is to be replanted and is not used on virgin land. 1,3-D is not shown to be used annually on crops with the exception of some root vegetables such as onions, carrots, and potatoes.

3. General Aquatic Risk Assessment for Endangered and Threatened Species

a. Aquatic Toxicity of Pesticide

The primary sources of toxicity information are the 1,3-D reregistration eligibility decision (RED) and the EFED database. There are some secondary aquatic acute toxicity data for 1,3-Dichloropropene from EPA's AQUIRE database (http://www.epa.gov/ecotox/). The AQUIRE database does not specify the percent active ingredient in product formulation and is only used as a means of corroborating the toxicity values reported in the RED denoting levels of toxicity for fish and invertebrates. Because this data is secondary , the AQUIRE data is presented in a separate table.

i. Freshwater Fish and Amphibian Acute Toxicity

Two freshwater studies using the TGAI are required to establish the toxicity of 1,3-Dichloropropene to fish. The preferred test species are rainbow trout (a coldwater fish) and bluegill sunfish (a warm water fish). Results of tests on selected surrogate and other sensitive species are tabulated below.

Table 7. Acute Toxicity of 1,3-Dichloropropene to Freshwater Fish. (EFED Database)

Species	Scientific name	% a.i.	96-hour LC50 (ppm)
Formulated product			
Bluegill sunfish	Lepomis macrochirus	96	3.7

Table 8. Acute Toxicity of 1,3-Dichloropropene to Freshwater Fish (RED)

Species	Scientific name	% a.i.	96-hour LC50 (ppm) (95% CI)	Toxicity Category
Bluegill sunfish	Lepomis macrochirus	≥80	6.1	Moderately toxic
Bluegill sunfish	Lepomis macrochirus	92	6.7	Moderately toxic
Bluegill sunfish	Lepomis macrochirus	92	7.1	Moderately toxic
Walleye	Stizostedion vitreum	100	1.08	Moderately toxic
Largemouth Bass	Micropterus salmoides	100	3.65	Moderately toxic
Rainbow Trout	Onchorynchus mykiss	92	3.9	Moderately toxic
Fathead minnow	Pimephales promelas	100	4.4	Moderately toxic
Rainbow Trout	Onchorynchus mykiss	92	5.9	Moderately toxic

Table 9. Acute Toxicity of 1,3-Dichloropropene to Freshwater Fish (Aquire)

Species	Scientific Name	End Point	Material	Value (ppm)	Reference
Fathead minnow	Pimephales promelas	LC50	Formulation	2.32	45758
Rainbow trout	Onchorynchus mykiss	LC50	Formulation	5.36	45758
Fathead minnow	Pimephales promelas	LC50	Formulation	1.2	14396

ii. Freshwater Fish, Chronic

At the time the RED was referenced it was stated that Dow AgroSciences will conduct a freshwater fish early life-stage study using Rainbow trout as confirmatory data. As stated in the RED, it is believed that 1,3-D will undergo rapid rates of dissipation in most surface waters due to volatilization and, to a lesser extent, by abiotic hydrolysis and possibly biodegradation. However, given the high acute LC_{50} value and a half-life of 13.5 days, there is interest in comparing the results to the run-off study to gauge possible exposures to freshwater fish on a chronic basis.

iii. Freshwater Invertebrates, Acute

A freshwater aquatic invertebrate toxicity test using the TGAI is required to establish the toxicity of 1,3- D to aquatic invertebrates. The preferred test species is Daphnia magna. Results of selected tests with Daphnia and other species are tabulated below.

Table 12. Acute toxicity of 1,3-Dichloropropene to invertebrates (from RED)

Species	Scientific name	% a.i.	48-hour LC50/EC50 (ppm) (95% CI)	Toxicity Category
Technical material				
Water flea	Daphnia magna	100	0.09	Highly toxic

iv. Freshwater Invertebrates, Chronic

At the time the RED was referenced, it was stated that Dow AgroSciences agreed to conduct a freshwater invertebrate chronic study (72-4(b)) using *Daphnia magna*. The data at hand on acute levels show that the LC_{50} for aquatic invertebrates (0.09 ppm) is less than 0.1 ppm. Also, at all registered application rates, initial, 21-day, and 90-day surfacewater EECs, as calculated by GENEEC, are less than one percent of the lowest LC_{50} for freshwater invertebrates. However, because GENEEC is not suitable for tracking soil fumigants and since rapid rates of dissipation in most surface waters is expected, there is less concerned about chronic risks than for acute risks for aquatic invertebrates.

v. Nontarget Aquatic Plants

OPP does not categorize toxicity to plants. There are no available data on aquatic vascular plants which are used to determine indirect effect on Salmonids due to loss of cover.

Table 16. Nontarget Aquatic Plant Toxicity of 1,3-Dichloropropene (EFED Database)

Species	Scientific name	% a.i.	120-hour EC50 (ppm)
Marine diatom	Skeletonema costatum	96	15.5 (10.8-22.3)
Freshwater diatom	Navicula pelliculosa	96	1.39 (1.09-1.81)

vii. Estuarine and marine animals

Table 17. Acute toxicity of 1,3-Dichloropropene to Estuarine and Marine fish (EFED Database, AQUIRE)

Species	Scientific name	%ai	96-hour LC50 ppm
Sheepshead minnow	Cyprinodon variegatus	96	.87 (0.57-1.1)
Sheepshead minnow	Cyprinodon variegatus	Formulated	1.8 (0.7-4.5)

Estuarine and Marine Fish, Chronic (RED)

The RED stated that chronic tests of estuarine/marine fish test using the TGAI are not required for 1,3-D at this time. This requirement will be re-evaluated after reviewing the freshwater fish toxicity information.

Estuarine and Marine Invertebrates, Acute (RED)

The RED stated that the registrant is conducting confirmatory studies on the mysid shrimp (72-3(c)) and Eastern oyster (72-3(b)) to test the toxicity of 1,3-D on estuarine and marine invertebrates. As noted above, 1,3-D use is expected to increase in areas and could impact estuarine and marine environments.

Table 11. Acute toxicity of 1,3-Dichloropropene to Non-Target Estuarine Invertebrates (EFED)

Species	Scientific name	% a.i.	96-hour LC50 (ppm)
Formulated product			
Mysid	Mysidopsis bahia	96	0.70 (0.6-0.85)

Estuarine and Marine Invertebrate, Chronic (RED)

The RED stated that chronic tests of estuarine and marine invertebrates using the TGAI are not required for 1,3-D at this time. This requirement will be re-evaluated after examining the results of the chronic freshwater invertebrate, acute marine/estuarine studies and the run-off study.

viii. Sublethal and Endocrine Effects

Sublethal and endocrine effects are addressed in the RED under endocrine disruptor effects on page 82:

"EPA is required to develop a screening program to determine whether certain substances (including all active ingredient pesticides and inerts) "may have an effect in humans that is similar to an effect predicted by a naturally occurring estrogen, or such other endocrine effect." The Agency is currently working with interested stakeholders, including other government agencies, public interest groups, industry and research scientists in developing a screening and testing program and a priority setting scheme to implement this program. Congress has allowed three years from the passage of FQPA (August 3, 1999) to implement this program. At that time, EPA may require further testing of this active ingredient and end-use products.

In deciding to continue to make reregistration determination during the early stages of FQPA implementations, EPA recognizes that it will be necessary to make decisions relating to FQPA before the implementation process is complete. In making these early case-by-case decisions, EPA does not intend to set broad precedents for the application of FQPA to its regulatory determinations. Rather, these early decisions will be made on a case-by-case basis and will not bind EPA as it proceeds with further policy development and rule making that may be required.

EPA may determine, as a result of this later implementation process, that any of the determination described in this RED are no longer appropriate. In this case, the Agency will consider itself free to pursue whatever action may be appropriate including, but not limited to, reconsideration of any portion of this RED."

b. Environmental fate and transport

The environmental fate and transport of 1,3-D are presented in the RED on page 56. Assessment of water resources, including surface water monitoring, is on pages 29 -30. EECs and model inputs are on pages 30-31.

1,3-D dissipates primarily through volatilization, leaching, abiotic hydrolysis, and aerobic
soil metabolism. Field volatility studies have shown that approximately 25 percent of the applied 1,3-D volatilizes during the two weeks after an application. Hydrolysis is temperature dependent and there is an increase in stability at lower temperatures. At 2C, for both pH 5.5 and 7.5, the half-life of the parent was 90 to 100 days. Under aerobic conditions, half-lives ranging from 12 to 54 days were reported for the parent. The 3-chloroallyl alcohol is expected to be the main hydrolytic degradation product and 3-chloroacrylic acid the major aerobic metabolite. Laboratory
mobility data, in addition to ground-water monitoring information, have clearly demonstrated that 1,3-D is highly mobile in soil. The Freundlich adsorption coefficients for 1,3-D were: K_d = 0.23 in loamy sand, K_d = 0.32 in sand; and in clay, K_d = 0.42 and 1.09.

More degradation and mobility studies can be found in the RED on pages 56-59.

Degradates

The major degradates of 1,3-D in soil are 3-chloroallyl alcohol and 3-chloroacrylic acid, both of which were detected in the prospective ground water monitoring studies (USEPA 1997). Information on the physical and chemical properties of 1,3-D's degradates, 3-chloroallyl alcohol and 3-chloroacrylic acid, are limited; however, the degradates are not expected to be as volatile as1,3-D.

c. Incidents

Incidents cited in the RED and documented in the EIIS database involve damage to crops after direct treatment not as a result of spill, runoff or drift.

d. Estimated and Actual Concentrations of 1,3-Dichloropropene in Water

(1) EECs from models

In the RED chapter,(Attachment A) 1,3-D aquatic EECs were estimated using two models, depending upon the site. GENEEC exposure estimates are used in the first-tier assessment of risk to aquatic organisms. If EEC's from GENEEC simulations exceed LOCs, the assessment is refined using the second-tier exposure model, PRZM-EXAMS. In the RED, GENEEC-derived EEC's for 1,3-D exceed LOC's for aquatic invertebrates. Therefore, a refined assessment was performed, using PRZM-EXAMS to simulate 1,3-D application to major crops.

All of the sites in previous models were based on climate and soils relative to the southeastern U.S., and are not likely to be representative of the western U. S. Consequently, additional efforts were made to use more recently developed sites to be more representative of the areas where Pacific salmon and steelhead occur. EFED provided western PRZMS-EXAMS results for the almonds, fruit, onions, sugar beets, berries, filberts, and potatoes (Attachment E)

In the models, it is considered that a 10-hectare watershed will all be treated with the maximum rate, maximum numbers of applications, and minimum intervals between applications. Runoff and drift from this 10-hectare watershed will go into a 1-hectare pond, 2 meters deep. This is a conservative model 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 and preclude continued exposure from a single application. Multiple applications may provide for chronic exposure, most likely in a pulsed mode.

The estimated environmental concentration models are not specifically designed for the estimation of soil fumigants. Concentrations estimated in theses models are highly conservative and do not realistically account for volatilization, and the application of containment measures as directed on the labels. I consulted agronomist from EFED about the high concentrations reported in the EECs. He stated "a PRZM and EXAMS were not created with a chemical as volatile as telone in mind. No matter how the modeling is done (tarp or no tarp, PRZM volatilization or not), the results should be regarded with a critical eye." Furthermore, there is high variability in the model predictions shown in Table 22. This variability demonstrates the wide range in output from the models performed on 1,3-D.

The EEC values of various, mostly western, crops are presented in Table 21.

Table 21. 1 in 10 year Return Frequency Concentrations (ppb) of 1,3-Dichloropropene

Scenario	Application Rate kg/ha	Peak	96-hour	21-day	60-day	90-day	Yearly
CA almond	404.5	35.3	27.6	12.1	4.5	3.0	0.76
CA fruit	404.5	46.0	34.3	13.8	5.2	3.5	0.86
CA onion	164.7	212	177	87.2	33.1	22.2	5.5
CA sugar beet	164.7	140	111	56.9	21.5	14.4	3.5
OR berry	164.7	45.3	38.2	19.2	7.2	4.8	1.2
OR filbert	404.5	234	182	82.0	30.9	20.6	5.1
ID potatoes	164.7	30.6	22.0	8.0	2.9	1.9	0.47

Table 22. Variability in the EEC Model

Crop	sugar beet	onion	fruit	almond	potato	berry	filbert
30 year Peak High	1240	417	193	160	112	198	323
30 year Peak Low	1.983×10^{-9}	0.03046	7.705×10^{-4}	7.942×10^{-6}	1.378×10^{-4}	4.838×10^{-7}	0.02763
Reported Peak 1 in 10 year	140	212	46.0	35.3	30.6	45.3	234
Rank of Reported Peak in 30 year	3rd	3rd	3rd	3rd	3rd	3rd	3rd

(2) Measured residues in the environment

NAWQA data

Monitoring data on 1,3-Dichloropropane is available from the NAQWA program as obtained from USGS" data warehouse" (at URL http://infotrek.er.usgs.gov/servlet/page?_pageid=543&_dad=portal30&_schema=PORTAL30).

Table 24 presents a summary of these monitoring data for the U. S. as a whole, and in study sites in states within the range of Pacific salmon and steelhead. When I revisited the NAWQA "data warehouse" in June, 2004, I found a total of 1688 samples. There were 0 detects for 1,3-Dichloropropane. We must note that the NAWQA sampling data, while considered high quality, are not targeted to sites and times where 1,3-Dichloropropane 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 1,3-Dichloropropane. It seems likely, but may not be correct, that when samples are taken, the highest NAWQA residues may actually represent peaks that occur in natural waters.

Table 24. 1,3-Dichloropropane Residues for Surface Water

State	# samples	% detects
National	1688	0
California	160	0
Oregon	30	0
Washington	130	0
Idaho	8	0

Targeted Studies

The RED summarized that there has been limited targeted monitoring data collected for 1,3-D**.** Limited surface water monitoring data are available for 1,3-D. Ambient surface water monitoring was conducted concurrent with the Florida prospective ground water study. Monitoring was performed at four sampling sites along two perimeter ditches around a 1,3-D treated field. 1,3-D was detected above a detection limit of 0.05 ppb in 14 of 20 samples collected from the two ditches in the first five days post-application (prior to the first runoff event). Concentrations ranged from 0.07 to 1.8 ppb. The maximum concentration of 1.8 ppb was the only detection > 1 ppb. No 1,3-D was detected in samples collected from the ditches after five days post-application.

Impurity

The formulated 1,3-D product contains from 0.1 to 0.06 percent 1,2-D. 1,2-D has a vapor pressure of 42 mm Hg at 20° C, has a water solubility of 2700 ppm at 20°C, is fairly stable to hydrolysis with a half-life of 77 days at pH 5.5, and has variable aerobic soil half-lives (41 to 69 days on four soils but stable in a sandy loam and a loam). With 1,2-D, photoreactions are also minimal with a half-life of 313 days with respect to the (OH) radical and stable with respect to ozone. Mobility studies give a strong indication of the extreme mobility of 1,2-D. Freundlich adsorption coefficients for 1,2-D were K_d =0.12, K_d =0.16, K_d =0.05, K_d =0.87 for the Fuquay loamy sand, Metz sandy loam, Hanford loam, and the Wahiawa sandy clay loam soils, respectively. In column leaching experiments using a Fuquay loamy sand with 0.64% organic carbon, a total of 85.8% of the applied 1,2-D leached from the soil column. For the Wahiawa sandy clay loam column with 2.32% organic carbon, a total of 73.2% of the applied was found in the leachate. Thus, mobility was somewhat inversely proportional to organic matter content.

1,2-Dichloropropane (1,2-D) is of interest because it is an impurity found in Telone® products (0.06 to 0.1% by weight) and has been shown to migrate to ground water and persist for many years. EPA has not conducted a formal evaluation of the toxicology database for 1,2-D at this time because 1,2-D is no longer registered as a pesticide. Office of Research and Development (ORD) evaluated the limited available database for 1,2-D and concluded that the liver was the principal target organ of toxicity. ORD also found effects from acute exposures; the effects were seen in the lungs, liver, kidneys central nervous system and eyes. A more detailed description is on EPA's IRIS data base.

e. Water Quality Criteria

1,3-D is not currently regulated under the Safe Drinking Water Act, however a Health Advisory level (HA) of 0.2 ppb has been established for 1,3-D. Because the HA is advisory in nature, public water supply systems are not required to sample and analyze for 1,3-D. The 0.2 ppb represents the level of daily consumption over a lifetime associated with a 1×10^{-6} cancer risk. Please see the RED pages 26-27 for a more in depth discussion of water quality data.

f. Recent Changes in Pesticide Registrations

There are no recent changes addressed in the RED.

g. Existing Protections

Label Requirements

"Do not apply within 100 feet of any well used for potable water."

"Do not apply in areas overlying karst geology."

h. Discussion and General Risk Conclusion for Pesticide

1,3-D is "highly toxic" to aquatic invertebrates but is not likely to lead to adverse effects in these organisms due to high volatility and dissipation rates. Estimated environmental concentrations suggest that levels of concern for acute toxicity to freshwater fish are not exceeded when field concentrations are tested. Other data suggest the EEC modeling that is used to assess exposure risk characterization is not accurate for soil fumigants and the actual concentrations offer a more precise picture of the exposure risk.

EECs were requested for specific crops in the ESUs. The environmental fate modeling was conducted to assess relative impact of spray drift on 1,3-D loading into the standard water body. This process was accomplished using a fixed exposure scenario. (Attachment E)

Table 26. Risk Quotients (RQ) for Freshwater Fish and Invertebrates on Drift Scenarios from EECs[1]

Crop	Peak EEC	Acute fish RQ	Acute invert RQ	21-day EEC	Chronic invert RQ	60-day EEC	Chronic fish RQ
Almonds (CA)	35.3	0.01	0.39	12.1	N.C	4.5	N.C
Fruit (CA)	46.0	0.01	0.51	13.8	N.C	5.2	N.C
Onion (CA)	212	0.05	2.35	87.2	N.C	33.1	N.C
Sugar beet (CA)	140	0.03	1.56	56.9	N.C	21.5	N.C
Berry (OR)	45.3	0.01	0.50	19.2	N.C	7.2	N.C
Filbert (OR)	234	0.06	2.6	82.09	N.C	30.9	N.C
Potatoes (ID)	30.6	0.01	0.34	8.0	N.C	2.9	N.C

[1] Based on fish LC_{50} (Rainbow trout) = 3900 ppb; invertebrate LC_{50} (waterflea) = 90 ppb Acute RQ = peak EEC/LC_{50}; chronic invertebrate RQ = 21-day EEC/invertebrate NOEC; chronic fish RQ = 60-day EEC/chronic fish NOEC Application rates are listed in EEC attachment.

With a most sensitive fish LC50 of 3.9 ppm, the LOCs for direct acute effects for endangered species would be exceeded when 1,3-D concentrations in water exceed 195 ppb [RQ for direct effects to endangered species = concentration of 1,3-D/ LD_{50} of most sensitive fish]0.05 = concentration of 1,3-D/3.9 ppm). The concern for chronic risk and chronic exposure are not likely for 1,3-D.

In the RED it is stated, "Because GENEEC is not suitable for tracking soil fumigants, it is believed that actual residues may be a better indicator of exposure and risk. The freshwater fish LC_{50} (1.08 ppm) was compared to actual residues detected in perimeter ditches adjacent to fields treated at an application rate of 182 lbs a.i./acre (MRID #44005201). Concentrations ranged from 0.34 ppb to 1.8 ppb. The resulting risk quotient ranges from 0.002 to 0.0003 which does not exceed any LOC."

Invertebrates

The EECs provided were used to calculate the risk quotient for invertebrates. A risk quotient of RQ> 0.5 indicates that the pesticide may indirectly affect threatened and endangered species through food supply reduction. All of the calculated RQ's from the EECs exceed the level of concern for effects on food supply, however the EEC's cannot accurately account for the amount of 1,3-D actually found in surface water. In addition, while the concentrations in the EEC's are high the rapid dissipation of 1,3-D likely would reduce the risk to aquatic invertebrates.

According to the RED, when the LC_{50} (0.09 ppm) is compared to actual residues (MRID #44005201) detected in perimeter ditches adjacent to fields in Florida treated at an application rate of 182 lbs a.i./acre ranged from 1.8 ppb to 0.34 ppb. The resulting risk quotients range from ranges from 0.02 to 0.004, which do not exceed the LOC of 0.5, loss of food supply. If residues in ditch water are assumed to be directly proportional to the application rate, then at 556 lbs a.i./acre, concentrations in ditch water would reach 1.04 to 5.5 ppb.

Conclusions

The EEC is intended to determine the maximum potential risk that may occur from the use of 1,3-Dichloropropene . Therefore, it can be expected that any site-specific or species-specific analysis is likely to determine that risks are much less than the maximum potential. In part, this is reflected in the western EEC scenarios, which are modified by less runoff and somewhat higher drift than eastern scenarios. According to Wang et al., 25- 50% of soil fumigants such as 1,3-D can be lost to the atmosphere without proper barrier methods applied. As a result the use of 1,3-D for agriculture is closely controlled in California (Wang et al. 1999). In addition California has taken measures to reduce atmospheric exposure to 1,3-D by increasing the chisel from a minimum dept of 12 inches to 18 inches. This, coupled with the containment requirements on the label, and the loss of effectiveness through chemical release if these procedures are not followed, it is reasonable to conclude that the amount of actual environmental exposure to 1,3-D through volatilization and runoff will be minimal but cannot be precluded. An OPP/EFED environmental fate scientist stated that even if capping and tarping procedures were closely followed 1,3-D would still have a portion that will volatilize. However, any persistence in surface water is unlikely due to moderate to high volatility and transport and dynamics of stream flow in stream habitats of salmonids in the PNW. Furthermore, offsite drift should not be a threat of due to the highly technical application procedures.

This conclusion concurs with the RED statement addressing modeling and this soil fumigant: The discrepancy between model estimates of the maximum concentrations in surface water and the monitoring data reflect, in part, the fact that they address different transport pathways. However, the larger problem with the models is that they are not well-suited to track volatile soil incorporated fumigants through the soil to air and water resources. Based on the database as a whole, it is our professional judgement that once 1,3-D enters surface water, it degrades rapidly due to its chemical properties. Thus, the fate and concentrations of the degradates become of primary concern. We do not have a complete data base to determine whether run-off is a significant pathway. At the time the RED was written, Dow AgroSciences was scheduled to conduct a run-off study to track whether 1,3-D is available for runoff.

The low persistence of 1,3-D in water should serve to reduce the environmental concentrations due to the following characteristics of dissipation:

- Although laboratory studies indicate that 1,3-D volatilization is a major route of dissipation, 1,3-D has not been detected in air and rain samples across the United States. This is in part due to the containment procedures immediately after application.

1,3-D may be reevaluated for chronic risk to aquatic organisms when long term studies as stated earlier, Dow AgroSciences will conduct a freshwater fish early life-stage study using Rainbow trout as confirmatory data. As stated in the RED, it is believed that 1,3-D will undergo rapid rates of dissipation in most surface waters due to volatilization and, to a lesser extent, by abiotic hydrolysis and possibly biodegradation. However, given the high acute LC_{50} value and a half-life of 13.5 days, there is interest in comparing the results to the run-off study to gauge possible exposures to freshwater fish on a chronic basis.

4. Description of Pacific Salmon and Steelhead Evolutionarily Significant Units (ESU) Relative to 1,3-D Use Sites

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 it 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. All charts referenced in the following section is located in Attachment D for California data and E for Pacific Northwest states data.

(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 REDs, in a stream area with suitable gravel composition, water depth and velocity. After laying eggs in a REDs, adult chinook will guard the REDs 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 their northern extent reaches 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 with agricultural areas where pesticides could be used 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. Appendix B table B-1 in contains usage information for the California counties supporting the California Coastal Chinook Salmon ESU.

There is reported usage of 1,3-D for crops in only three of the seven California counties supporting the California coastal chinook salmon ESU. The minimal amount of reported usage, the small percentage of counties in the ESU where there is usage, in addition to the stringent controls that California places on this chemical lead me to conclude that the use of 1,3–D will have no effect on 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. These areas are in the counties of Shasta, Tehama, Butte, Glenn, Colusa, Sutter, Yolo, Yuba, Placer, Sacramento, Solano, Nevada, Contra Costa, Napa, Alameda, Marin, Sonoma, San Mateo, San Francisco, and Santa Clara. However, Santa Clara and San Mateo counties are south of the Oakland Bay Bridge and are not included in the analysis.

Table 2 in attachment B contains usage information for the California counties supporting the Central Valley spring-run chinook salmon ESU.

There is a modest amount of 1,3-D use within this ESU. Given the amount of usage, the interval of usage on tree crops, and that the use is restricted to habitat areas, the likelihood for effects from these uses seems low, especially in conjunction with strict controls imposed by California. Therefore, I conclude that the use of 1,3-D will have no effect on the Central Valley Spring-run Chinook Salmon 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. Spawning and rearing habitat would be in the counties of Hood River, Wasco, Columbia, Clackamas, Marion, Multnomah, and Washington in Oregon, and Klickitat, Skamania, Clark, Cowlitz, Lewis, Wahkiakum, and Pacific in Washington. Only small forested parts of Wasco County and Marion County intersect the hydrologic units, and these were excluded from the analysis because 1,3-D would not be used there. The migration corridors include portions of Clatsop and Columbia Counties in Oregon and Pacific County in Washington.

Note: We have made several changes in the counties included in this ESU. We will be providing details and a rationale in a separate submission to NMFS.

Table 1 in attachment C shows the cropping information for Oregon and Washington counties where the Lower Columbia River chinook salmon ESU occurs. 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 USDA to make the data available.

There is a large amount of 1,3-D that could potentially be used within this ESU. The bulk of Clackamas County acreage is most likely not in the watershed of this ESU. The total potential use is mostly on crops where 1,3-D will only be used during crop rotation which is likely to be at intervals greater than one year. However, the likelihood for effects from these uses cannot be precluded because of application rates and the use on root vegetables. I conclude that the use of 1,3-D may affect, but is not likely to adversely affect the Lower Columbia River Chinook Salmon 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, apparently all of which could have spawning and rearing habitat, are Skagit, Whatcom, San Juan, Island, Snohomish, King, Pierce, Thurston, Lewis, Grays Harbor, Mason, Clallam, Jefferson, and Kitsap. Grays Harbor County was excluded because the very small amount of habitat is within the Olympic National Forest.

Table 4 in attachment C shows the acreage information for Washington counties where the Puget Sound 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 USDA to make the data available.

There is a moderate amount of 1,3-D that could potentially be used within this ESU. Given that the uses occur in habitat locations, the likelihood for effects from these uses seems low, but cannot be precluded. Therefore, I conclude that the use of 1,3-D may affect, but is not likely to adversely affect the Puget Sound Chinook Salmon 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 San Mateo and Santa Clara counties) are excluded (58FR33212-33219, June 16, 1993). Table 5 in attachment B shows the cropping information for California counties where the Sacramento River winter-run chinook salmon ESU is located.

There is a moderate amount of 1,3-D usage in habitat areas and a small amount of usage in spawning and growth areas within this ESU. The use of 1,3-D is mostly on walnuts and uncultivated agricultural areas in which use would not be on a regular basis. The breeding area of the Sacramento River Winter-run chinook salmon is in the Sacramento River rather than tributaries however there is a moderate amount of usage in the habitat areas. These factors lead me to believe that the likelihood for effects is low, especially in conjunction with the state controls on fumigant usage. I conclude that the use of 1,3-D may affect, but is not likely to adversely affect the Sacramento River Winter-run Chinook Salmon 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 year, 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. These units are in Wasco, Jefferson, Crook, Sherman, Gilliam, Wheeler, Morrow, Baker, Umatilla, Grant, Harney, Wallowa, and Union counties in Oregon; Adams, Asotin, Columbia, Franklin, Garfield, Lincoln, Spokane, Walla Walla, and Whitman counties in Washington; and Adams, Benewah, Clearwater, Idaho, Latah, Lewis, Nez Perce, Shoshone, and Valley counties in Idaho.

Wasco, Jefferson, Sherman, Gilliam, Wheeler, Morrow, Crook, Harney, and Grant Counties were included to encompass the more recent definition including the Deschutes and John Day Rivers. However, because the FR Notice indicated that this ESU was extirpated in the John Day, Umatilla, and Walla Walla rivers, we have excluded Wheeler, Grant, and Harney counties from the analysis,
and also Umatilla County except as part of the migratory corridor. We have retained Wasco, Sherman, and Jefferson counties along the lower Deschutes River and Gilliam and Morrow counties along Willow Creek as potential spawning and rearing habitat. We also excluded Crook County because it is above Pelton Dam.

As explained previously, we have excluded the high elevation sliver of Imnaha Creek in Baker County. In addition, we have re-examined other watershed considerations that we made in previous consultation analyses. Because Palouse Falls is an upstream barrier to passage, we are now excluding Adams, Lincoln, and Spokane counties in Washington from this ESU analysis. As best as we can tell, it appears that Benewah County, ID was also included in the counties in the Critical Habitat FR Notice as part of the Palouse River watershed, and we have therefore excluded it also. Finally, it appears that waters in Shoshone County, ID are all above Dworshak Dam, which is an upstream barrier. As a result of this re-examination, we now consider that spawning and rearing habitat for the Snake River fall chinook includes Nez Perce, Latah, Lewis, Clearwater, Adams, Idaho, and Valley counties in Idaho; Wallowa, Union, and the newly added Wasco, Sherman, Jefferson, Gilliam and Morrow counties in Oregon; and Asotin, Columbia, Franklin, Garfield, Walla Walla, and Whitman counties in Washington. For this particular analysis, we have excluded Valley County, Idaho because that portion in the Salmon River watershed is all forested areas where 1,3-D would not be used; private land areas of Valley County where 1,3-D could be used are in the Payette River watershed. As always, we solicit NMFS comments on these counties to include or exclude.

The migratory corridor of Snake River fall-run chinook includes the additional counties of Umatilla, Hood River, Multnomah, Columbia, and Clatsop in Oregon, and Benton, Klickitat, Skamania, Clark, Cowlitz, Wahkiakum, and Pacific in Washington.

Tables 6 in attachment C shows the cropping information for Pacific Northwest counties where the Snake River fall-run chinook salmon ESU is located and for the Oregon and Washington counties where this ESU migrates. 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 USDA to make the data available.

There is a substantial amount of 1,3-D that could potentially be used with within this ESU. Given the large potential usage in Benton County, Washington and in Umatilla County, Oregon on mostly onions and potatoes within the migratory areas, and in Frankilin County, Washington on root vegetables in spawning and growth areas, in conjunction with the applications procedures in place to minimize run off, drift, and volatilization the likelihood for exposure from these uses is minimal but cannot be precluded. Therefore, I conclude that the use of 1,3-D may affect, but is not likely to adversely affect the Snake River Fall-run Chinook Salmon ESU within its breeding, spawning and migratory areas.

(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 year, 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 mentioned in the Critical Habitat Notice include Union, Umatilla, and Wallowa, and Baker counties in Oregon; Adams, Blaine, Custer, Idaho, Lemhi, Lewis, and Nez Perce, and Valley counties in Idaho; and Asotin, Columbia, Franklin, Garfield, Walla Walla, and Whitman counties in Washington. We have excluded Valley County, Idaho because that portion in the Salmon River watershed is all in forested areas where 1,3-D would not be used; the private land areas of Valley County where 1,3-D could be used are in the Payette River watershed. 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, and Pacific Counties in Washington.

Table 7 in attachment C shows the crop-acreage information for Oregon and Washington counties where the Snake River spring/summer-run chinook salmon ESU occurs. If there is no acreage given for a specific crop, this means that there are too few growers in the area for USDA to make the data available.

There is a substantial amount of 1,3-D that could potentially be used within this ESU. Given the large number of pounds that could be used in migration and spawning and growth areas, in conjunction with the applications procedures in place to minimize run off, drift, and volatilization the likelihood for exposure from these uses is minimal but cannot be precluded. Therefore, I conclude that the use of 1,3-D may affect, but is not likely to adversely affect the Snake River Spring/summer-run Chinook Salmon 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, and Okanogan (Table 48). The lower river reaches are migratory corridors and include

Clatsop, Columbia, Gilliam, Hood River, Morrow, Multnomah, Sherman, Umatilla, and Wasco Counties in Oregon, and Benton, Grant, Clark, Cowlitz, Franklin, Kittitas, Klickitat, Skamania, Wahkiakum, Walla Walla, Yakima, and Pacific Counties in Washington (Table 49).

[Note: In previous consultations, we incorrectly included Grant, Kittitas and Benton counties in Washington as part of the spawning and growth habitat. However, these counties are below Rock Island Dam and have been moved to the migratory corridor table.]

Table 8 in attachment C shows the cropping information for Washington counties that support the Upper Columbia River spring-run chinook salmon ESU and for the Oregon and Washington counties where this ESU migrates. 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 USDA to make the data available.

There is a substantial amount of 1,3-D that could potentially be used within this ESU. Given the large amounts that could be used in migration, spawning and growth areas, in conjunction with the applications procedures in place to minimize run off, drift, and volatilization the likelihood for exposure from these uses is minimal but cannot be precluded. Therefore, I conclude that the use of 1,3-D may affect but is not likely to adversely affect the Upper Columbia River Spring-run Chinook Salmon 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, Lincoln, Linn, Polk, Marion, Yamhill, Washington, and Tillamook. However, Douglas, Lincoln and Tillamook counties include salmon habitat only in the forested areas where crop acreage is not meaningful, and were therefore not included in the tables for this ESU. Migration corridors include Clackamas, Multnomah, Columbia, and Clatsop Counties in Oregon, and Clark, Cowlitz, Wahkiakum, Lewis, and Pacific Counties in Washington.

Table 9 in attachment C shows the cropping information for Oregon counties where the Upper Willamette River chinook salmon ESU occurs and for the Oregon and Washington counties where this ESU migrates. 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 USDA to make the data available.

There is a considerable amount of 1,3-D that could potentially be used within this ESU. Given the large amounts that could be used in migration, spawning and growth areas, in conjunction with the applications procedures in place to minimize run off, drift, and volatilization the likelihood for exposure from these uses is minimal but cannot be precluded. Therefore, I conclude that the use of 1,3-D may affect but is not likely to adversely affect the Upper Willamette River Chinook Salmon 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 4 years, 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 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 two rivers in southern Puget Sound have winter-run fish.

Redds are usually dug in the mainstem 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, Lower Willamette in the counties of Clark, Skamania, Cowlitz, Wahkiakum, Pacific, Lewis, Washington and Multnomah, Clatsop, Columbia, and Washington, Oregon. It appears that there are three extant populations in Grays River, Hardy Creek, and Hamilton Creek. Because the ESU extends on the Oregon side only up to Milton Creek, and because we cannot see that Milton Creek reaches into Washington County, we have excluded Washington County from this ESU. Washington County was named in the Critical Habitat FR Notice. It appears that the Washington County connection with the hydrologic unit is with the Willamette River which is upstream from Milton Creek. We solicit NMFS comment.

Table 10 in attachment C shows the cropping information for Oregon and Washington counties where the Columbia River chum salmon ESU occurs. 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 USDA to make the data available.

There is a considerable amount of 1,3-D that could potentially be used within this ESU. Given the large amounts that could be used in habitat areas, in conjunction with the applications procedures in place to minimize run off, drift, and volatilization the likelihood for exposure from these uses is minimal but cannot be precluded. Therefore, I conclude that the use of 1,3-D may affect but is not likely to adversely affect Columbia River Chum Salmon 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.’

Table 11 in attachment C shows the acreage of crops in these counties on which 1,3-D can be used. 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 USDA to make the data available.

There is a modest amount of 1,3-D that could potentially be used within this ESU. In conjunction with the applications procedures in place to minimize runoff, drift, and volatilization the likelihood for exposure from these uses is negligible. Therefore, I conclude that the use of 1,3-D will have no effect on the Hood Canal Summer-run Chum Salmon 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 are 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; it is excluded.

Table 12 in attachment B shows the acreage of crops in these counties on which 1,3-D can be used.

There is a small amount of 1,3-D that could potentially be used within this ESU. In conjunction with the applications procedures in place to minimize runoff, drift, and volatilization the likelihood for exposure from these uses is negligible. Therefore, I conclude that the use of 1,3-D will have no effect on the Central California Coast Coho Salmon 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 Douglas, Lane, Coos, Curry, Benton, Lincoln, Polk, Tillamook, Yamhill, Washington, Columbia, and Clatsop. However, the portions of Yamhill, Washington, and Columbia counties that are within the ESU are primarily mountainous forested. Benton and Polk counties are primarily part of the Willamette River watershed, but the small parts that may drain into the Pacific Ocean do include agricultural areas, and therefore they are included in the tables.

Table 13 in attachment C shows the acreage where 1,3-D can be used for Oregon counties where the Oregon coast coho salmon ESU occurs. 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 USDA to make the data available.

There is a large amount of 1,3-D that could potentially be used within this ESU. Given that the potential usage of 1,3-D only occurs on crops where application is not in regular intervals, in conjunction with the applications procedures in place to minimize runoff, drift, and volatilization the likelihood for exposure from these uses is negligible, therefore I conclude that the use of 1,3-D will have no effect on the Oregon Coast Coho Salmon ESU

(2) 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, Glenn, Lake, Del Norte, and Siskiyou in California and Curry, Jackson, Josephine, Klamath, and Douglas in Oregon. Glenn, Lake, and Douglas Counties are excluded from the crop acreage tables in this analysis.

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

Tables 14 in attachment C and 14 in attachment B show the acreage where 1,3-D can be used for Oregon and California counties where the Southern Oregon/Northern California Coast Coho Salmon ESU occurs. 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 USDA to make the data available

There is a moderate amount of 1,3-D that could potentially be used within this ESU in California and Oregon Counties. Given that the potential usage of 1,3-D mostly occurs on crops where application is not in regular intervals, in conjunction with the applications procedures in place to minimize runoff, drift, and volatilization the likelihood for exposure from these uses is negligible, therefore, I conclude that the use of 1,3-D will have no effect on the Southern Oregon/Northern California coastal 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 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.

While Lake Ozette itself is part of Olympic National Park, its tributaries extend outside park boundaries, much of which is private land. There is limited agriculture in the whole of Clallam

County. Table 15 in attachment C shows acreage within this county for crops where 1,3-D can be used.

There is a small amount of 1,3-D that could potentially be treated used within this ESU. There is use in only one county in this ESU. Given that the potential usage of 1,3-D mostly occurs on crops where application is not in regular intervals, in conjunction with the applications procedures in place to minimize runoff, drift, and volatilization the likelihood for exposure from these uses is negligible, therefore, I conclude that the use of 1,3-D will have no effect on the Ozette Lake sockeye salmon 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. However, the habitat area for the salmon is high elevation areas in a National Wilderness area and National Forest. Considering that the migratory corridors are larger rivers any exposure during migration should be well below levels of concern.

Table 16 in attachment C shows the acreage of crops in counties for this ESU. If there is no acreage given for a specific crop, this means that there are too few growers in the area for USDA to make the data available.

There is a substantial amount of 1,3-D that could potentially be used within this ESU, especially on potatoes and onions. Given that the migratory corridors are large rivers and only a modest amount is used in spawning and growth areas, in conjunction with the applications procedures in place to minimize runoff, drift, and volatilization, the likelihood for exposure from these uses is negligible, therefore, I conclude that the use of 1,3-D will have no effect on the Snake River sockeye salmon 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).

Counties of occurrence for this ESU are Santa Cruz, San Mateo, San Francisco, Marin, Sonoma, Mendocino, Napa, Alameda, Contra Costa, Solano, and Santa Clara counties Attachment B Table 17.

There is modest amount of 1,3-D that could potentially be used within this ESU. Given that the potential usage of 1,3-D only occurs on crops where application is not in regular yearly intervals, in conjunction with the applications procedures in place to minimize runoff, drift, and volatilization the likelihood for exposure from these uses is negligible, therefore, I conclude that the use of 1,3-D will have no effect on 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, Napa, Nevada, Placer, Sacramento, San Benito, San Francisco, San Joaquin, San Mateo, San Francisco, Santa Clara, 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 1,3-D in counties where the California Central Valley steelhead ESU occurs is presented in Attachment C Table 18.

There is a considerable amount of 1,3-D that could potentially be treated used within this ESU. Given that a large amount of the potential usage of 1,3-D occurs on sweet potatoes in Merced County, the remaining crops have applications in irregular intervals, and furthermore in conjunction with the applications procedures in place to minimize runoff, drift, and volatilization the likelihood for exposure from these uses is negligible. Therefore, I conclude that the use of 1,3-D will have no effect on the California Central Valley 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, Cowlitz, and Lewis 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.

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.

Table 19 in attachment C shows the cropping information for Oregon and Washington counties where the Lower Columbia River steelhead ESU is located and for the Oregon and Washington counties where this ESU migrates. 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 USDA to make the data available.

There is a moderate amount of 1,3-D that could potentially be used within this ESU. Given that a large amount of the potential usage of 1,3-D occurs on strawberries in Clackamas County where usages is most likely not in the watershed of this ESU, the remaining crops have applications in irregular intervals, and furthermore in conjunction with the applications procedures in place to minimize runoff, drift, and volatilization the likelihood for exposure from these uses is negligible. Therefore, I conclude that the use of 1,3-D will have no effect on, the Lower Columbia River Steelhead 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.

In the John Day River watershed, we have excluded Harney County, Oregon because there is only a tiny amount of the John Day River and several tributary creeks (e.g., Utley, Bear Cougar creeks) which get into high elevation areas (approximately 1700M and higher) of northern Harney County where there are no crops grown. Union and Wallowa Counties, Oregon were excluded because the small reaches of the Umatilla and Walla Walla Rivers in these counties occur in high elevation areas where crops are not grown.

The Oregon counties then that appear to have spawning and rearing habitat are Gilliam, Morrow, Umatilla, Sherman, Wasco, Crook, Grant, Wheeler, and Jefferson counties. Washington counties providing spawning and rearing habitat would be 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.

Table 20 in attachment C shows the cropping information for Oregon and Washington counties where the Middle Columbia River steelhead ESU is located and for the Oregon and Washington counties where this ESU migrates. 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 USDA to make the data available.

There is a substantial amount of 1,3-D that could potentially be treated used within this ESU. Given that a large amount of the potential usage of 1,3-D occurs on root vegetables, the remaining crops have applications in irregular intervals, and furthermore in conjunction with the applications procedures in place to minimize runoff, drift, and volatilization the likelihood for exposure from these uses is negligible, but can't be precluded. Therefore, I conclude that the use of 1,3-D may affect but is not likely to adversely affect, the Middle Columbia River Steelhead 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, Glenn, Lake, and Sonoma. Glenn and Lake counties are excluded from this particular analysis because the hydrologic units in these counties are entirely within the Mendocino National Forest, where there would be no 1,3-D usage.Usage of 1,3-D in counties where the Northern California Steelhead ESUs occurs is presented in Attachment B Table 21.

There is a small amount of 1,3-D that could potentially be used within this ESU. Given that the potential usage of 1,3-D only occurs on crops where application is not in regular yearly intervals, in conjunction with the applications procedures in place to minimize runoff, drift, and volatilization the likelihood for exposure from these uses is negligible, therefore, I conclude that the use of 1,3-D will have no effect on 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, Baker, Union, and Umatilla (northeastern part) in Oregon; Asotin, Garfield, Columbia, Whitman, Franklin, Walla Walla, Adams, Lincoln, and Spokane in Washington; and Adams, Idaho, Nez Perce, Blaine, Custer, Lemhi, Boise, Valley, Lewis, Clearwater, and Latah in Idaho.

We have excluded Baker County, Oregon, which has a tiny fragment of the Imnaha River. While a small part of Rock Creek extends into Baker County, this occurs at 7200 feet in the mountains (partly in a wilderness area) and is of no significance with respect to 1,3-D use in agricultural areas. We have similarly excluded the Upper Grande Ronde watershed tributaries (e.g., Looking Glass and Cabin Creeks) that are barely into higher elevation forested areas of Umatilla County. In Idaho, Blaine and Boise counties technically have waters that are part of the steelhead ESU, but again, these are tiny areas which occur in the Sawtooth National Recreation Area and/or National Forest lands. These areas are not relevant to use of 1,3-D. The agricultural areas of Valley County, Idaho, appear to be primarily associated with the Payette River watershed, but there is enough of the Salmon River watershed in this county it was included.

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.

Table 22 in attachment C shows the cropping information for the Pacific Northwest counties where the Snake River Basin steelhead ESU is located and for the Oregon and Washington counties where this ESU migrates. 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 USDA to make the data available.

There is a substantial amount of 1,3-D that could potentially be treated used within this ESU. Given that a large amount of the potential usage of 1,3-D occurs on root vegetables, the remaining crops have applications in irregular intervals, the potential amounts used in growth and spawning areas, and in conjunction with the applications procedures in place to minimize runoff, drift, and volatilization the likelihood for exposure from these uses is minimal, but can't be precluded. Therefore, I conclude that the use of 1,3-D may affect but is not likely to adversely affect, the Snake River Basin Steelhead 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. Reported usage of 1,3-D in counties where this ESU occurs is presented in Attachment B Table 23.

There is a substantial amount of 1,3-D that could potentially be treated used within this ESU. Given that the potential usage of 1,3-D occurs on crops that have applications in irregular intervals, the potential use amounts occur in habitat areas, and in conjunction with the applications procedures in place to minimize runoff, drift, and volatilization the likelihood for exposure from these uses is negligible. Therefore, I conclude that the use of 1,3-D will have no effect on the South Central California 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). The San Mateo Creek watershed also includes a small portion of the southwest corner of Riverside County, but the area is in the Cleveland National Forest. 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.

Reportable usage of 1,3-D in counties where this ESU occurs are presented in Attachment B Table 24.

There is a modest amount of 1,3-D that could potentially be used within this ESU. Given that a the potential usage of 1,3-D occurs on crops that have applications in irregular intervals, and in conjunction with the applications procedures in place to minimize runoff, drift, and volatilization the likelihood for exposure from these uses is negligible. Therefore, I conclude that the use of 1,3-D will have no effect on 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, Washington; and Gilliam, Morrow, Sherman, Umatilla, Wasco, Hood River, Multnomah, Columbia, and Clatsop, Oregon.

Table 25 in Attachment C shows the cropping information where 1,3-D can be used in Washington counties where the Upper Columbia River 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 USDA to make the data available.

There is a substantial amount of 1,3-D that could potentially be treated used within this ESU. Given that a large amount of the potential usage of 1,3-D occurs on root vegetables, the remaining crops have applications in irregular intervals, and in conjunction with the applications procedures in place to minimize runoff, drift, and volatilization the likelihood for exposure from these uses is negligible, but can't be precluded. Therefore, I conclude that the use of 1,3-D may affect but is not likely to adversely affect, the Upper Columbia River Steelhead ESU within its breeding and migratory areas.

(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, and small parts of Lincoln and Tillamook 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, Oregon, and Clark, Cowlitz, Wahkiakum, and Pacific counties, Washington.

Table 26 in attachment C shows the cropping information for Oregon counties where the Upper Willamette River steelhead ESU is located and for the Oregon and Washington counties where this ESU migrates. 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 USDA to make the data available.

There is a substantial amount of 1,3-D that could potentially be treated used within this ESU. Given that a large amount of the potential usage of 1,3-D occurs on strawberries, which have applications in irregular intervals, and in conjunction with the applications procedures in place to minimize runoff, drift, and volatilization the likelihood for exposure from these uses is negligible. Therefore, I conclude that the use of 1,3-D will have no effect on the Upper Willamette River Steelhead ESU in spawning and growth areas.

5. Specific Conclusions for Pacific Salmon and Steelhead

Table 27. Summary Conclusions on Specific ESUs of Salmon and Steelhead for 1,3-D

Species	ESU	Finding	Table
Chinook Salmon	California Coastal	no effect	1
Chinook Salmon	Central Valley spring-run	no effect	2
Chinook Salmon	Lower Columbia	may affect, but not likely to adversely affect	3
Chinook Salmon	Puget Sound	may affect, but not likely to adversely affect	4
Chinook Salmon	Sacramento River winter-run	may affect, but not likely to adversely affect	5

Chinook Salmon	Snake River fall-run	may affect, but not likely to adversely affect	6
Chinook Salmon	Snake River spring/summer-run	may affect, but not likely to adversely affect	7
Chinook Salmon	Upper Columbia spring-run	may affect, but not likely to adversely affect	8
Chinook Salmon	Upper Willamette	may affect, but not likely to adversely affect	9
Chum salmon	Columbia River	may affect, but not likely to adversely affect	10
Chum salmon	Hood Canal summer-run	no effect	11
Coho salmon	Central California	no effect	12
Coho salmon	Oregon Coast	no effect	13
Coho salmon	Southern Oregon/Northern California Coast	no effect	14
Sockeye salmon	Ozette Lake	no effect	15
Sockeye salmon	Snake River	no effect	16
Steelhead	Central California Coast	no effect	17
Steelhead	Central Valley, California	no effect	18
Steelhead	Lower Columbia River	no effect	19
Steelhead	Middle Columbia River	may affect, but not likely to adversely affect	20
Steelhead	Northern California	no effect	21
Steelhead	Snake River Basin	may affect, but not likely to adversely affect	22
Steelhead	South-Central California	no effect	23
Steelhead	Southern California	no effect	24
Steelhead	Upper Columbia River	may affect, but not likely to adversely affect	25
Steelhead	Upper Willamette River	no effect	26

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Attachment G: Figures 1 and 2: Washington State Department of Agriculture