

Appendix F: Herbicide Hazards and Project Design Criteria designed to Mitigate Hazards

Trade Name(s): **Transline**

Clopyralid				
Herbicide Characteristics	Basic Hazard Identification	Risk Characterization (SERA Risk Assess.)	Label Restrictions & Information	Project Design Criteria
Extremely SELECTIVE for broadleaves. Post emergent herbicide		Selectivity reduces threat to non-target plants	Avoid non-target contact with spray in treated areas	#4, 17. Use calibrated spray equipment and coarse spray to reduce drift. Use backpack, wick or stem injection for chemical applications to reduce potential for drift.
High water solubility	0.01 % of that applied may reach stream after first significant rainfall	Contamination threat to water resources and non-target species	Do not contaminate water. Do not apply directly to water or to areas where surface water is present. Do not contaminate irrigation ditches.	No use in 50 foot riparian buffer.
Weakly adsorbed to soil	Very high mobility in soil		Users are advised not to apply where soils have a rapid to very rapid permeability throughout the profile (such as loamy sand to sand) and the water table is shallow.	Application restricted in areas with loam to clay soils.
Human health effects	Slight skin and eye irritation		Avoid contact with skin and eyes or clothing. Avoid breathing spray mist. Applicators and handlers must wear long-sleeved shirt and long pants, waterproof gloves, shoes plus socks	#3. Applicators will use personal protective equipment when applying herbicides.

Trade Name(s): **Rodeo; Aquamaster**

Glyphosate				
Herbicide Characteristics	Basic Hazard Identification	Risk Characterization (SERA Risk Assess.)	Label Restrictions & Information	Project Design Criteria
Broad spectrum, Non-selective	Will kill contacted desirable plants,	No risk from runoff; boom-spray drift may adversely affect non-target species	Keep people and pets off treated areas until spray solution has dried to prevent transfer of this product onto desirable vegetation.	#4, 17. Use calibrated spray equipment and coarse spray to reduce drift. Use backpack, wick or stem injection for chemical applications to reduce potential for drift.
Very high water solubility	Runoff, leaching potential		Rainfall within 6 hours may reduce effectiveness;	#9. No application when rain is forecast within the next 24 hours.
Human health effects	May damage mucosal tissue, weight loss in mammals; mild liver toxicity	All exposures for workers and public far below level of concern	Applicators and other handlers must wear long-sleeved shirt and long pants, shoes plus socks, and protective eyewear.	#3. Applicators will use personal protective equipment when applying herbicides.
	Mild to moderate irritant to skin and eyes.		Do not get in eyes or on clothing; Avoid breathing vapor or spray mist;	
Wildlife effects	Can cause diarrhea, weight loss in mammals; weight loss in birds at very high doses; some mortality to pregnant rabbits observed	Mortality to some large vegetation-eating mammals plausible at highest application rates only; some risk to insect-eating birds & mammals at high rate		Use lowest effective application rates.

Glyphosate				
Herbicide Characteristics	Basic Hazard Identification	Risk Characterization (SERA Risk Assess.)	Label Restrictions & Information	Project Design Criteria
		Chronic risk to insect-eating birds at typical rate unknown; at highest rate, chronic risk to insect-eating birds and mammals unknown		
Surfactants (tallow amine or POEA) in non-aquatic use formulations very toxic to aquatic organisms	Low toxicity to fish; surfactant in some formulations much more toxic than glyphosate	Even aquatic formulation exceeds level of concern for endangered fish , with max risk assumptions; surfactant formulations may cause mortality at high application rate only		Use Rodeo and Aquamaster which contain no POEA
	Surfactants may be highly toxic to aquatic organisms		Do not apply (surfactant formulations) directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment.	No spray within 10 feet of water to reduce potential for contact with aquatic organisms. Use LI-700 as only surfactant in 0-50 feet from water. #13 Spray tanks will not be washed within 150 feet of live water.
	Low or no toxicity to bees, beetles, spider mites, wasps, isopods, earthworms, or snails.	Highest application rate may pose risk to some individual bees, but not likely to populations		Use lowest effective application rates.

Trade Name(s): **Poast**

Sethoxydim				
Herbicide Characteristics	Basic Hazard Identification	Risk Characterization (SERA Risk Assess.)	Label Restrictions & Information	Project Design Criteria
Selective for annual and perennial grasses			Low likelihood of impacting non-target plants from drift	
Very high water solubility	Leaching, run-off potential		Do not contaminate water.	No application in 50 foot riparian buffer.
Medium mobility in soil				
Human health effects	Causes skin and eye irritation	Skin or eye irritation from mishandling.	Applicators and other handlers must wear coveralls over short-sleeved shirt and short pants; chemical resistant gloves and footwear, plus socks; protective eyewear; etc.	Applicators will use personal protective equipment when applying herbicides.
Wildlife effects		Chronic risk to insect-eating birds or mammals unknown at typical and highest rates		
Aquatic Effects	Highly toxic to fish due to petroleum inert	Exposure exceeds level of concern for federally listed fish at typical rate, and max exposure assumptions	This product is toxic to aquatic organisms. Do not apply directly to water or to areas where surface water is present.	Use only outside 50 foot riparian buffer.
	No data on effects to amphibians, fish used as a surrogate	Plausible risk to amphibians		

Trade Name: **Garlon 3A**

Triclopyr				
Herbicide Characteristics	Basic Hazard Identification	Risk Characterization* (SERA Risk Assess.)	Label Restrictions & Information	Project Design Criteria
Target: Woody and herbaceous plants, especially root- or stem-sprouting species				Restricted to selective application methods by forest plan standard (R6 2005 ROD)
Absorbed thru roots, foliage and green bark.	Non-target plant effects possible; some bryophytes and lichens sensitive to triclopyr		Do not apply through any type of irrigation system.	Use calibrated spray equipment and coarse spray to reduce drift. Use backpack, wick or stem injection for chemical applications to reduce potential for drift.
Two forms: salt (acid) (Garlon 3A) and ester (Garlon 4)	Ester form more toxic and volatile		Apply at cool temps with no wind. Combustible.	Do not propose to use Garlon 4
Salt formulation is highly soluble in water	Runoff, leaching		Do not contaminate water when cleaning equipment.	Do not use within 50 foot riparian buffer.
Low adsorption to soils, varies with clay and OM content	Very high mobility in soils		The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.	Use only where soils are loamy to clay.
	Inhibits growth of soil fungi and bacteria	Transient inhibition in the growth of some bacteria or fungi might be expected		Use selective methods of herbicide application to have only small localized effects.

Triclopyr				
Herbicide Characteristics	Basic Hazard Identification	Risk Characterization* (SERA Risk Assess.)	Label Restrictions & Information	Project Design Criteria
	Can cause severe eye damage		Applicators and other handlers must wear long-sleeved shirt and long pants; shoes plus socks; protective eyewear; chemical resistant gloves.	Applicators will use personal protective equipment when applying herbicides.
Human health effects	Evidence for carcinogenicity is marginal (not convincing, but not entirely negative)			Use lowest effective application rates
	Effects to kidney are basis of risk to for acute and chronic exposures humans	At high application rates, chronic exposures to workers exceed level of concern; acute exposures do not exceed level of concern for workers. At high application rates, some acute and chronic exposures exceed level of concern for public. No exposures exceed level of concern at typical application rate.	Do not apply this product in a way that will contact workers or other persons, either directly or through drift.	Applicators will use personal protective equipment when applying herbicides. All areas of high human use will be posted and cordoned off prior to and during application.
Wildlife effects	For wildlife, acute lethality only at very high doses, but effects to kidney and liver at lower doses	Acute exposures below level of concern at typical application rate, but exceed level of concern for grass and insect eating mammals		Use lowest effective application rates

Triclopyr				
Herbicide Characteristics	Basic Hazard Identification	Risk Characterization* (SERA Risk Assess.)	Label Restrictions & Information	Project Design Criteria
	Primary effect from chronic doses is to the kidney	Using protective assumptions, chronic exposures exceed level of concern for grass-eating mammals. Risk from chronic exposure to contaminated insects unknown.		
Fish effects	Salt/acid formulation low toxicity to fish; has aquatic use label	Exposures exceed level of concern for <u>federally listed</u> fish at typical rate, but not other fish even at highest application rate	(Garlon 3A) Permissible to treat flood plains, marshes, swamps, bogs etc. Permissible to treat non-irrigation ditch banks. When making application to banks or shorelines of moving water sites, minimize overspray to open water.	No use of this herbicide within 50 foot riparian buffer
	Metabolite TCP much more toxic to fish than the salt form, about the same toxicity as ester	At typical application rate, no TCP exposures exceed level of concern. At highest application rate, chronic exposure exceeds level of concern		Use lowest effective application rate
	Ester form much more toxic to aquatic plants and algae than salt form	Only <u>salt</u> form exceeds level of concern for aquatic plants; algae not at risk from either form		No use of this herbicide within 50 foot riparian buffer

Triclopyr				
Herbicide Characteristics	Basic Hazard Identification	Risk Characterization* (SERA Risk Assess.)	Label Restrictions & Information	Project Design Criteria
	Ester formulation much more toxic to amphibians than salt formulation	At typical application rate, risk to amphibians from either form is low. At highest rate, exposure to run-off of either form could adversely affect responsiveness of tadpoles.		Use lowest effective application rate
	Practically non-toxic to bees	Exposure exceeds level of concern only for highest application rates		Use lowest effective application rate

*Results of these risk characterizations are from scenarios where triclopyr is broadcast sprayed over a large area. A standard in each Forest Plan that was added by the Region Six Invasive Plant Program ROD (USDA Forest Service 2005) prohibits this type of application. Triclopyr is restricted to selective application methods only. Therefore, in practice, it is not plausible to create the exposures causing concern during use of triclopyr for invasive plant control in Region Six.

Trade Name(s): **Arsenal, Habitat**

Imazapyr				
Herbicide Characteristics	Basic Hazard Identification	Risk Characterization (SERA Risk Assess.)	Label Restrictions & Information	Project Design Features
Non-selective				
Uptake by roots & leaves; active in soil as pre-emergent	May damage non-target plants; may be exuded into soil from roots of treated plants	Drift or runoff may cause some damage to susceptible species	Do not apply to irrigation ditches; prevent drift to desirable plants	Use calibrated spray equipment and coarse spray to reduce drift. Use backpack, wick or stem injection for chemical applications to reduce potential for drift.
Very high water solubility			Do not contaminate water	Wick or inject from streamside to 10 feet from water
Weakly bound to soil, but OM and lower pH increase adsorption to moderate levels	Moderately mobile in soils			
Human health effects	Mildly irritating to eyes and skin	Mild eye irritation from mishandling; no exposure scenario exceeded RfD for workers or public except spill		Applicators will use personal protective equipment when applying herbicides.
Aquatic Plants	Some aquatic plant species sensitive to imazapyr	Potential risk to aquatic plants at typical application rate, no risk to algae		