Appendix G

Herbicide Information

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G.1. INTRODUCTION

This appendix describes Western's approach to using herbicides to control vegetation along the San Joaquin Valley ROWs. The approach is based on Western's 2007 Integrated Vegetation Management (IVM) Guide and Transmission Vegetation Management Program (Western 2007) and related operations and maintenance (O&M) activities planned for the San Joaquin Valley. Western updates its IVM Guide periodically in response to changes in regulatory requirements, best management practices, and industry standards. The use of some herbicides listed in this appendix may be restricted, new herbicides may be approved for use, and application techniques may evolve. This appendix presents information current at the time of publication of this Environmental Assessment (EA); future changes in Western's herbicide practices would be within the scope of environmental evaluations described in this EA.

Historically, Western's vegetation management activities have been restricted primarily to control vegetation which poses a fire or safety hazard to transmission facilities. However, the IVM approach expands the vegetation management activities to include the control of noxious or undesirable weeds and to promote low-growing plant communities within the ROW. IVM is a more sustainable, cost-effective, and long-term solution, through the use of herbicides in a controlled and managed way.

Western considers several factors when selecting the appropriate, effective, and safe herbicides for IVM. Western has determined that it is generally desirable to select an herbicide that has low toxicity, will not move from its target or leach into groundwater (low water solubility), and will not persist in the environment for a long period of time (low persistence). Western selects herbicides that meet these criteria.

Western uses several different methods to apply herbicides. The method selected depends on the type of control needed, the type of vegetation to be controlled, and the site situation (site conditions and locations). Some of the methods that Western utilizes are stump treatment, basal spray/treatment, foliage spray/treatment, soil treatment (preemergence), and under- surfacing materials treatment.

Sections 7 and 8 of Western's 2007 IVM Guide provide information on herbicide formulation, herbicide application, pre-application procedures, safety precautions, record keeping, and clean up. The portions of this information that are related to the evaluation of environmental effects of the Proposed Action in this Environmental Assessment are presented in this Appendix.

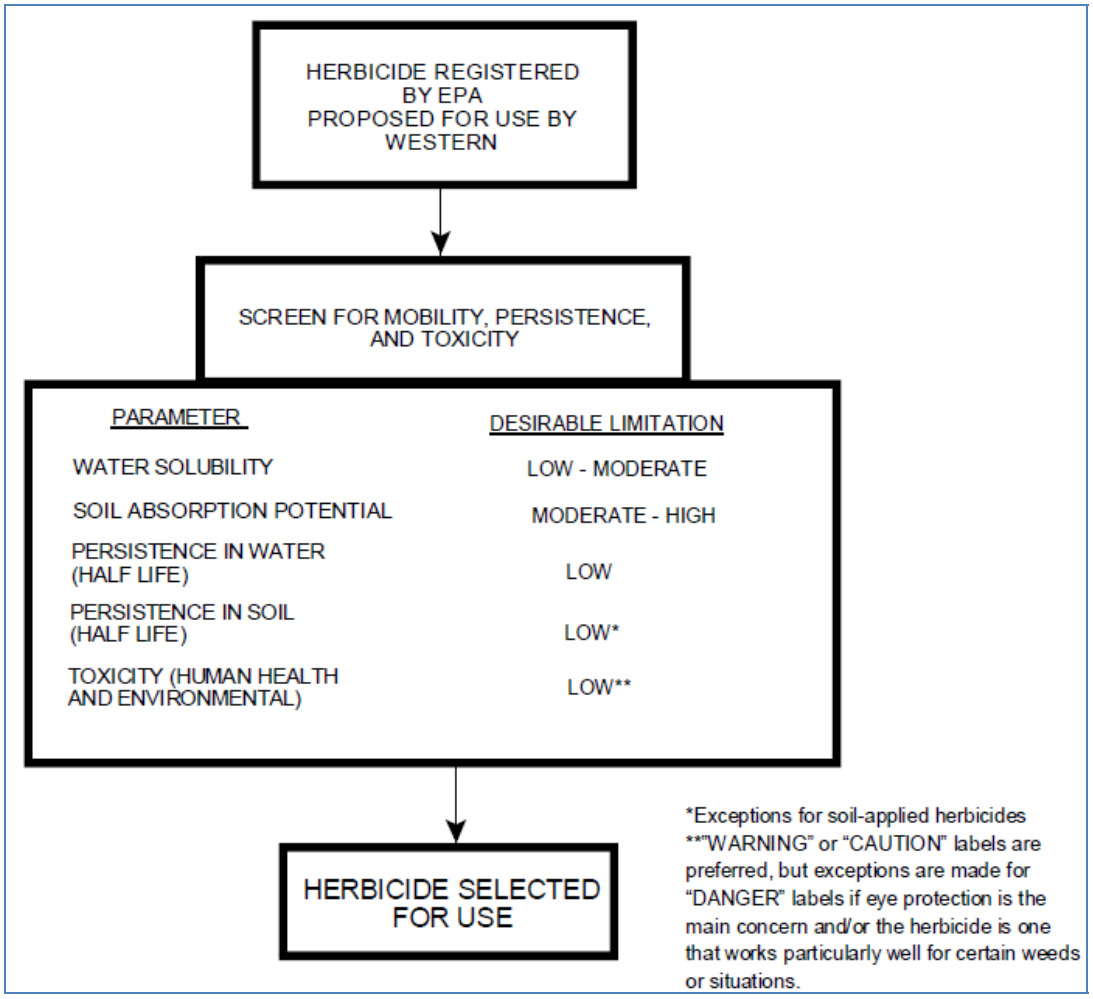
G.2. HERBICIDES SELECTED FOR USE BY WESTERN

Western considers several factors in selecting appropriate, effective and safe herbicides for use in the project area. Figure G.2-1 demonstrates a screening process for selecting an herbicide. It is generally desirable to select an herbicide that has low toxicity, will not move from its target or leach into groundwater (low water solubility), and will not remain in the environment for a long period of time (low persistence). However, each factor

must be considered in light of the herbicide's intended use, its effectiveness, the target vegetation, and the site characteristics.

Selecting the right herbicide treatment can also be done through a decision tree exercise, in which the most important factors are queried with a "yes"/"no" outcome to lead to the best herbicide mix for the species present, site conditions, seasonal or climatic conditions, and type of application used.

Based on information about herbicides that have been successfully used by Western, a list of suggested herbicides has been developed. Table G.2-1 lists those herbicides by common (chemical) and trade names, along with their EPA Registration numbers, manufacturers, and type of use.



Source: Western 2007

Figure G.2-1. Western's Herbicide Selection Process

Table G.2-1. Herbicides Selected for Use in the Project Area

Herbicide	Trade Name	EPA Registration Number	Manufacturer or Distributor	Use
Chlorsulfuron	Telar® DF**	352-522	DuPont	ROW
Dithiopyr	Dimension Ultra 40®	62719-445	Dow AgroSciences	Landscaped Areas
Flumioxazin	Payload®	59639-120	Valent USA	Bareground – Substations, *Kochia* control
Glyphosate	Roundup® PRO**	524-475	Monsanto	Substations Areas near water, wetlands
	Aquamaster® (aquatic)**	524-343	Monsanto	
	Rodeo® (aquatic)**	62719-324	Dow	Areas near water, wetlands
Imazapyr	Habitat® (liquid)**	241-246	BASF Corporation	Substations, ROW
	Stalker®**	241-398	BASF Agricultural Products	Stump Treatment
	Arsenal® ACC**	241-299	BASF	Substations, some ROW
Oxyfluorfen	GoalTender®	62719-447	Dow AgroSciences	Landscaped Sites – Bareground Control
Sulfometuron Methyl	Oust® XP**	352-601	DuPont	Storage Yards, Subs
Sulfometuron Methyl and Chlorsulfuron	Landmark® MP®	352-621	DuPont	Bareground - Substations
Mefluidide	Embark® 2S** (Plant growth regulator)	2217-759	PBI/Gordon	Buffers, around subs. (on grass)
Tebuthiuron	Spike® 80DF**	62719-107	Dow AgroSciences	Substations
Triclopyr	Garlon 3A®**	62719-37	Dow AgroSciences	ROW
	Garlon 4®*8	62719-40		
	Pathfinder ®**	62719-176		Stump Treatment

Herbicide	Trade Name	EPA Registration Number	Manufacturer or Distributor	Use
Pendamethalin	Pendulum WDG®	241-340	BASF Specialty Products	Substations
Oryzalin	Surflan A.S. ®	70506-44-829	United Phosphorus Inc	Substations
Fluroxypyr	Vista®	62719-308	Dow AgroSciences	ROW, Substation esp. for Kochia
Paclobutrazol	Profile 2SC® (Tree growth regulator)	67690-22	SePRO Corporation	ROW (sensitive areas) Substations (screens)
Trifluralin	Biobarrier® Biobarrier II®	59823-1 59823-3	Reemay	Substations, yards

Source: Western 2007

Not all herbicides are equally appropriate, effective, or safe, given different site conditions and locations. In selecting a particular herbicide and formulation to use, Western follows label directions, and matches the particular site conditions to the label precautions and type of herbicides (e.g., selective vs. nonselective). Also, Western checks to see if the herbicide is restricted to certain uses under State of California regulations or if it is approved by a Federal land management agency, if one is involved. Table G.2-2 presents some factors that Western considers in selecting a particular herbicide/formulation for vegetation control.

To help in determining which herbicide is most appropriate, Tables G.2-3 and G.2-4 present more information about the suggested herbicides, such as:

- Relative toxicity
- Persistence
- Leaching potential
- Label restrictions
- State-specific restrictions
- Formulation or application method normally used

Table G.2-3 lists the non-selective herbicides that are used primarily at substations and yards. Table G.2-4 lists the selective herbicides that affect broadleaf plants and trees, but not grasses, and are used on rights-of-way, plus some selective pre-emergent herbicides and growth regulators used at substations, yards, and tree screens.

Table G.2-2. Factors Western Considers In Selecting an Herbicide

Factor	Comment
Type of control needed	Generally use non-selective herbicides for "bareground" only or where they can be applied very selectively.
Type of undesirable species	Check label, literature and applicator experience for plant susceptibility to certain herbicides; see Table 11-1 for herbicides recommended for specific noxious weeds.
Potential damage to adjacent crops and/or desirable vegetation (from soil-applied herbicides)	Do not use herbicides with multiple chemical characteristics that have significant potential for off-target movement. Check label for precautions. Use only herbicides that will not injure or destroy desirable plants by root absorption if roots of desirable plants extend under area to be treated.
Potential pollution of surface water - proximity and topography	Use only an herbicide approved for use close to water bodies where runoff could carry herbicide to water.
Potential pollution of groundwater - site geology/soils and depth to groundwater	Use an herbicide with low leaching potential and low persistence if groundwater is shallow and/or soils are sandy (permeable) and have low organic matter. Check label for particular susceptibilities; use low-drift formulation and nonpersistent herbicide.
Exposure of humans and animals	Check label for restrictions; use low toxicity herbicide.
Exposure of sensitive aquatic species, including amphibians	Use herbicides and adjuvants that are labeled for aquatic use and that do not contain a surfactant as an inert ingredient (e.g., Aquamaster®, Rodeo®); restrict or limit use near sensitive habitat.
State or Federal Agency (e.g., BOR) restrictions	Check State and agency approved lists or guidance

Source: Western 2007

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Table G.2-3. Non-Selective Herbicides Available for Use in the Project Area

Chemical Common Name	Trade Name(s)	Treatment Method(s) Available	Soil Persistence	Leaching Potential	Label Restrictions (see label for details)
Glyphosate	Roundup® PRO; Rodeo® (aquatic), Aquamaster® (aquatic) Accord® Concentrate	Foliage Spray	Depends on soil texture and organic matter content. Half-life is from 3-130 days (30 days). Not active in soil.	Low potential[1,6]	Limit drift; use only when potential for drift to sensitive areas (e.g., endangered species habitat) is minimal. Skin/eye contact; inhalation; ingestion. Note: Rodeo® and Aquamaster® do not contain a surfactant; the inert ingredient is water.
Imazapyr	Arsenal® Stalker®	Soil Treatment	Broken down by exposure to sunlight and by soil microorganisms. Remains active in the soil for 6 months to 2 years.[1] Half-life in soil is 90 days.	Low potential[1,7,8]	Limit drift; use in/near water, wetlands, irrigation ditches or water flows onto agricultural land; endangered plants and habitat; inhalation, ingestion, skin/eye contact.
Sulfometuron Methyl	Oust® XP	Soil Treatment	Half-life in soil is 60 days	Relatively high[6]	Limit drift or use in/near water; particles that move off site can damage non-target crops, vegetation.
Sulfometuron methyl and Chlorsulfuron	Landmark MP®	Soil Treatment	See base chemicals	Relatively high – see base chemicals	Limit drift or use in/near water; particles that move off site can damage non-target crops, vegetation.

Chemical Common Name	Trade Name(s)	Treatment Method(s) Available	Soil Persistence	Leaching Potential	Label Restrictions (see label for details)
Flumioxazin	Payload®	Foliage Spray	Low – half-life of 15 days	Low	Do not apply to water; toxic to aquatic invertebrates; so no apply where runoff is likely to occur
Diuron and Tebuthiuron	SpraKil SR-13®	Soil Treatment	See Diuron. Tebuthiuron can persist for up to 2 years	Known to leach under certain conditions	Do not apply to water; may result in groundwater contamination in areas with very permeable soils and shallow water table
Dithiopyr	Dimension Ultra 40®	Foliage spray	Highly adsorbed; persistent	Highly immobile	Highly toxic to aquatic organisms; watch for drift and runoff near aquatic sites; do not apply directly to water or when conditions favor drift
Oxyfluorfen	GoalTender®	Soil Treatment	Readily biodegradable	High potential for mobility in soil	Do not apply to water; highly toxic to fish, wildlife, aquatic invertebrates, and plants; runoff is an issue

Source: Western 2007

Table G.2-4. Selective Herbicides Available for Use in the Project Area

Chemical Common Name	Trade Name(s)	Treatment Method(s) Available	Soil Persistence	Leaching Potential	Label Restrictions (see label for details)
Chlorsulfuron	Telar® DF	Foliage Spray	6-12 months residual[2]. Half-life of 1-3 months. (30 days)	High potential in permeable soils.	Limit drift, do not apply to water.
Clopyralid	Transline®	Foliage Spray	Moderate residual[2] 1-5 months. Half-life of 2-10 weeks. (20 days)	Relatively high.	Human health - ingestion, skin/eye contact. Do not apply to water, where have permeable soils.
Triclopyr	Garlon 3A® Garlon 4® Pathfinder II®	Foliage Spray Basal Treatment	Moderately residual. Half-life or 46 days.	Low to Moderate - leaching potential depends on soil type, acidity, and rainfall.	Limit drift, use near endangered plants; irrigation ditches, domestic water; inhalation skin/eye contact; combustible.
Pendamethalin (does not affect many weeds, trees)	Pendulum WDG®	Soil Treatment (Preemergent control; often used in mix with Roundup® in landscaped areas)	Half-life of 60 days.	Low	Toxic to fish; do not apply to water; limit drift. Avoid contact with eyes, skin, and clothing. May discolor sprayed surfaces.
Oryzalin (does not affect many weeds, trees)	Surflan A.S.® Oryzalin 4®	Soil Treatment (Preemergent control; often used in mix with Roundup®) in landscaped areas)	Half-life of 60-90 days	Low	Do not apply to water; limit drift; avoid contact with skin, eyes, and clothing. May discolor sprayed surfaces.

Chemical Common Name	Trade Name(s)	Treatment Method(s) Available	Soil Persistence	Leaching Potential	Label Restrictions (see label for details)
Mefluidide	Embark® (Plant Growth Regulator)	Foliage Spray	Not persistent in soil. Half-life of 2 days.	Low - adsorption on the soil insignificant.	Limit drift; do not allow animals to graze on treated areas; avoid contact with skin, clothing; do not apply to water.
Paclobutrazol	Profile or Cambistat 2SC® Tree Growth Regulator	Soil drench, Soil injection	Average half-life = 1-3 years.	Very low. High adsorption, low solubility.	Do not apply to water or where surface water present; avoid contact with skin, eyes, clothing. (Can affect nearby non-target vegetation)
Trifluralin	Biobarrier® Biobarrier II®	Subsurface herbicide impregnated geotextile placement	Half-life of 60 days.	Usually high[4], but probably lower in this product (time-release nodules)	Toxic to fish; do not apply to water or wetlands; avoid contact with eyes, skin, clothing.
Fluroxypyr	Vista®	Foliage Spray	Half-life of 1-4 weeks	Relatively low sorptivity and therefore has potential for leaching, but also low water solubility and rapid dissipation in field.	Toxic to fish; do not apply to water or wetlands; drift can affect non-target aquatic organisms and plants.

Chemical Common Name	Trade Name(s)	Treatment Method(s) Available	Soil Persistence	Leaching Potential	Label Restrictions (see label for details)
Aminopyralid	Milestone®	Foliage Spray	Relatively immobile; not very persistent; shorter half-life than clopyralid and picloram.	Minimal leaching below 15-30 cm	Do not apply to water

Source: Western 2007

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G.3. HERBICIDE APPLICATION METHODS

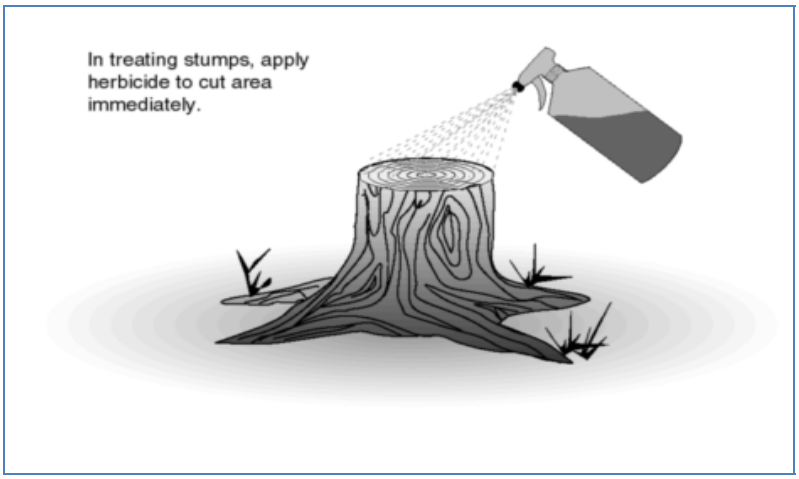
Western uses several different methods to apply herbicides. Selecting a method depends on the type of control needed, the type of vegetation, and the site situation (site conditions, location). These methods include:

- Stump treatment
- Basal spray/treatment
- Foliage spray/treatment (post-emergence)
- Soil treatment (pre-emergence)
- Under surfacing materials treatment

Generally, all of these are options for use on rights-of-way to control brush or noxious weeds. At substations and yards, non-selective herbicides are usually applied either as soil treatments or foliage applications.

G.3.1 Stump Treatment

Stump treatment generally involves cutting a tree down and treating the freshly cut surface, specifically the cambium layer, with herbicide. Species, stem diameter, and stump height dictate which herbicide and solution type (i.e., oil-based, water-based, or undiluted herbicide) should be used (Figure G.3-1). This type of treatment is used when vegetation is cut to ground line. Therefore, its primary uses are: (1) initial clearing and (2) maintenance clearing of individual trees that have grown.



Source: Western 2007

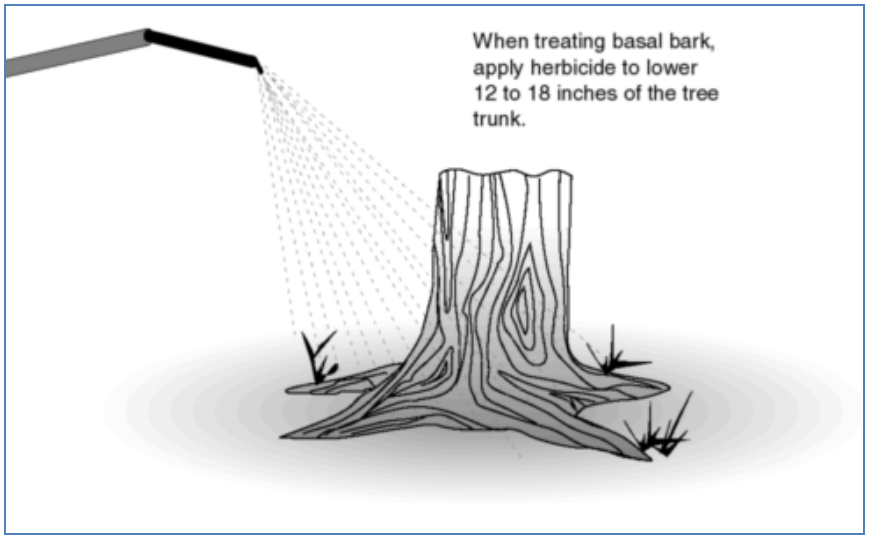
Figure G.3-1. Example of Stump Treatment Method

Stump injection is another method of stump treatment. The method that has been used within Western is the EZJECT® capsule injection system. The system is composed of two parts - an application lance and an herbicide-impregnated capsule, which can contain one of several different herbicides. With this system, the herbicide is injected directly in the tree or stump, thereby avoiding drift or impacts to desirable vegetation.

G.3.2 Basal Spray/Treatment

The basal treatment method involves spraying the lower part of the stem of target vegetation with an herbicide diluted in oil. Only certain herbicides are appropriate for this use (Figure G.3-2). It is more selective than a foliage spray and is low profile; it does not produce immediate brownout of vegetation and can be applied during the dormant season. Therefore, this treatment may be prescribed where:

- Brush is too tall to foliage spray without causing unacceptable drift.
- The right-of-way is adjacent to cropland, residences, susceptible vegetation, or other sensitive areas, and drift is a problem.
- The right-of-way contains a high density of desirable vegetation, which could not be avoided with foliage spray.
- The right-of-way is in a visually sensitive area where immediate brownout would be unacceptable, and, due to seasonal limitations, only those foliage sprays which cause immediate brownout can be used.



Source: Western 2007

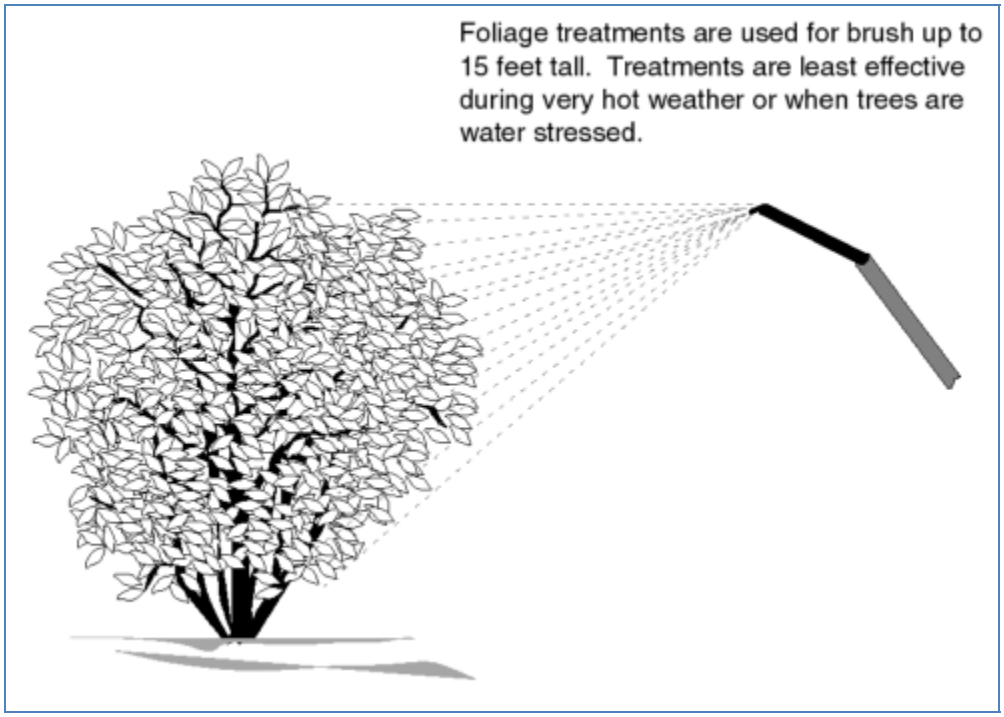
Figure G.3-2. Example of Basal Spray Treatment Method

To basal spray, maintenance personnel apply the herbicide to the lower 12 to 18 inches of the tree trunk or brush from early spring to mid-fall. Some species can be treated during winter, as long as snow/ice do not prevent contact of the chemical with the bark.

G.3.3 Foliage Spray

Foliar spraying is a common method of applying herbicides on brush up to 15 feet tall. This consists of applying a mixture of herbicide, water, and surfactant to the entire plant's foliage and stems (Figure G.3-3). Because it is sprayed up into the air, drift can be a problem under certain conditions. Also, most foliage sprays cause immediate brownout of vegetation. Therefore, in cases where drift or brownout is a problem, either foliage spraying is eliminated, or an alternate treatment (basal, or cut and stump treatment) is prescribed.

To apply herbicides using a foliar spray, make applications from early summer to late September, depending on the choice of herbicide.

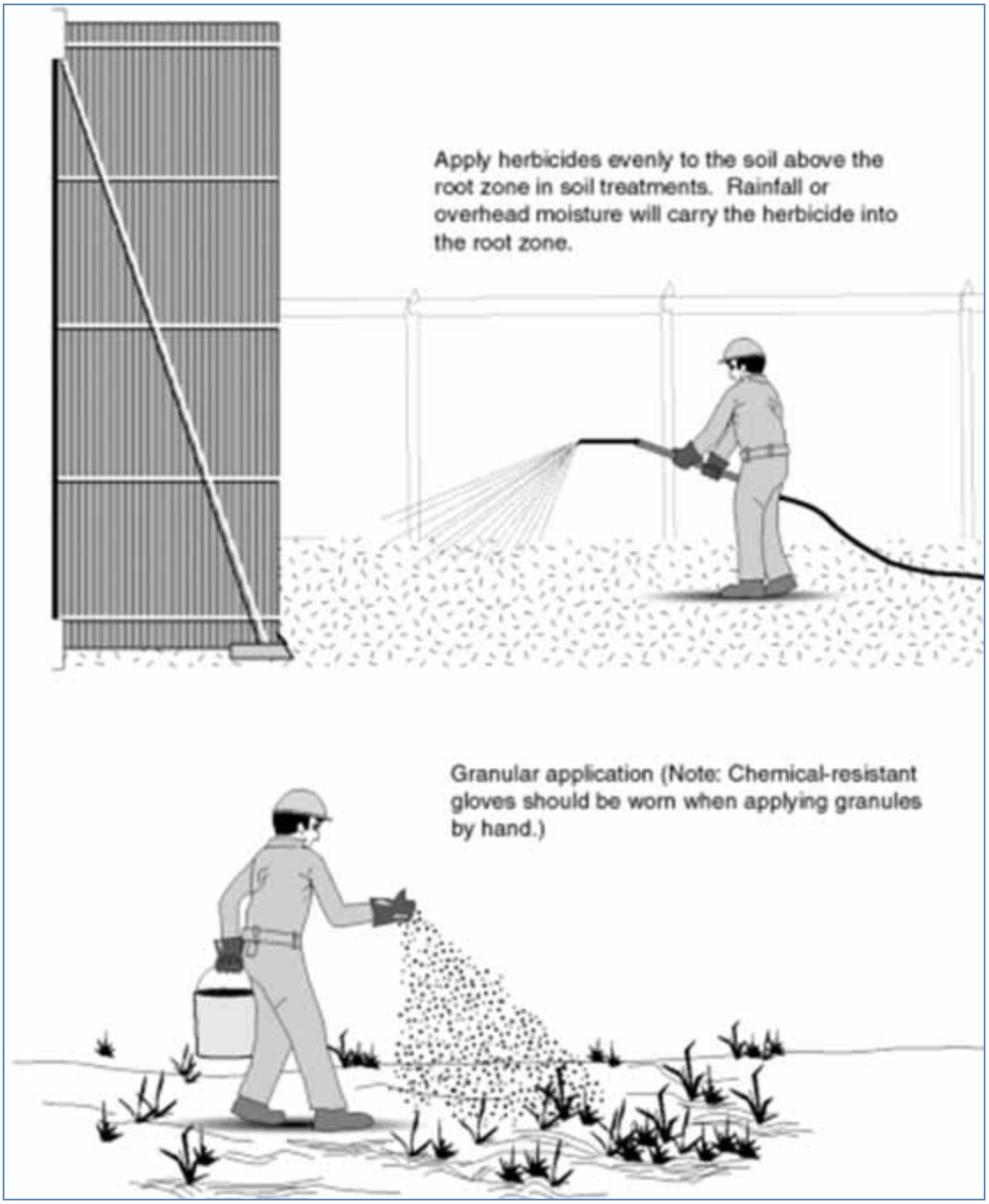


Source: Western 2007

Figure G.3-3. Example of Foliage Spray Treatment Method

G.3.4 Soil Treatment

Bareground applications of non-selective herbicides prevent the establishment of vegetation. In some instances, soil-active herbicides can be applied to the base of a tree to provide control. These herbicides are available in both liquid and solid (granular or pellet) formulations. Rainfall is required for activation (Figure G.3-4).



Source: Western 2007

Figure G.3-4. Examples of Soil Treatment Methods

Herbicides applied evenly to the soil surface move into the root zone of the targeted plants with rainfall or overhead moisture.

As a component of Western's Transmission Vegetation Management Program, Western has developed multiple year weed control programs for substations and other yards where "total" or bare ground residual weed control is necessary. Following this type of vegetation management program for bare ground control offers high performance, economical use of funds, and labor savings. Western can eliminate all vegetation from a given site by establishing a multiple year program. This plan is based on an initial first year program, followed by several years with a maintenance program.

Consistency, when using bare ground herbicides, is achieved when reducing the influence of key limiting factors. Western's standard for bare ground control should be an area that is clean, free of weeds, for an entire growing season. To achieve this expectation, manage these seven limiting factors:

1. Skipping an annual treatment typically results in weed escapes.
2. Mismatching an herbicide to a tolerant weed will result in poor control.
3. Rate shaving the recommended rate results in weed escapes.
4. The use of weak, less persistent herbicides allows for regrowth on the site.
5. The lack of a multiple year program adds unnecessary retreatment cost.
6. Failure to initially clean up the site results in chronic control problems.
7. Applications made after the weeds have emerged, late in the season, typically result in reduced performance. The weeds become established and moisture is not present to properly activate the residual herbicide to place it in the root zone of the germinating weeds.

G.3.4.1 Initial Treatment (First year clean up)

This program is implemented when an area has not been previously treated or the area is experiencing weed escapes during the growing season. A preemergent application must be used to clean up areas previously untreated or neglected.

G.3.4.2 Maintenance Treatment Programs (Second and Third years)

This program is used to maintain the initial treatment. If weeds begin to reenter this treatment, Western rotates back to the initial treatment program for one year. A yearly evaluation is often performed to fine tune the herbicide rate and combination.

G.3.4.3 Weed Resistance

These multi-year programs involve the rotation of herbicide products to achieve better control and best management practices to minimize off-site environmental impacts. Different herbicide products have different modes of action related to how they affect weed growth. When mixing herbicides with different modes of action, a broader spectrum of control is achieved for weed resistant to particular herbicides.

G.3.4.4 Non-Selective Herbicides

Non-selective herbicides can be very effective, but require special attention because they can affect adjacent desirable vegetation (including underlying roots) and/or readily leach into shallow groundwater. To reduce off-target risk, Western applies these herbicides only (1) where they will not be carried from treated areas in drift or surface water runoff; (2) where treated soil will not be blown or otherwise be moved into cropland; and (3) where shallow groundwater will not be affected.

G.3.4.5 Postemergent Contact Herbicides

On occasion it is necessary to add a postemergent contact herbicide to a tank mix of bare ground herbicides for a quick burn down, if weeds have already emerged from the ground. Postemergent contact herbicides have little or no residual soil activity, and therefore need to be applied throughout the growing season. A very effective, nonselective postemergence herbicide is glyphosate. Any postemergent herbicide would have to be applied periodically to control weeds germinating throughout the growing season if no residual herbicides have been applied in conjunction with the postemergent contact herbicides. Complete control of weeds may require retreatment. There are glyphosate formulations that are registered for aquatic sites.

G.3.4.6 Application Timing

Bare-ground applications can be done in the spring or fall. Fall applications (October - November) are appropriate under the following conditions:

1. Rainfall is less than 15 inches per year.
2. Wind and temperature are stable.
3. Winter rain and snow accumulation insure that the herbicide will be positioned into the soil below the plant's roots germinating in the spring.
4. Sensitive crops adjacent to treated areas will be harvested.

Spring applications (February - March) are appropriate under the following conditions:

1. When the rainfall is greater than 15 inches per year.
2. With soil types that have greater potential for leaching or run off.
3. In warmer climates where weed germination might occur earlier in the season.

G.3.4.7 Application Parameters

Sensitive Crops – During application, Western minimizes spray drift to avoid off-target damage to desirable plants. Applicators are knowledgeable of the chemical tolerance of adjacent vegetation, crops, and ornamentals. Care is taken with treatments which will interface (e.g., surface runoff or drift) with agricultural crops. Western accounts for

weather conditions and limits applications accordingly. Additionally, Western uses drift control agents to reduce drift.

Spray-Marking Dye – Western may require that a spray-marking dye be added to the spray solution when liquid herbicides are being applied. The spray-marking dye is a temporary colorant added to the spray solution for marking spray applications. Sunlight or rain will entirely fade the colorant in about 1.5 to 2 days. By adding a colorant to the spraying system, spray application contractors will be able to accurately and uniformly apply herbicides. In addition, Western personnel will be able to observe where herbicides have and have not been applied to the surface of the graveled yard and outside the perimeter of the security fence. This makes inspection of contractor work by Western personnel much easier and more reliable.

G.3.4.8 Best Management Practice for Bare Ground Applications

When applying any bare ground herbicide, there are always inherent risks that the chemical will move off-site with surface water runoff. To minimize future movement of herbicides from applications done at substations, yards, around transmission line structures, and other facilities where bare ground control is desired, Western considers the following best management practices:

Climatic Conditions – The degree of pesticide leaching and transport in surface water at a particular site depends in part on precipitation events. Runoff potential can be minimized by observing weather patterns and avoiding pesticide application before major precipitation events. The immediate weather forecast is useful in making a specific application decision.

Application Perimeter Buffer Zone – Applications should be done so as to minimize off-site impacts by minimizing drift and restricting weed control to 2 feet outside the security fence of any substation or yard, and to minimize drift to any portion of the right-of-way around structures where clearing of vegetation is needed for fire control. On occasion, the ditches which collect and direct surface water runoff can act as detention structures where vegetation is killed. Outside the security fence, vegetation should be mowed if possible.

Highly Sensitive Areas – In those areas where potential exists to damage sensitive crops as a result of runoff, a post-emergent strategy that includes the herbicide glyphosate should be considered. The post-emergent strategy will, however, require multiple applications during the growing season since there is no residual control. Consideration can be given to using glyphosate in a mix with other herbicides to gain broader coverage and preemergent control.

G.4. WESTERN ENVIRONMENTAL PROTECTION REQUIREMENTS

Adverse effects to the atmosphere, soil, or water in the environment can occur as a result of misuse of herbicides. Western selects herbicides based on site-specific conditions and applied according to all directions, warnings, and precautions on the herbicide label.

The following environmental standards and procedures are relevant to all methods of vegetation control in the project area. These measures should be looked upon as means to avoid or minimize environmental impacts of vegetation control, thereby mitigating the effects of the various control procedures.

1. Comply with all applicable Federal and State laws and regulations, and interagency agreements, in conducting vegetation management treatments. If interagency agreements limit vegetation clearing such that power system reliability could be compromised, attempt to re-negotiate these agreements to allow for removal or reduction of vegetation where flashover or fire dangers exist.
2. Select treatments for specific sites based on considerations of sociological, economic, and ecological consequences; that is, use an IVM decision-making process.
3. Strictly observe herbicide application rates, application techniques, and restrictions as specified on EPA-approved label instructions .
4. Use licensed herbicide applicators exclusively as specified by State law.
5. Strictly observe application buffer zones around water bodies -- See Table G.4-1 for minimal buffers that should be observed during herbicide application near water bodies, unless other buffers are specified by agency agreement or regulation.

Table G.4-1. Application Buffers Near Water Bodies

Herbicide Application Method	Minimum Water Buffer Width*
Foliage Spray	50 feet
Basal Spray	10 feet
Stump Treatment	10 feet
Soil Treatment - Pellets	10 feet

Source: Western 2007

*These are minimum buffers – buffers used should be sufficient to prevent adverse environmental impacts and should depend on site specific conditions, label restrictions, and any land management agency restrictions

6. Observe wind and weather limitations for herbicide applications to minimize drift and runoff. Apply chemicals when wind is calm or when a light breeze is

blowing away from non-target plants. See Table G.4-2 for a summary of weather-related restrictions for herbicides applications. Use drift control agents (if necessary) to avoid hazard of damage to nearby plants.

Table G.4-2. Weather summary - restrictions for herbicide applications

Control Method	Max. Temp	Minimum Humidity	Precip.	Wind	Season
Foliar Spray	75º	30%	None	0-5 MPH	Spring/Summer[3]
Stump Treatment	--	--	Minimal	--	Frost Free[1]
Pellet/Soil Applications	--	--	[2]	--	Frost Free[1]
Basal Spray	75º	30%	Minimal	0-10 MPH	Frost Free[1]

Source: Western 2007

[1] Wood must not be frozen to permit penetration.

[2] Moderate precipitation required to move chemical in soil.

[3] Or as specified on herbicide label.

7. Prevent groundwater and surface water contamination by using preventative measures. Recognize that the greatest potential for groundwater contamination from herbicides occurs with the following conditions:
   - Herbicide - highly soluble; low soil absorption; persistent.
   - Soil - permeable - sandy, gravel, low organic matter.
   - Site - shallow groundwater, nearby surface water, wet climate, floodplain.
   - Management - high rate or frequency of application, soil-applied herbicide, application before heavy rain.
8. Where warranted and feasible, monitor herbicide residues and soil and water; monitor the fate of herbicides (in groundwater and surface water) used as high allocation rates for substation weed control.
9. Strictly observe all laws and regulations governing herbicide handling, storage, and disposal and spill cleanup.
10. Observe buffers/reduce disturbance if endangered/threatened/rare species are likely; check label restrictions.
11. Research continually into new vegetation control methods and documentation of study designs and results.
12. Train herbicide applicators to ensure proper application rates and herbicide placement are used; inspect herbicide operations to ensure proper implementation.

G.5. Herbicide Risk

The following sections provide summaries of the risks for a subset of herbicides for which the U.S. Forest Service (USFS) has performed risk assessments and that are available for use in the project area as determined by the Western. Full risk assessments are available at www.fs.fed.us/foresthealth/pesticide/risk.shtml.

G.5.1 Clopyralid

The Forest Service uses only the commercial formulation of Clopyralid named Transline. Transline is a liquid formulation that is manufactured by Dow AgroSciences. The most common method of application of Transline is backpack (selective foliar) and boom spray (broadcast foliar). Transline is labeled for use only in non-crop areas such as rights-of-way and the maintenance of wildlife openings, tree plantations, rangeland, and permanent grass pastures. Technical-grade Clopyralid contains hexachlorobenzene as a contaminant, a classified carcinogen; however, Clopyralid is classified as practically nontoxic in microorganisms, aquatic vertebrates, aquatic freshwater invertebrates, estuarine/marine invertebrates, and slightly toxic in terrestrial animals.

The herbicide Clopyralid is used in the control and management of broadleaf weeds. This herbicide is relatively specific to broadleaf plants because Clopyralid is rapidly absorbed across leaf surfaces but much less readily absorbed by the roots of plants. Clopyralid is a plant growth regulator and acts as a synthetic auxin or hormone, altering the plant's metabolism and growth characteristics, causing a proliferation of abnormal growth that interferes with the transport of nutrients throughout the plant. Terrestrial plants are the nontarget species that would most likely be damaged by Clopyralid. Sensitive crops or other desirable sensitive plant species could be adversely affected by the off-site drift of Clopyralid under a variety of different scenarios depending on local site-specific conditions. However, more tolerant plant species are not likely to be affected unless they are directly sprayed or subject to substantial drift, although drift should not be allowed. Transline should only be used under calm conditions (wind no greater than 10 mph) and should be kept out of lakes, ponds, streams, and other bodies of water.

Clopyralid has a tendency to move into soil rather than to be transported by runoff, additionally; off-site movement of Clopyralid by soil runoff does not appear to be a substantial risk to nontarget plant species. Clopyralid does not bind tightly to soil and thus would seem to have a high potential for leaching. Studies indicate that leaching and subsequent contamination of ground water is likely to be minimal. Aquatic plants do not appear to be at any substantial risk from any plausible acute or chronic exposures; however, in the very extreme case of an accidental spill of a large amount of the herbicide into a relatively small body of water, sensitive aquatic plants could be damaged.

In technical grade Clopyralid, hexachlorobenzene, a carcinogen, is a contaminant with a concentration of approximately 2.5 ppm or less. Although technical grade Clopyralid has been subject to several chronic bioassays for carcinogenicity and none of the bioassays have shown that Clopyralid has carcinogenic potential, it does contain low levels of hexachlorobenzene which is ubiquitous and persistent in the environment. The major sources of general exposure for the public to hexachlorobenzene involve industrial emissions, proximity to hazardous waste sites, and the consumption of contaminated food. Virtually all individuals are exposed to hexachlorobenzene and virtually all individuals are exposed to hexachlorobenzene in their bodies. Due to the relatively

small amounts of Clopyralid that will be used Western, the application of herbicide is not expected to increase ambient levels of hexachlorobenzene.

G.5.2 Chlorsulfuron

Three commercial formulations of chlorsulfuron that are most commonly used for preemergent and early postemergent control of many annual, biennial and perennial broadleaf weeds are Telar®DF, Glean® produced by Dupont, and Corsair™ produced by Riverdale. The primary method of application for Telar®DF and Corsair™ is backpack (selective foliar) and boom spray (broadcast foliar). Boom spray is the application used in rights-of-way management. Glean® is the only formulation of chlorsulfuron registered for aerial application; however, the Forest Service does not use aerial application of chlorsulfuron.

All formulations of chlorsulfuron are labeled for the control of many annual, biennial, and perennial broadleaf weeds. None of the formulations are specifically registered for forestry use. Additionally, Telar®DF and Corsair™ are labeled specifically for noncrop, industrial site use and Glean® is labeled for agricultural use. For Telar®DF there is a label specifically for use in California. All formulations are recommended to have a non-ionic surfactant added as an adjuvant for postemergence applications. Chlorsulfuron is formulated as a dry flowable granule.

Chlorsulfuron is an effective and potent herbicide and could have adverse effects on some nontarget plant species, both terrestrial and aquatic, unless measures are taken to limit exposure. Damage to nontarget plant species after ground broadcast applications could extend to distances of greater than 900 feet from the application site; however, when used in backpack (directed foliar) application offsite drift could be reduced substantially. The acetolactate synthase (an enzyme that catalyzes the biosynthesis of three branched-chain amino acids), which is essential for plant growth, is inhibited by chlorsulfuron and effects plant growth. Under conditions that favor runoff, the offsite movement of chlorsulfuron via runoff could be substantial. Chlorsulfuron has limited water solubility; however, like many other herbicides, chlorsulfuron is much more toxic to aquatic plants than to aquatic animals. Thus, if chlorsulfuron is applied in areas where transport to water containing aquatic macrophytes is likely, it would be plausible that detectable damage could be observed.

Chlorsulfuron used in Telar®DF has a practically nontoxic classification in microorganisms, aquatic vertebrates, freshwater invertebrates, aquatic estuarine/marine invertebrates, and terrestrial animals. Application of chlorsulfuron should only be applied under calm conditions and drift should not be allowed from the treatment area. Chlorsulfuron should be kept out of lakes, ponds, streams, and other bodies of water.

G.5.3 Glyphosate

The herbicide glyphosate is used primarily in conifer release, noxious weed control, and site preparation. The most common commercial glyphosate products used by Western are Accord, Rodeo, and Roundup which use the isopropylamine salt of glyphosate. Technical grade glyphosate contains an impurity, N-nitrosoglyphosate, but the amount

of this impurity in glyphosate has been classified as toxicologically insignificant by the U.S. EPA.

The most common method of application for glyphosate in Forest Service programs involves backpack applied directed foliar sprays; however, glyphosate is applied in hack and squirt applications (the bark and cambium of a standing tree is cut with a hatchet and the herbicide is then applied to the cut using a squirt bottle) for tree removal maintenance of right-of-ways, during site preparation, and conifer release operations.

The herbicidal activity of glyphosate is due primarily to the inhibition of the shikimate pathway which is involved in the synthesis of aromatic amino acids in plants and microorganisms (the metabolic pathway does not occur in humans or other animals). The two specific biochemical mechanisms of action for glyphosate are uncoupling of oxidative phosphorylation and inhibition of hepativ mixed function oxidases. It should be noted that the U.S. EPA indicates that glyphosate is classified as Group E: Evidence of non-carcinogenicity for humans (although this assessment has been challenged).

Some formulations of glyphosate recommend the use of a surfactant to improve the efficacy of glyphosate and some surfactants may be more toxic than the herbicides with which they are used. A risk of using a surfactant is that they may play a substantial role in the interpretation of a large number of suicides and attempted suicides involving the ingestion of glyphosate formulations, primarily Roundup, the acute mammalian toxicity of different glyphosate formulation does not appear to differ substantially. On the other hand, the risk characterization for both workers and members of the public in contact with glyphosate indicates that there is very little potential risk at the typical application rate of 2 lbs a.e./acre. However, glyphosate and glyphosate formulations are skin and eye irritants.

Available toxicity studies suggest potential effects of glyphosate in mammals and birds to inhibit oxidative phosphorylation and consequently reduce food conversion efficiency as well as the apparent lack of teratogenic activity. In soil microorganisms, under field conditions, there is very little information suggesting that glyphosate will be harmful. However, glyphosate has a variety of toxic effects in plants, including the inhibition of photosynthesis as well as inhibition of respiration and nucleic acid syntheses in plants and microorganisms. In higher plants, inhibition of the shikimic acid pathway leads to an inhibition or cessation of growth, cellular disruption, and, at sufficiently high levels of exposure, plant death. Unintended drift as well as unintended direct deposition are the more plausible exposure scenarios for nontarget terrestrial plant species which could induce plant death in nontarget species. For sensitive nontarget species of plants the upper range of application rate of glyphosate could affect plants as much as 100 feet from the application site. Some fish species such as salmonids are more sensitive to glyphosate than other species of fish. Yet, amphibians are generally no more sensitive to glyphosate than fish. Thus, the use of glyphosate near bodies of water where sensitive species of fish may be found (i.e., salmonids) should be conducted with substantial care to avoid contamination of surface water. It is worth noting that aquatic plants appear to be somewhat less sensitive to glyphosate than the most sensitive aquatic animals.

G.5.4 Imazapyr

The herbicide Imazapyr is used in the control of a variety of grasses, broadleaf weeds, vines, and brush species, site preparation, wildlife habitat improvement and conifer or hardwood release, and right-of-way maintenance. While Imazapyr formulations can be used in pre-emergence applications, the most common and effective applications are post-emergent when the vegetation to be controlled is growing vigorously. The most common application of Imazapyr for right-of-way maintenance is boom spray. However, the commercial formulation of Imazapyr, Habitat and Arsenal AC, are commonly applied with cut-surface treatment methods while Arsenal and Chopper formulations involve backpack (selective foliar) and boom spray (broadcast foliar) operations.

Imazapyr is an effective herbicide, one in which even tolerant plants that are directly sprayed with Imazapyr at normal application rates are likely to be damaged. However, Imazapyr is less toxic to conifers, but is toxic to many other non-target plants. Some sensitive plant species could be affected by the off-site drift or by off-site movement in runoff of Imazapyr depending on local site-specific conditions. Imazapyr inhibits acetolactate synthase (ALS), an enzyme that catalyzes the biosynthesis of three branched-chain amino acids, all of which are essential for plant growth. Imazapyr is not metabolized extensively in plants but is transported rapidly from treated leaves to root systems and may be exuded into the soil from the roots of treated plants. Therefore, post-emergence application method is more effective than the pre-emergence application method.

Where runoff is prevalent, damage from runoff appears to pose a greater hazard than drift. Residual soil contamination with Imazapyr could be prolonged in some areas. Some effects are also plausible in aquatic plants. Aquatic macrophytes appear to be more sensitive to Imazapyr than unicellular algae. Peak concentrations of Imazapyr in surface water could be associated with adverse effects in some aquatic macrophytes.

Adverse effects in workers, members of the general public, as well as terrestrial or aquatic animals do not appear to be likely. Imazapyr is relatively non-toxic to soil microorganisms, aquatic invertebrates, and fish and is not expected to bioaccumulation in the food chain. Additionally, Imazapyr is practically non-toxic in terrestrial animals and birds. The most sensitive species appears to be aquatic macrophytes, *Lemna minor* and *Myrophyllium sibiricum;* however, some aquatic algae appear to be substantially less sensitive.

G.5.5 Oxyfluorfen

Oxyfluorfen is used for the control of weeds around conifers and some deciduous trees. Oxyfluorfen is a diphenyl-ether herbicide that is used to control a large number of broadleaf weeds in both forestry and agriculture. Oxyfluorfen is known to inhibit protoporphyrinogen oxidase (also known as “protoporphyrinogen IX oxidase” or “protox”), resulting in inhibition of heme biosynthesis, and induction of symptoms in rodents consistent with the expression of human variegate porphyria (i.e. effects on the liver, blood, blood-forming tissue.). Oxyfluorfen is relatively ineffective in inhibiting seed germination but is toxic after either direct spray or soil application. Oxyfluorfen is more

effective in pre-emergent soil applications than direct spray since it is most toxic to plants when they germinate.

Adverse effects on populations of nontarget terrestrial plants, mammals, and birds are plausible following use of Oxyfluorfen at the typical and maximum application rates and methods. Adverse effects on aquatic life, especially plants and aquatic invertebrates, are virtually certain if steps are not taken to prevent contamination of nearby aquatic habitats; Oxyfluorfen is highly toxic to aquatic animals even though it is not very soluble in water. Aquatic algae are more sensitive than fish but are equal in sensitivity with aquatic invertebrates. Formulations of Oxyfluorfen appear to be more toxic than technical grade herbicide, regardless of purity. Aquatic macrophytes are equally sensitive to Oxyfluorfen with respect to algae.

It is plausible that Oxyfluorfen exposure resulting from typical and maximum application rates and methods could result in adverse health effects among workers who handle herbicides without extensive use of personal protective equipment, and among members of the general public who might consume vegetation contaminated with the herbicide primarily through spray drift. Oxyfluorfen is of a low order of acute oral toxicity, is a mild eye and skin irritant, and only causes reproductive/development effects in rodents and rabbits at doses/concentrations which cause toxicity in pregnant dams or does. Oxyfluorfen is classified as a Group C, possible human carcinogen by the U.S. EPA. Additionally, Oxyfluorfen inhibits protoporphyrinogen oxidase, individuals who are innately deficient in protoporphyrinogen oxidase (i.e. have variegate porphyria) might be uniquely sensitive to Oxyfluorfen exposure.

Oxyfluorfen is practically non-toxic to mammals, birds, and honey bees; highly toxic to fish; and very highly toxic to aquatic invertebrates. This herbicide causes phyotoxicity in non-target plants at concentrations which are likely used under field conditions. A limited number of studies suggest that the effects of Oxyfluorfen on soil microorganisms are also likely to be transient, with measured variables in exposed populations ultimately rebounding above those of control levels.

G.5.6 Triclopyr

The herbicide triclopyr mimics auxin, a plant growth hormone, thus disrupting the normal growth and viability of plants. Triclopyr is used for wildlife habitat improvement, noxious weed control, conifer or hardwood release, and site preparation, among other uses such as right-of-way management, hardwood control, facilities maintenance, and seed orchard protection. Triclopyr has a low order of acute lethal potency, although, just like any chemical, Triclopyr at sufficiently high exposure levels can cause toxic effects.

Although triclopyr causes developmental effects only at doses that cause maternal toxicity, reproductive effects are an endpoint of concern to both the human health and ecological risk assessments and the quantitative risk assessment for mammalian wildlife is based on the same data as used in the human health risk assessment. The U.S. EPA /OPP (1998a) has classified triclopyr acid as being practically non-toxic to slightly toxic to birds and practically non-toxic to honey bees. Very high concentrations of triclopyr have been shown to cause growth inhibition in bacteria and fungi in

laboratory bioassays. Some bryophytes and lichens may be sensitive to long term effects after triclopyr exposure. There is very little suggestion in any field studies that triclopyr had any direct adverse effects on both animal and plant terrestrial organisms and most reported effects may simply reflect changes in habitat secondary to vegetation management practices.

Fish tend to be lethargic to hyper sensitive to triclopyr. The environmental metabolite of triclopyr (TCP) is potentially more toxic in fish than either triclopyr acid or triclopyr TEA. In free-living amphibians observations of hind limb deformities has been observed; however, Garlon 3A and Garlon 4 (commercial formulations of triclopyr) have been specifically tested for malformations in the frog embryo teratogensis assay and no statistically significant effects were noted. Aquatic vertebrates appear to be about equally or somewhat less sensitive than fish to the various forms of triclopyr.

Although triclopyr BEE (butoxyethyl ester) is much more toxic to aquatic species than triclopyr TEA (triethylamine) or triclopyr acid, the projected levels of exposure are much less even for acute scenarios because of the rapid hydrolysis of triclopyr BEE to triclopyr acid as well as the lesser runoff of triclopyr BEE because of its lower water solubility and higher affinity for soils. Nonetheless, triclopyr BEE is projected to be somewhat more hazardous when used near bodies of water where runoff to open water may occur. If triclopyr is applied at high rates of exposure in areas where surface water contamination is plausible, implementation of BMPs would protect aquatic resources. Site-specific modeling and/or environmental monitoring could be useful to ensure and verify that concentrations TCP do not reach harmful concentrations.

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Appendix H

Floodplains/Wetlands Assessment

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Floodplains/Wetlands Assessment

for the

Western Area Power Administration
San Joaquin Valley Right-of-Way
Maintenance Activities Project

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December 2009

Introduction

Project Background

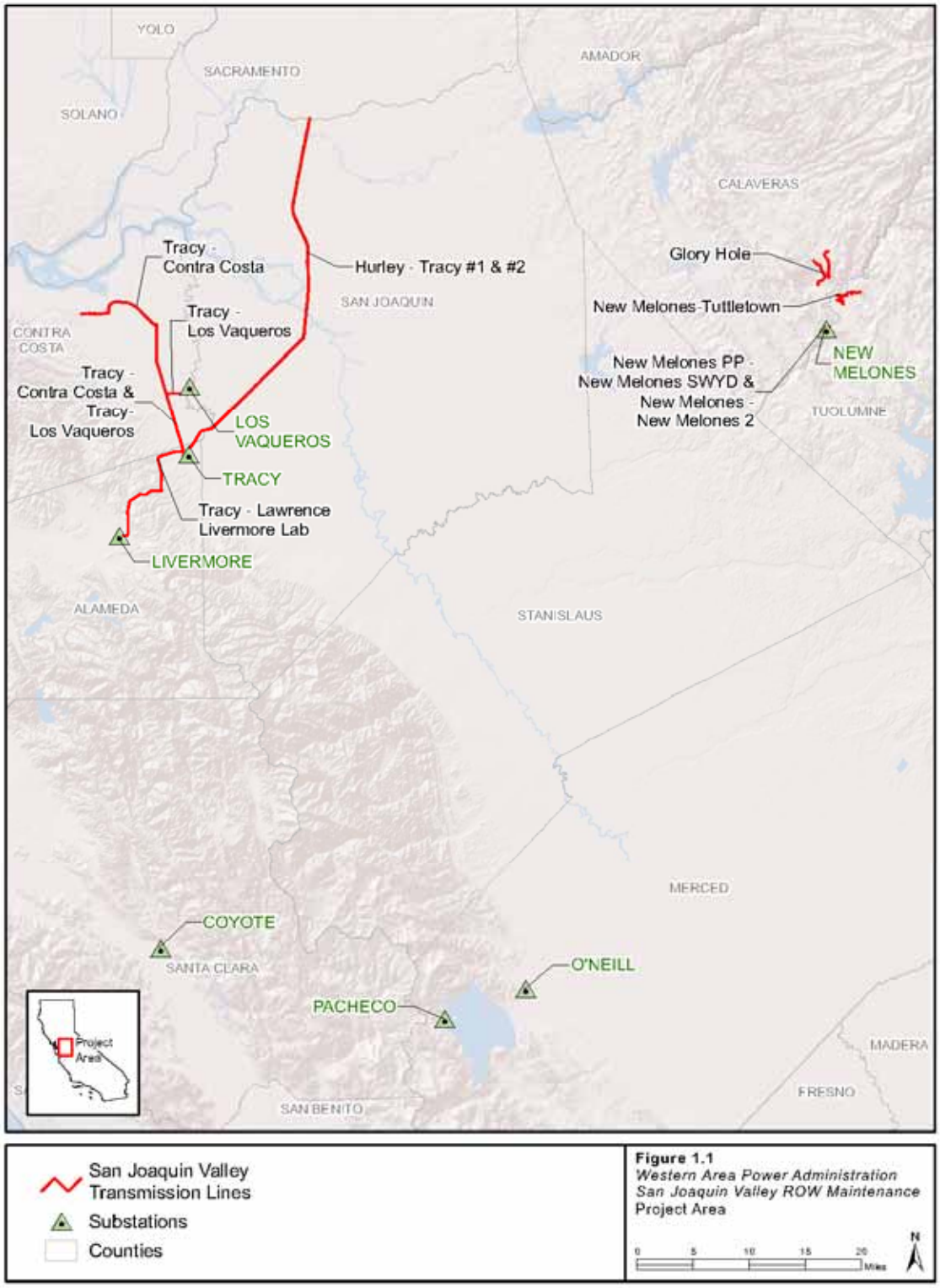
The Western Area Power Administration (Western), an agency of the Department of Energy (DOE), markets and delivers hydroelectric power and related services within a 15-state service area of the central and western United States. The Sierra Nevada Region (SNR) is one of four customer service regions and is responsible for the operation and maintenance of federal transmission facilities within a geographic service territory that includes Northern California and a portion of Nevada. In order to effectively operate and maintain the facilities, Western must comply with various directives, regulations, and orders, including the National Electric Safety Code and Western States Coordinating Council, which ensure protection of human safety and reliability of the transmission system.

Western currently has one completed Environmental Assessment (EA), and another that is nearing completion, which address routine right-of-way (ROW) operations and maintenance activities. These two EAs, however, are only applicable to operation and maintenance (O&M) activities within roughly two-thirds of the SNR's service area. The current EA, entitled San Joaquin Valley ROW Maintenance EA, addresses O&M activities within the remaining portion of the SNR's service area.

Several sections of the ROW are within floodplains and wetlands areas. The project therefore requires the preparation of a Floodplain/Wetlands Assessment in accordance with Title 10 *Code of Federal Regulations* (CFR) Part 1022. This Floodplain/Wetlands Assessment examines the effects of proposed ROW maintenance on floodplains and wetlands along existing ROWs within the project area.

The project area is in the northern San Joaquin Valley and includes portions of San Joaquin, Contra Costa, Calveras, Tuolomne, Merced, Alameda, and Santa Clara counties (Figure 1).

The present natural settings of the project ROWs are shaped by a variety of landscapes. These include agricultural lands on the San Joaquin Valley floor, the dry rolling hills and rangelands of the Coastal Mountain Range, the scrub oak dotted foothills east of the Sierra Nevada Range Mountains, and small riparian corridors near major and minor watercourses. Much of the ROW crosses through diked reclaimed lands in the Sacramento-San Joaquin River Delta.


YOLO
SACRAMENTO
SOLANO
AMADOR
CALAVERAS
Tracy - Contra Costa
Hurley - Tracy #1 & #2
SAN JOAQUIN
Glory Hole
New Melones-Tuttletown
Tracy - Los Vaqueros
CONTRA COSTA
NEW MELONES
New Melones PP - New Melones SWYD & New Melones - New Melones 2
Tracy - Contra Costa & Tracy- Los Vaqueros
LOS VAQUEROS
TUOLUMNE
TRACY
Tracy - Lawrence Livermore Lab
LIVERMORE
ALAMEDA
STANISLAUS
MERCED
COYOTE
SANTA CLARA
O'NEILL
PACHECO
MADERA
FRESNO
SAN BENITO
Project Area
San Joaquin Valley Transmission Lines
Substations
Counties
Figure 1.1
Western Area Power Administration
San Joaquin Valley ROW Maintenance
Project Area
0 5 10 15 20 Miles
N

Regulatory Background

DOE is required by Executive Order (E.O.) 11988—Floodplain Management (May 24, 1977) to ensure that the potential effects of any action it may take in a floodplain are evaluated and its planning programs and budget requests reflect consideration of flood hazards and floodplain management. DOE is also required by E.O. 11990—Protection of Wetlands (May 24, 1977) to ensure consideration of wetlands protection in decision making, and to ensure the evaluation of the potential impacts of any new construction proposed in a wetland. Title 10 CFR Part 1022 establishes DOE policies to comply with E.O. 11988 and E.O. 11990.

Title 10 CFR Part 1022.11(c) requires DOE to determine whether a proposed action would be located within a wetland by consulting the most authoritative information available for the site. DOE reviewed available sources of information to determine the extent of wetlands located within the project area, including:

- U.S. Fish and Wildlife Service National Wetlands inventory data (USFWS 1990)
- Results of biological surveys conducted for Western transmission-line and access-road ROWs within the project area. Surveys collected locational data for a variety of wetland and habitat features, including:
    - Vernal pools
    - Other wetlands
    - Rivers and streams
    - Potential habitat for special-status species

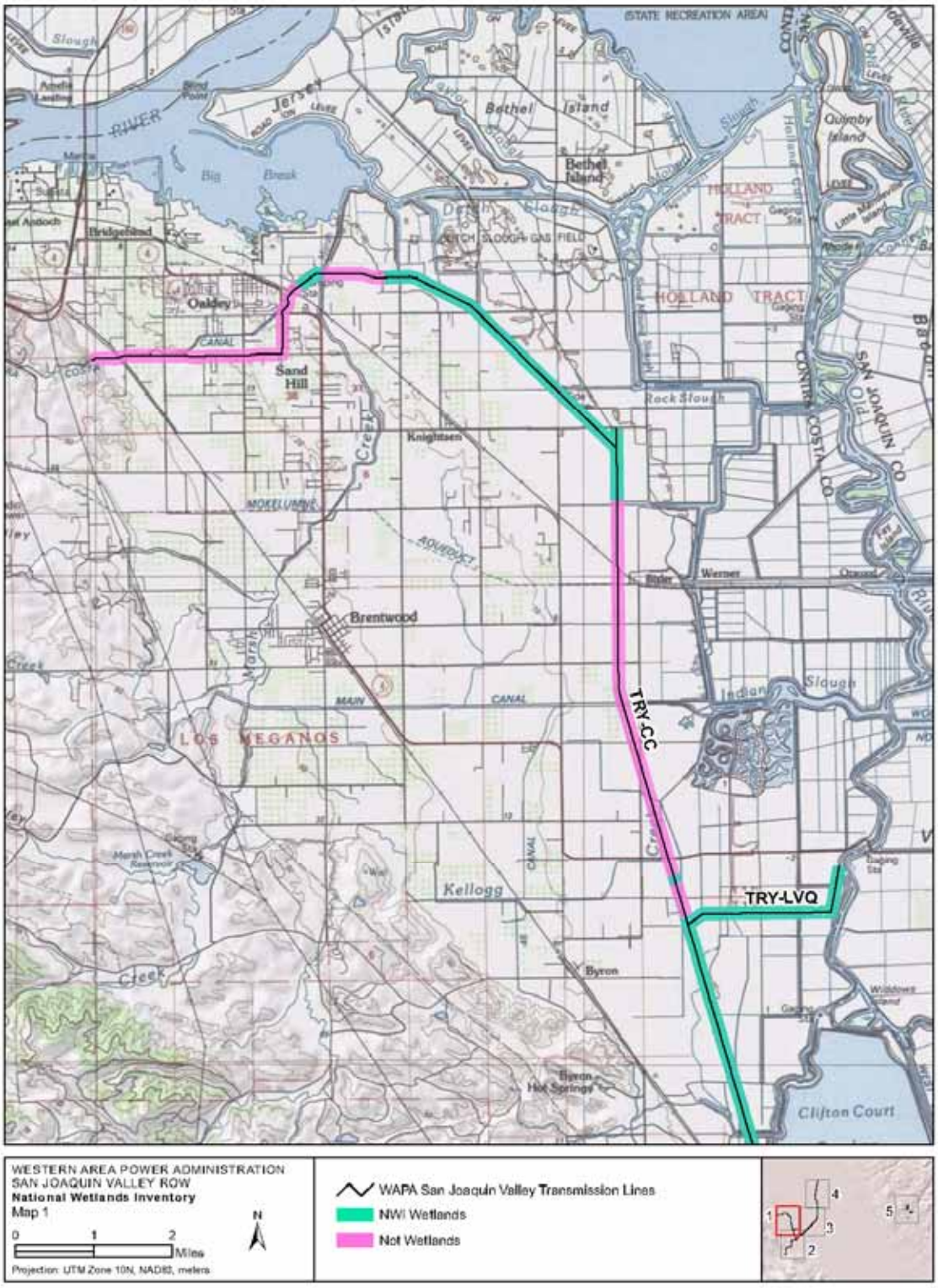
Title 10 CFR Part 1022.11(b) requires DOE to determine whether a proposed action would be located within a floodplain by consulting the most authoritative information available for the site. DOE reviewed available sources of information to determine the extent of floodplains located within the project area, including Flood Insurance Rate Maps or Flood Hazard Boundary Maps prepared by FEMA.

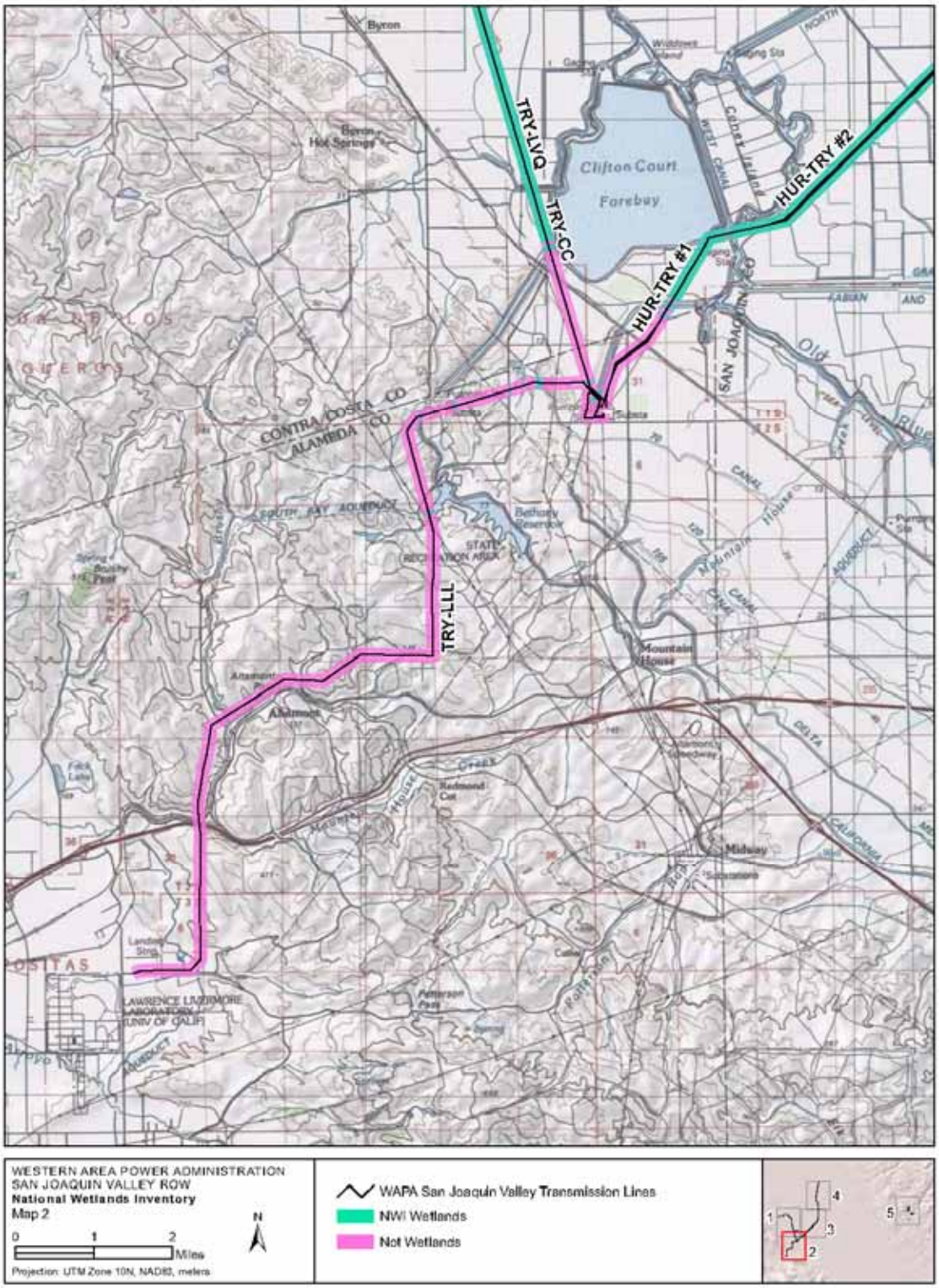
Title 10 CFR Part 1022.4 identifies two kinds of floodplains for consideration in the floodplains/wetlands assessment. The base floodplain is a 100-year floodplain, i.e., the floodplain with a 1.0 percent chance of flooding in a given year. The critical action floodplain is at minimum a 500-year floodplain, i.e., the floodplain with a 0.2 percent chance of flooding in a given year. The critical action floodplain applies to those DOE actions for which even a slight chance of flooding would be too great, including the storage of highly volatile, toxic, or water-reactive materials.

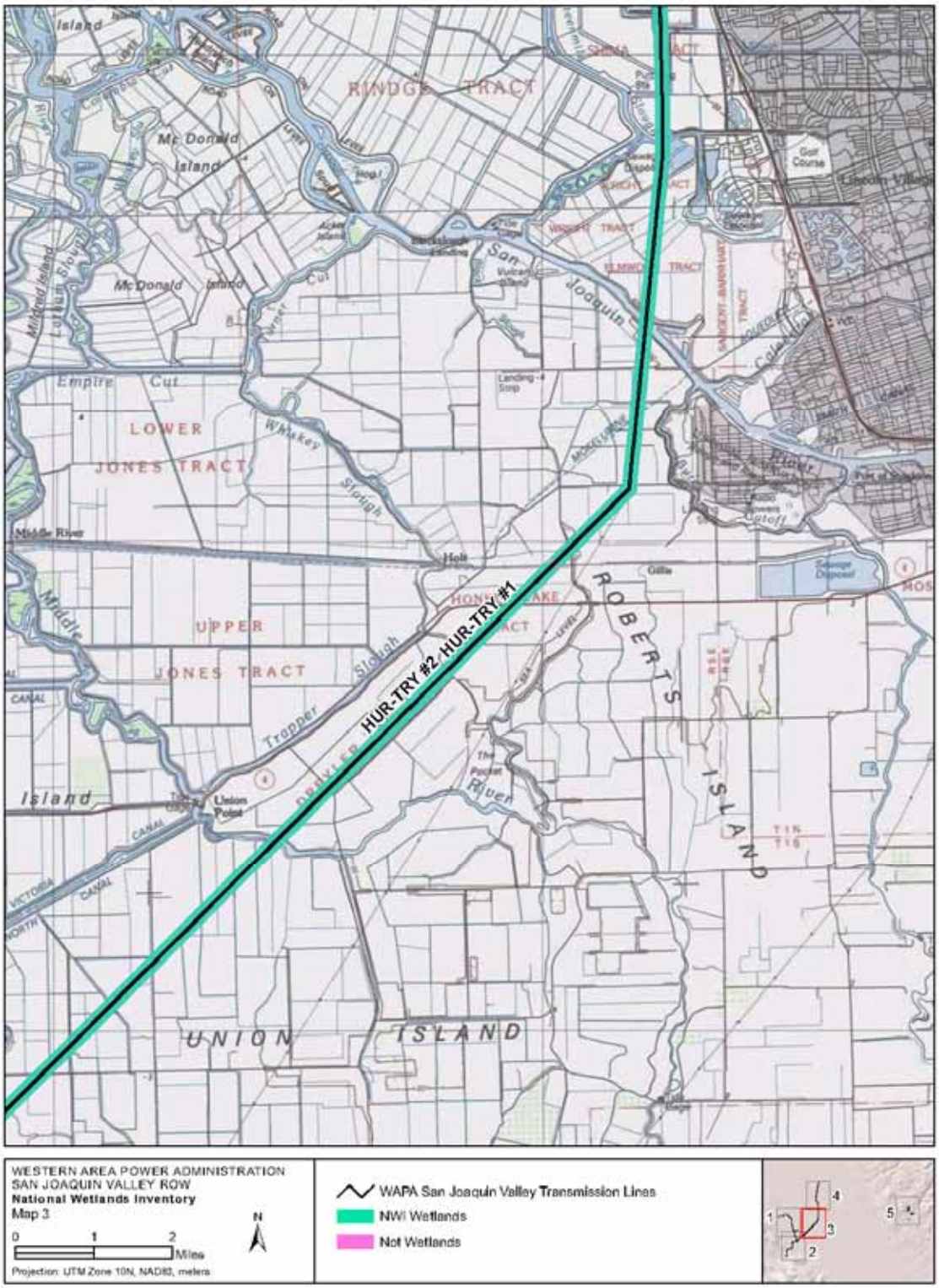
Wetlands

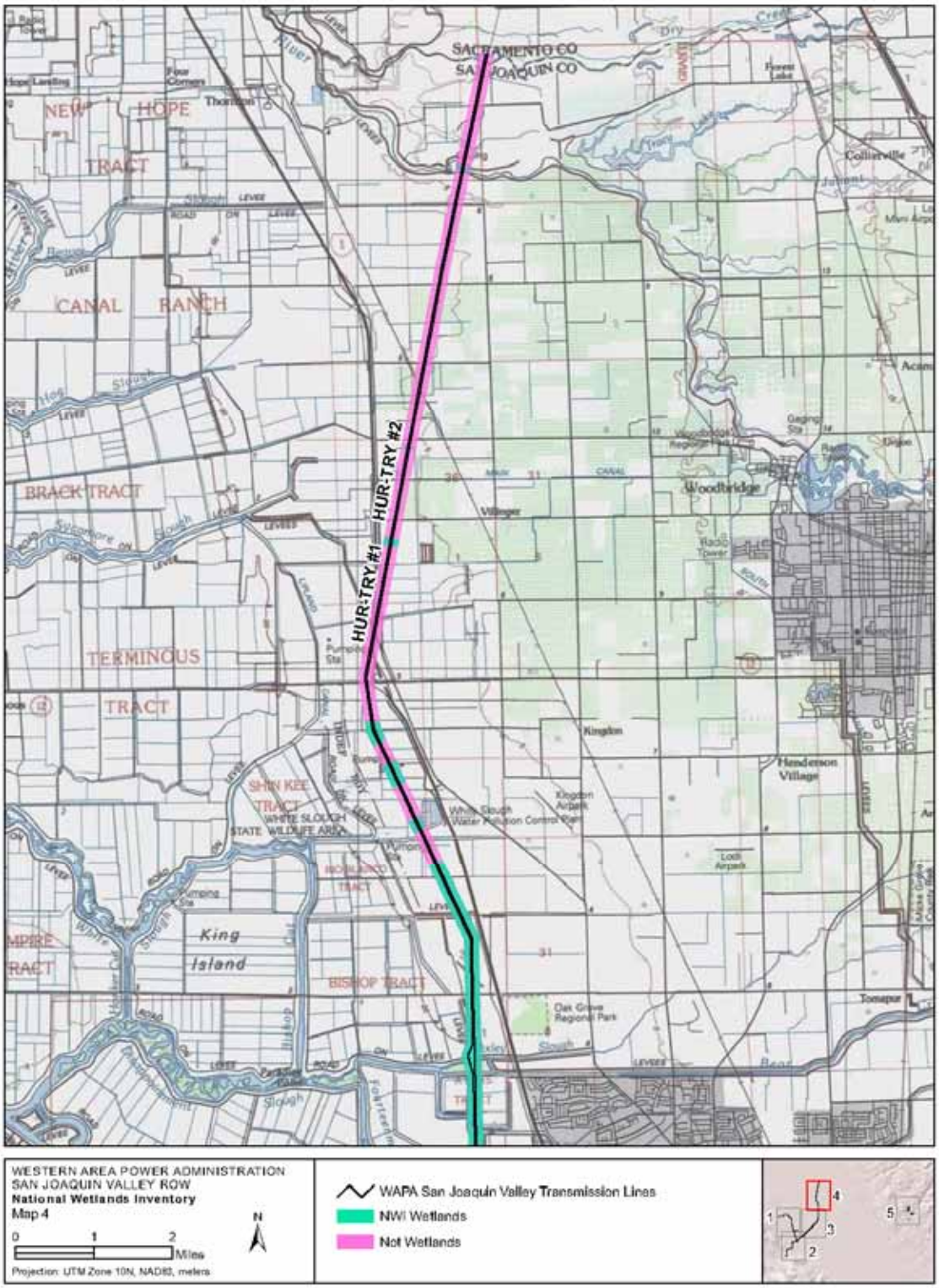
Existing Conditions

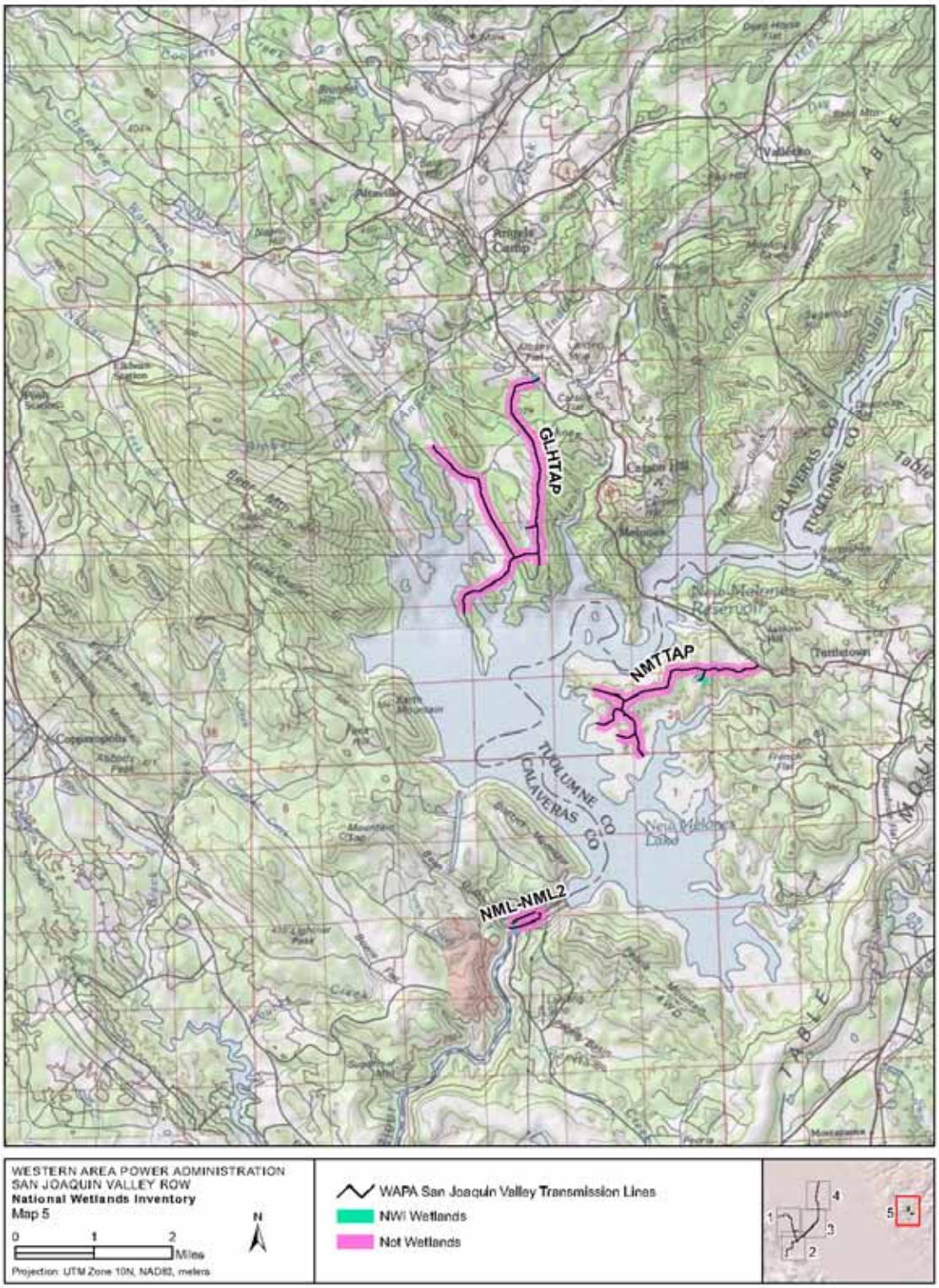
The existing environment is described in Section 3 of the EA. The following paragraphs summarize the extent of wetlands in the study area according to data from the National Wetlands Inventory (Figure 2).


WESTERN AREA POWER ADMINISTRATION
SAN JOAQUIN VALLEY ROW
National Wetlands Inventory
Map 1
0 1 2 Miles
Projection: UTM Zone 10N, NAD83, meters
N
WAPA San Joaquin Valley Transmission Lines
NWI Wetlands
Not Wetlands
TRY-CC
TRY-LVQ
Oakley
Sand Hill
Brentwood
Knightsen
Bethel Island
Jersey Island
Quimby Island
HOLLAND TRACT
LOS MEGANOS
Kellogg
Byron
Clifton Court
Rock Slough
Indian Slough
Big Break
Bridgehead
Werner
Byron Hot Springs
Marsh Creek Reservoir
Wildlife Island
STATE RECREATION AREA
SAN JOAQUIN CO
CONTRA COSTA CO
MAIN CANAL
MOKELUMNE AQUEDUCT
Old River
Dutch Slough Gas Field


TRY-LVQ
TRY-CC
HUR-TRY #1
HUR-TRY #2
TRY-LLL
Clifton Court
Forebay
Byron
Byron Hot Springs
CONTRA COSTA CO
ALAMEDA CO
SOUTH BAY AQUEDUCT
Bethany Reservoir
STATE RECREATION AREA
Mountain House
Altamont
Midway
LAWRENCE LIVERMORE LABORATORY (UNIV OF CALIF)
WESTERN AREA POWER ADMINISTRATION
SAN JOAQUIN VALLEY ROW
National Wetlands Inventory
Map 2
0 1 2 Miles
Projection: UTM Zone 10N, NAD83, meters
N
WAPA San Joaquin Valley Transmission Lines
NWI Wetlands
Not Wetlands
1
2
3
4
5


RINDGE TRACT
Mc Donald Island
Mc Donald Island
San Joaquin
Empire Cut
LOWER JONES TRACT
Whiskey Slough
Middle River
UPPER JONES TRACT
Middle
Trapper Slough
HUR-TRY #2 HUR-TRY #1
ROBERTS ISLAND
The Pocket
River
Island
Union Point
UNION ISLAND
Lincoln Village
Golf Course
WESTERN AREA POWER ADMINISTRATION
SAN JOAQUIN VALLEY ROW
National Wetlands Inventory
Map 3
0 1 2 Miles
Projection: UTM Zone 10N, NAD83, meters
N
WAPA San Joaquin Valley Transmission Lines
NWI Wetlands
Not Wetlands
1
2
3
4
5


SACRAMENTO CO
SAN JOAQUIN CO
NEW HOPE TRACT
CANAL RANCH
BRACK TRACT
TERMINOUS TRACT
SHIN KEE TRACT
WHITE SLOUGH STATE WILDLIFE AREA
King Island
BISHOP TRACT
HUR-TRY #1
HUR-TRY #2
Woodbridge
Kingston
Henderson Village
Collierville
Tonapur
WESTERN AREA POWER ADMINISTRATION
SAN JOAQUIN VALLEY ROW
National Wetlands Inventory
Map 4
0 1 2 Miles
Projection: UTM Zone 10N, NAD83, meters
N
WAPA San Joaquin Valley Transmission Lines
NWI Wetlands
Not Wetlands


GL-HTAP
NMTTAP
NML-NML2
TUOLUMNE CO
CALAVERAS CO
WESTERN AREA POWER ADMINISTRATION
SAN JOAQUIN VALLEY ROW
National Wetlands Inventory
Map 5
0 1 2 Miles
Projection: UTM Zone 10N, NAD83, meters
N
WAPA San Joaquin Valley Transmission Lines
NWI Wetlands
Not Wetlands
1
2
3
4
5

Hurley-Tracy (HUR-TRY) #1 230 kV: This transmission line is comprised of one row of single-circuit steel towers and is paralleled by the HUR-TRY #2 line. The ROW is 125-ft wide. This section of the transmission line begins at the Sacramento-San Joaquin County line, and ends at tower (TWR) 69/2 where it joins with HUR-TRY #2. The length of this transmission line is 32.14 miles (mi), with a ROW area of 487.05 acres. This transmission line passes through 0.27 mi of Freshwater Emergent Wetland, 0.05 mi of Freshwater Forested/Scrub Wetland, 0.01 mi of Freshwater Pond, 0.47 mi of Riverine, and 22.72 mi of Other Wetlands. Other wetlands include several classifications that refer to diked former tidelands, and other natural and artificial wetlands associated with the Sacramento San Joaquin River Delta.

HUR-TRY #2 230 kV: This transmission line is comprised of one row of single-circuit steel towers and is paralleled by the HUR-TRY #1 line. The ROW is 125 ft wide. This section of the transmission line begins at the Sacramento San Joaquin County line, and ends at TWR 69/2 where it joins with HUR-TRY #1. The length of this portion of the transmission line is 32.16 mi, with a ROW area of 487.29 acres. This transmission line passes through 0.26 mi of Freshwater Emergent Wetland, 0.04 mi of Freshwater Forested/Scrub Wetland, 0.05 mi of Freshwater Pond, 0.47 mi of Riverine, and 22.98 mi of Other Wetlands.

HUR-TRY #1 and #2 230 kV: This transmission line is comprised of one row of double-circuit steel towers. The ROW is 125 ft wide. This section of the transmission line begins at TWR 69/2, and ends at Tracy Substation. The length of this ROW segment is 3.38 mi, with a ROW area of 51.22 acres. This transmission line passes through 0.06 mi of Freshwater Emergent Wetland, 0.01 mi of Freshwater Forested/Scrub Wetland, 0.11 mi of Riverine, and 1.59 mi of Other Wetlands.

Tracy-Contra Costa 69 kV: This transmission line is comprised of single suspension wood and steel towers. The transmission line starts at Tracy Substation and ends at CC4. The ROW is 125 ft wide from Tracy Substation to TWR 12/8; the length of this portion of the transmission line is 12.75 mi and the ROW area is 193.19 acres. From TWR 12/8 to CC4 the ROW is 50 ft wide; the length of this transmission line is 8.02 mi, with a ROW area of 48.63 acres. This transmission line passes through 0.29 mi of Freshwater Emergent Wetland, 0.04 mi of Freshwater Pond, 0.07 mi of Lake, 0.06 mi of Riverine, and 8.36 mi of Other Wetlands.

Tracy-Lawrence Livermore Lab 230 kV: This transmission line is comprised of steel single-strain towers. The ROW is 120 ft wide. The transmission line starts at Tracy Substation and ends at Lawrence Livermore Lab Substation. The length of this transmission line is 12.7 mi, with a ROW area of 184.68 acres. This transmission line passes through 0.07 mi of Freshwater Emergent Wetland, 0.02 mi of Freshwater Pond, 0.03 mi of Lake, 0.06 mi of Riverine, and 0.04 mi of Other Wetlands.

Tracy-Los Vaqueros 69 kV: This transmission line is comprised of wood horizontal posts. The ROW is 125 ft wide. The transmission line starts at TWR 0/1 and ends at Los

Vaqueros Substation. The length of this transmission line is 2.46 mi, with a ROW area of 37.24 acres. This transmission line passes through 0.29 mi of Freshwater Emergent Wetland, 0.07 mi of Lake, 0.13 mi of Riverine, and 5.75 mi of Other Wetlands.

New Melones (NML) #1 230 kV: This transmission line is comprised of one row of single-circuit steel towers. The ROW is 25 ft wide. The transmission line starts at the NML Powerhouse and ends at NML Substation. The length of this ROW segment is 0.33 mi, with a ROW area of 1.0 acre. This transmission line does not pass through any wetlands.

New Melones #2 230 kV: This transmission line is comprised of one row of single-circuit steel towers. The ROW is 100 ft wide. The transmission line starts at the NML Powerhouse and ends at NML Substation. The length of this transmission line is approximately 0.5 mi, with an area of approximately 5.98 acres. This transmission line passes through 0.04 mi of Lake.

New Melones–Tuttletown 17.2 kV Distribution Line: This distribution line is comprised of wood posts. The ROW is 25 ft wide. The length of this line is 4.20 mi, with a ROW area of 12.73 acres. This distribution line passes through 0.06 mi of Other Wetlands.

Glory Hole 17.2 kV Distribution Line: This distribution line is comprised of wood posts. The ROW is 25 ft wide. The length of this line is 6.16 mi, with a ROW area of 18.68 acres. This distribution line passes through 0.02 mi of Freshwater Emergent Wetland and 0.01 mi of Other Wetlands.

Wetland Impacts and Alternatives

The Proposed Action involves expanding the scope of operations and maintenance activities on existing transmission lines. Techniques for manual and mechanical vegetation control methods under the Proposed Action would be the same as those described for the No Action Alternative, and would include trimming, mowing, removal, disposal, and placement of geotextile barriers for vegetation management. Under the Proposed Action, Western also proposes using herbicides to kill or suppress growth of plants, and using soil borings for geotechnical or environmental analysis.

Removal of plants could alter the wetland habitat values in localized areas. This change in habitat due to maintenance activities is expected to be minimal. This effect would be similar under the Proposed Action and the No Action Alternative. Since the ROW is already established, maintenance activities are not anticipated to cause further fragmentation of habitat.

Maintenance vehicle traffic could cause rutting or compaction in wetlands, altering their habitat value. This effect would be similar under the Proposed Action and the No Action Alternative.

Herbicides could affect non-target vegetation. The degree to which this occurs would depend both on the specific herbicide, and on whether the herbicide contacts non-target

vegetation because of the application technique. Factors include drift (when herbicide drifts through the air or blows away from the intended area of application), water or soil movement, and accidental spills or accidental/careless applications. Effects of the specific herbicide on non-target vegetation would also depend on the "selectivity" of the herbicide. A selective herbicide kills only one type of vegetation (e.g., broadleaf plants). A nonselective herbicide might kill a number of plant types (such as broadleaf and grasses). The more selective a particular herbicide, the less the potential there is for non-targeted vegetation to be harmed. This effect would occur only under the Proposed Action, and would be minimized by following best management practices, described in Western's *Integrated Vegetation Management Environmental Guidance Manual* (Western 2007), including:

- Reviewing federal and California state pesticide regulations for restrictions on use of particular herbicides
- Reviewing property owner/interagency agreements for herbicide type or application-method restrictions
- Observing site conditions to match specific herbicides and application methods to those conditions, including: the plants that are to be controlled; the season of the year and associated limitations; presence of sensitive environmental areas (e.g., endangered species, habitat, wetlands, etc.); presence/proximity of non-target vegetation; and vegetation conditions (height, amount of tall, growing brush, etc.)
- Reviewing Western's environmental protection requirements
- Following all restrictions and guidance listed on the herbicide label
- Calibrating equipment to ensure proper mixture and volume of herbicide
- Selecting the proper nozzle tip to avoid overspray
- Handling herbicides to avoid accidental spills and ensure worker and public safety

Floodplains

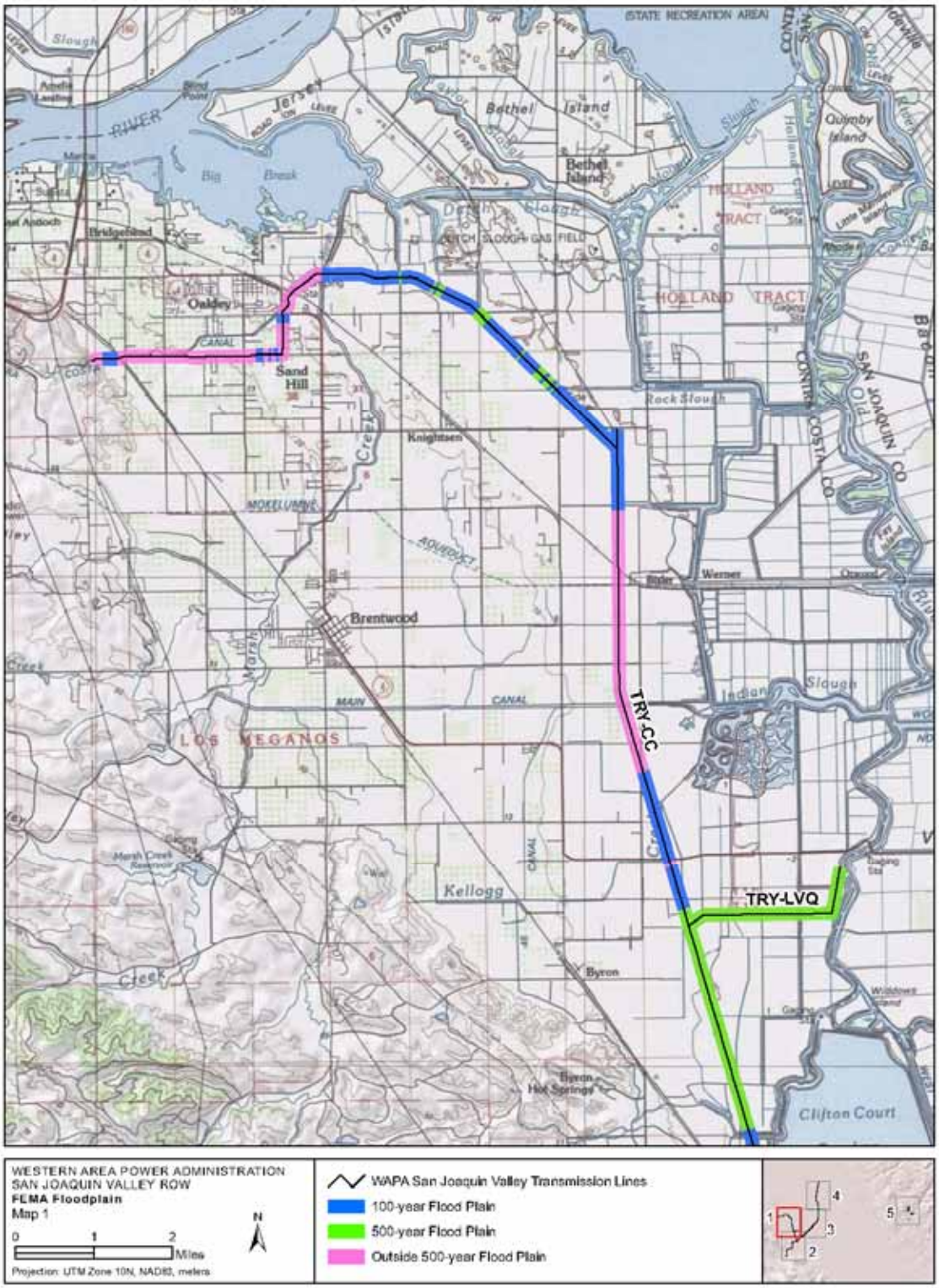
The existing environment is described in Section 3 of the EA. The following paragraphs summarize the extent of floodplains in the study area according to FEMA Flood Hazard Maps (Figure 3).

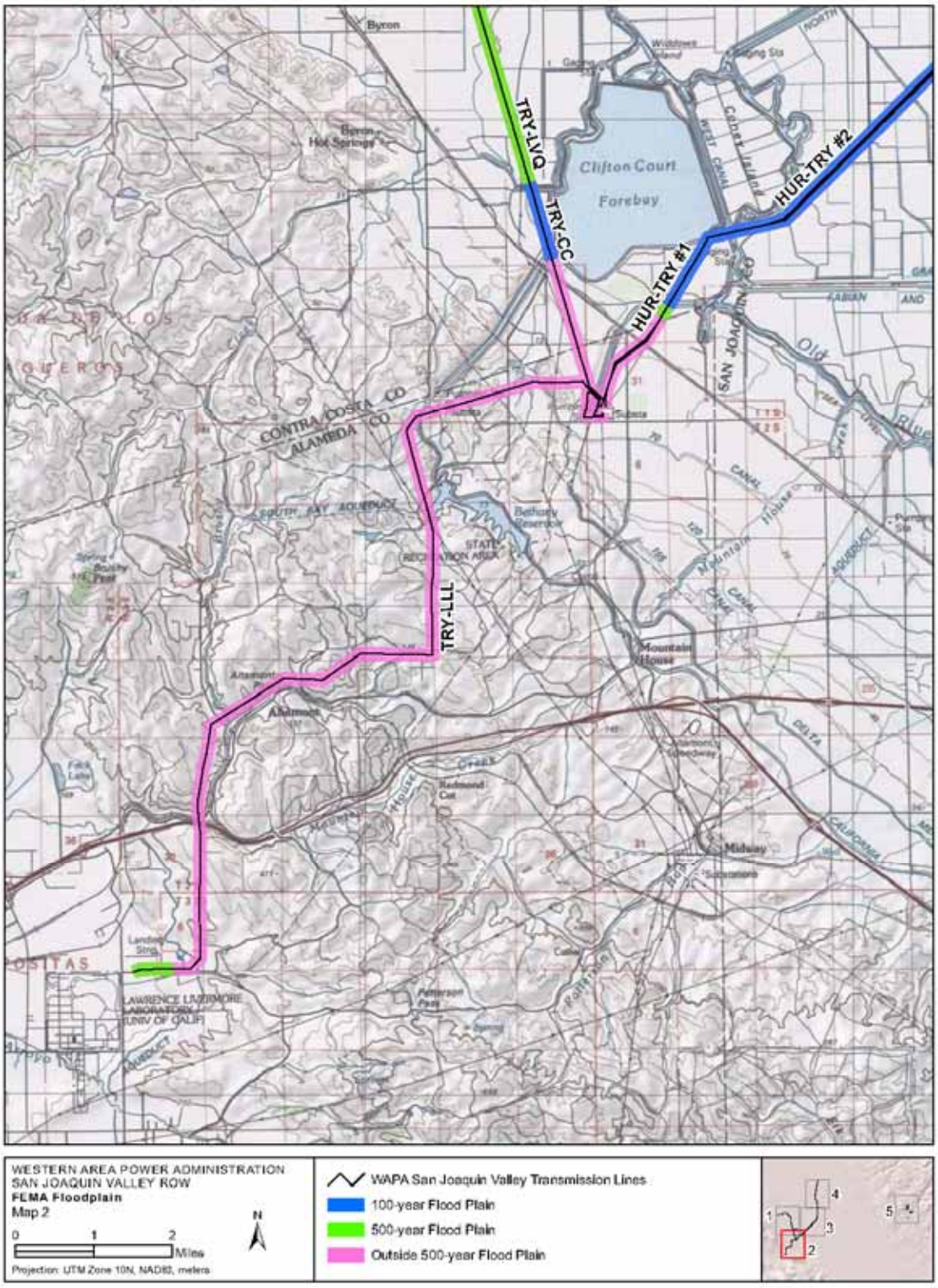
Existing conditions

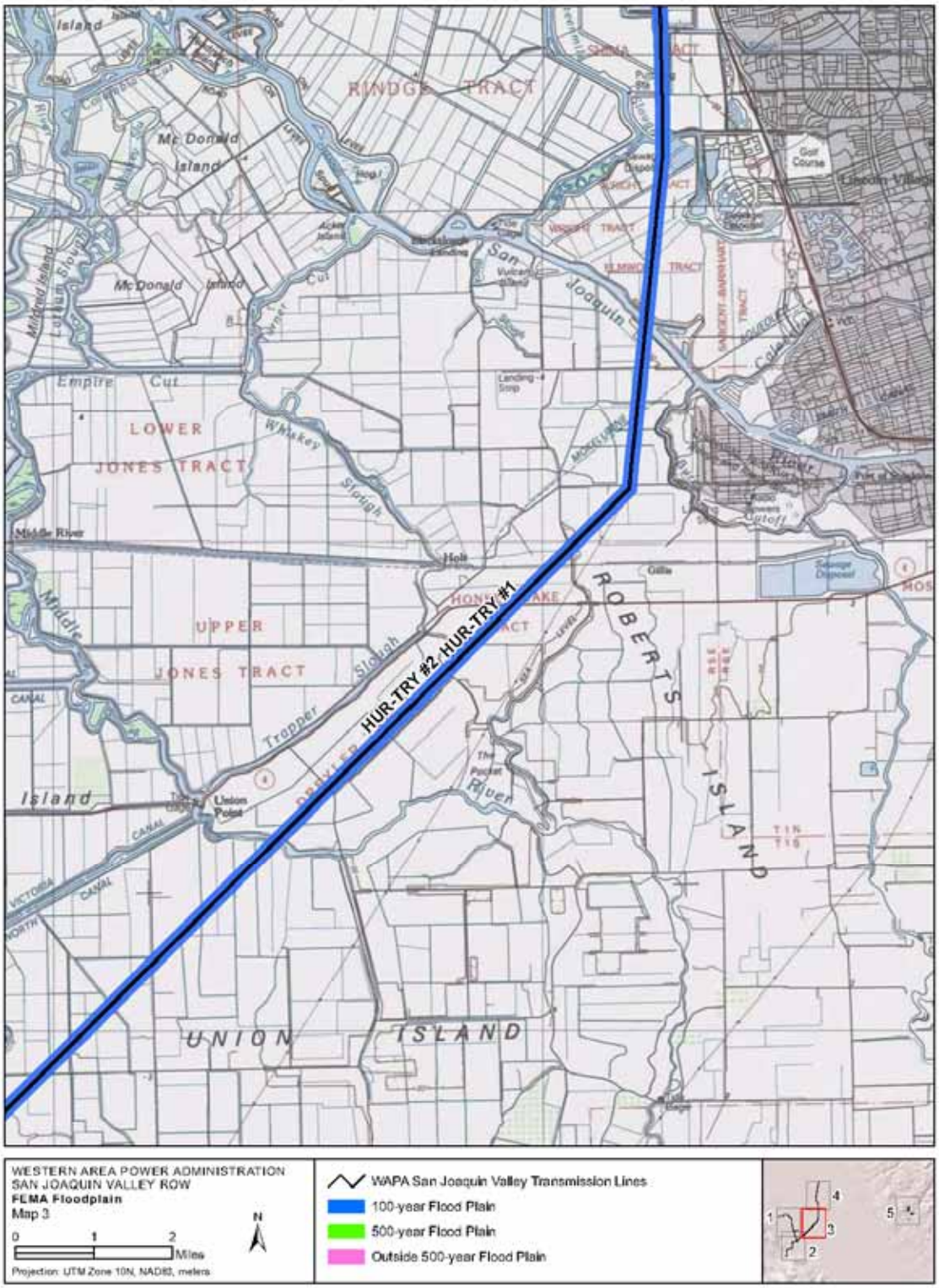
HUR-TRY #1: This transmission line passes through 25.49 mi of a 100-year floodplain and 8.15 mi of a 500-year floodplain.

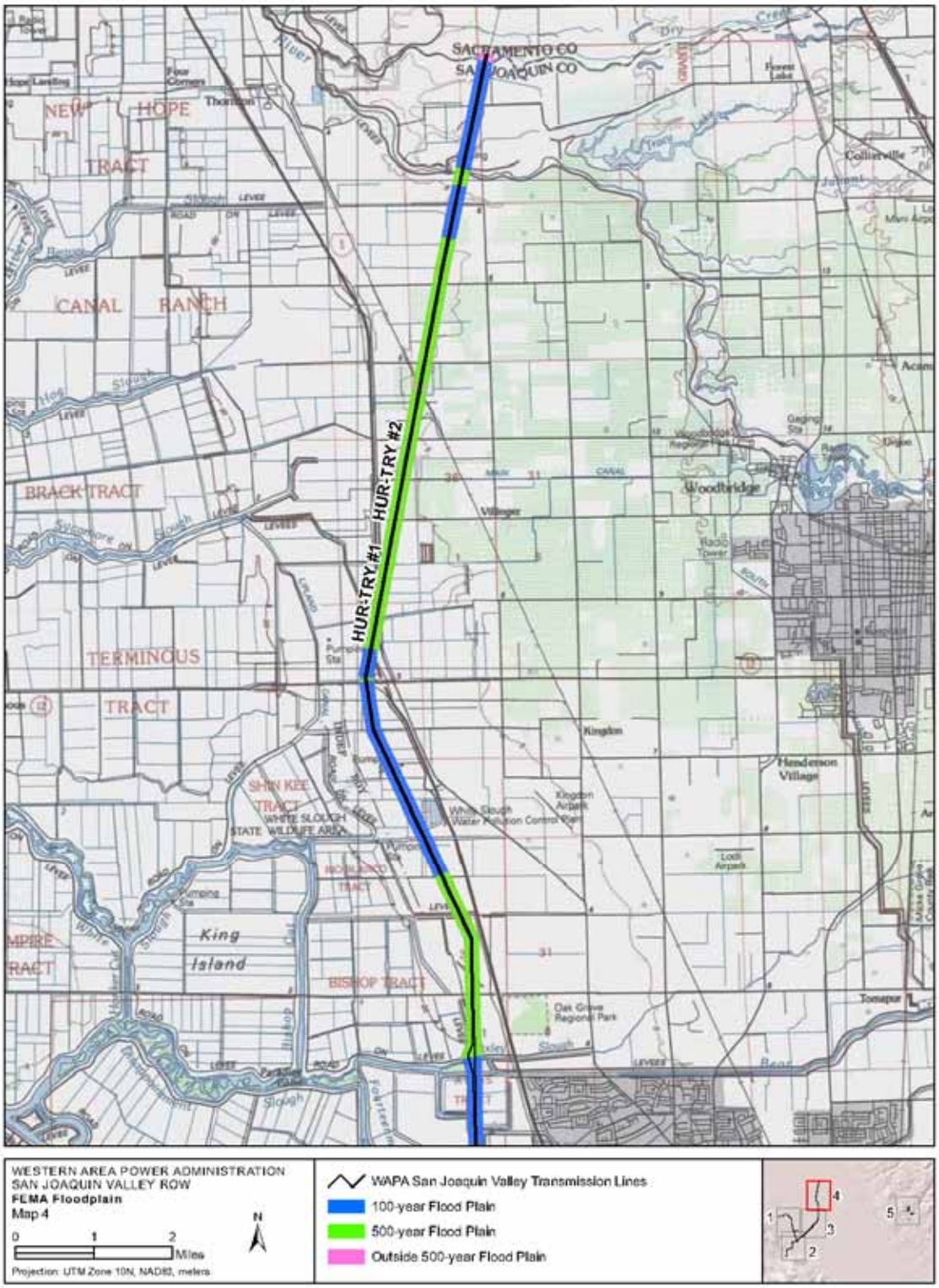
HUR-TRY #2: This transmission line passes through 25.54 mi of a 100-year floodplain and 8.10 mi of a 500-year floodplain.

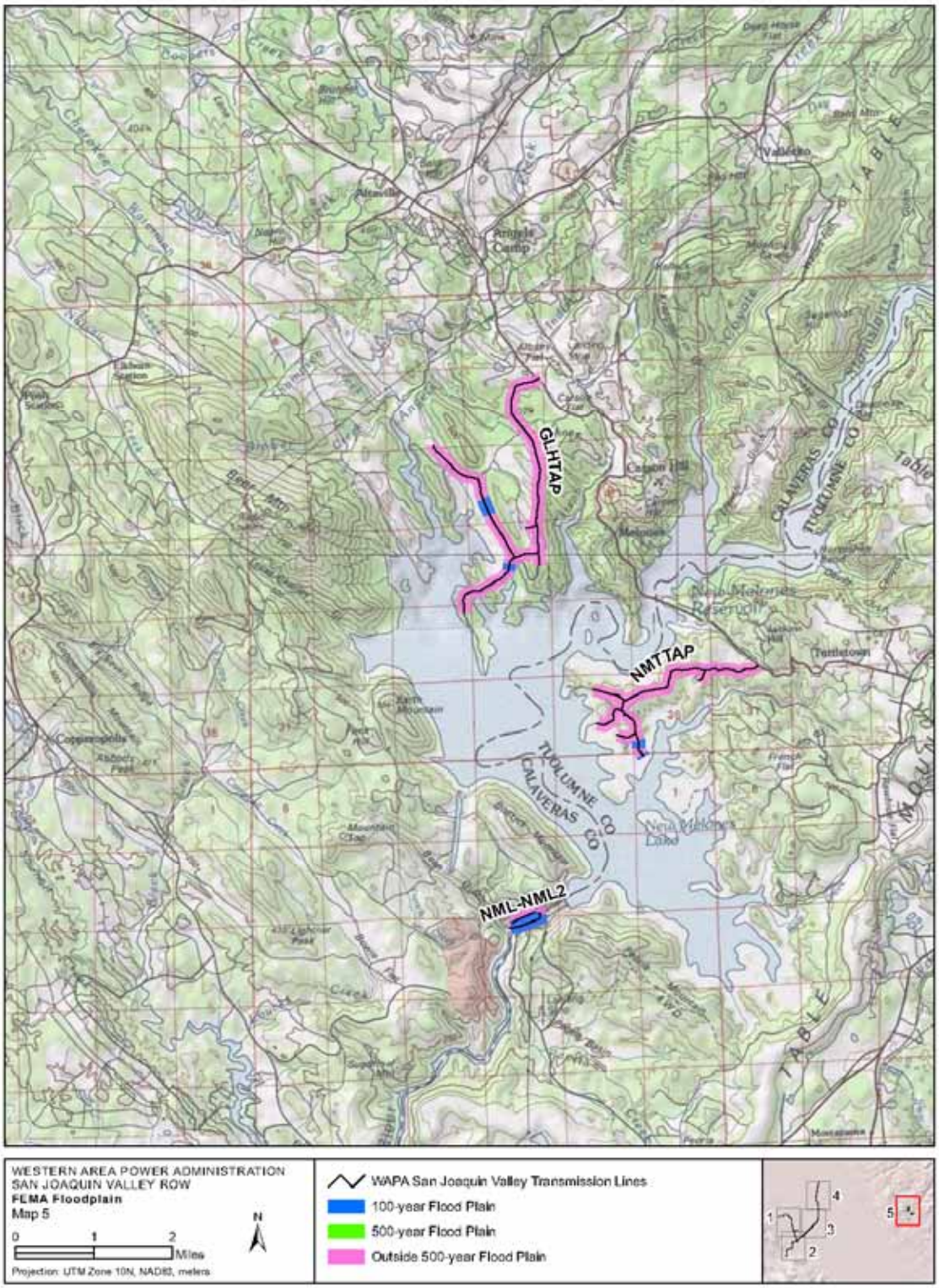
HUR-TRY #1 and #2: This transmission line passes through 1.79 mi of a 100-year floodplain and 0.17 mi of a 500-year floodplain.


WESTERN AREA POWER ADMINISTRATION
SAN JOAQUIN VALLEY ROW
FEMA Floodplain
Map 1
0 1 2 Miles
Projection: UTM Zone 10N, NAD83, meters
N
WAPA San Joaquin Valley Transmission Lines
100-year Flood Plain
500-year Flood Plain
Outside 500-year Flood Plain
TRY-CC
TRY-LVQ
Oakley
Sand Hill
Brentwood
Knightsen
Bethel Island
Jersey Island
Quimby Island
HOLLAND TRACT
LOS MEGANOS
Kellogg
Byron
Clifton Court
Rock Slough
Indian Slough
Big Break
Bridgehead
Werner
Marsh Creek Reservoir
Byron Hot Springs
Wildlife Island
STATE RECREATION AREA
DUTCH SLOUGH GAS FIELD
MOKELUMNE
AQUEDUCT
MAIN CANAL
CANAL
SAN JOAQUIN CO
CONTRA COSTA CO


TRY-LVQ
TRY-CC
HUR-TRY #1
HUR-TRY #2
TRY-LLL
Clifton Court
Forebay
Byron
Byron Hot Springs
CONTRA COSTA CO
ALAMEDA CO
SOUTH BAY AQUEDUCT
Bethany Reservoir
STATE RECREATION AREA
Mountain House
Altamont
Midway
SAN JOAQUIN
Old
LAWRENCE LIVERMORE LABORATORY (UNIV OF CALIF)
WESTERN AREA POWER ADMINISTRATION
SAN JOAQUIN VALLEY ROW
FEMA Floodplain
Map 2
0 1 2 Miles
Projection: UTM Zone 10N, NAD83, meters
N
WAPA San Joaquin Valley Transmission Lines
100-year Flood Plain
500-year Flood Plain
Outside 500-year Flood Plain
1
2
3
4
5


RINDGE TRACT
Mc Donald Island
Mc Donald Island
San Joaquin
Empire Cut
LOWER JONES TRACT
Whiskey Slough
Middle River
UPPER JONES TRACT
Middle
Trapper Slough
HUR-TRY #2
HUR-TRY #1
ROBERTS ISLAND
Island
Union Point
UNION ISLAND
WESTERN AREA POWER ADMINISTRATION
SAN JOAQUIN VALLEY ROW
FEMA Floodplain
Map 3
0 1 2 Miles
Projection: UTM Zone 10N, NAD83, meters
N
WAPA San Joaquin Valley Transmission Lines
100-year Flood Plain
500-year Flood Plain
Outside 500-year Flood Plain


SACRAMENTO CO
SAN JOAQUIN CO
HUR-TRY #1
HUR-TRY #2
NEW HOPE TRACT
CANAL RANCH
BRACK TRACT
TERMINOUS TRACT
SHIN KEE TRACT
WHITE SLOUGH STATE WILDLIFE AREA
King Island
BISHOP TRACT
Woodbridge
Kingston
Henderson Village
Collierville
Tonapur
WESTERN AREA POWER ADMINISTRATION
SAN JOAQUIN VALLEY ROW
FEMA Floodplain
Map 4
0 1 2 Miles
Projection: UTM Zone 10N, NAD83, meters
N
WAPA San Joaquin Valley Transmission Lines
100-year Flood Plain
500-year Flood Plain
Outside 500-year Flood Plain


GL-HTAP
NMTTAP
NML-NML2
CALAVERAS CO
TUOLUMNE CO
WESTERN AREA POWER ADMINISTRATION
SAN JOAQUIN VALLEY ROW
FEMA Floodplain
Map 5
0 1 2 Miles
Projection: UTM Zone 10N, NAD83, meters
N
WAPA San Joaquin Valley Transmission Lines
100-year Flood Plain
500-year Flood Plain
Outside 500-year Flood Plain

Tracy–Contra Costa: This transmission line passes through 8.34 mi of a 100-year floodplain and 3.48 mi of a 500-year floodplain.

Tracy–Lawrence Livermore Lab: This transmission line passes through 0.52 mi of a 500-year floodplain.

Tracy–Los Vaqueros: This transmission line passes through 1.03 mi of a 100-year floodplain and 5.37 mi of a 500-year floodplain.

New Melones # 1: This transmission line does not pass through any floodplains.

New Melones #2: This transmission line passes through 0.43 mi of a 100-year floodplain.

New Melones–Tuttletown 17.2 kV Distribution Line: This distribution line passes through 0.14 mi of a 100-year floodplain.

Glory Hole 17.2 kV Distribution Line: This distribution line passes through 0.31 mi of a 100-year floodplain.

Floodplain Impacts and Alternatives

Adverse impacts to floodplains include the potential for flood damage to structures placed within the floodplain, and increased flooding due to displacement of water from the normal floodplain by road construction activities. Impacts can also occur when resources are degraded enough to lessen the ability of the floodplain to store excess water.

The Proposed Action involves expanding the scope of operations and maintenance activities on existing transmission lines. New activities included in the Proposed Action include the use of herbicides in vegetation management and the use of soil borings for geotechnical or environmental analysis. Both the Proposed Action and the No Action Alternative involve vegetation management activities that could locally alter runoff and drainage patterns. However, removal of vegetation along ROWs would not be expected to influence flow of water during 100- or 500-year flows. The No Action Alternative relies on manual and mechanical vegetation control methods, without herbicides, that are largely corrective and remove tall-growing plants that have already been established on a site. Under the Proposed Action, Western would use herbicide methods—either alone or in concert with manual and mechanical methods—both to remove established vegetation, and prevent its regrowth. The Proposed Action would promote low-growing plant communities and would involve less alteration of vegetation that could impact runoff and drainage patterns.

No structures are proposed as part of this project that could significantly displace water from the normal floodplain. Access road maintenance could cause minor changes to

land contours, affecting floodwater flow on an insignificant scale; this effect would be the same under the Proposed Action and the No Action Alternative.

References

10 CFR Part 1022. "Compliance with Floodplain/Wetlands Environmental Review Requirements," U.S. Department of Energy, Title 10, Code of Federal Regulations, Washington, D.C., March 7, 1979.

Executive Order 11988. "Floodplain Management," May 24, 1977.

Executive Order 11990. "Wetlands Management," May 24, 1977.

USFWS 1990. "National Wetlands Inventory Maps," U.S. Fish and Wildlife Service, Washington, D.C., various dates.

Western 2007. "Integrated Vegetation Management Environmental Guidance Manual," Western Area Power Administration, Folsom, California, February 2007.

Appendix I

Noxious Weed Management

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INTRODUCTION

Western's *Integrated Vegetation Management Guide and Transmission Vegetation Management Program* (February 2007) describes Western's procedures for vegetation management. This appendix presents Section 11 of the Guide, which provides Western's approach to noxious weed management.

11.0
NOXIOUS WEED MANAGEMENT

11.1 INTRODUCTION

Western's historical vegetation management activities have been restricted primarily to the control of vegetation which poses a fire or safety hazard to transmission facilities. The existing vegetation management control program has now been expanded to be more proactive, with active management toward the desired condition of a low growth community on the right-of-way, as well as the control of noxious or undesirable weeds. The following sections describe Western's Noxious Weed Management Policy and its implementation during all stages of construction and maintenance activities.

11.2 BACKGROUND

Virtually all noxious weed species are non-native plants that have found ideal growing environments in North America. In their native European habitats, insects, competing organisms, and soil and moisture conditions combine to keep these weeds in check. But in the western United States, an ideal environment, coupled with the species' prolific reproductive capabilities (seed production) and the lack of natural predators, have allowed noxious weeds to become established and to spread rapidly on both public and private rangeland and farmland. As a result, crop yields and wildlife habitat are being reduced, livestock is poisoned, native plants are displaced, and rangeland in good ecological condition is being invaded.

There are several internet sites with useful information on noxious weeds. A selection of these is provided in Appendix H.

11.3 FEDERAL, STATE AND COUNTY LAWS/REGULATIONS

The Federal Noxious Weed Act of 1974, as amended by Sec. 15, Management of Undesirable Plants on Federal Lands, 1990, mandates each Federal land management agency to:

1. Designate a lead office and person trained in the management of undesirable plant species
2. Establish and fund an undesirable plant management program
3. Complete and implement cooperative agreements with State agencies
4. Establish integrated management systems to control undesirable plant species

Federal agencies responsible for the management of public lands have established an interagency committee which agreed to work cooperatively to manage noxious weeds, increase public awareness, support further research, and provide technical assistance on private lands to accomplish an integrated approach to the management of noxious weeds. All Federal land management agencies have a designated weed coordinator or similar position, which can be found on the agency websites.

Western's General Counsel has concluded that language in the act requires Western to take action on lands we own and have jurisdiction over, including easements and rights-of-way. Additionally, the Department of Energy's (DOE) Office of Environmental Guidance has instructed Western to comply with all Federal and State mandates to control undesirable weeds.

Within Western's service area, all states except Texas have passed laws that address noxious weed management and have developed State noxious weed lists (see Appendix B - State Noxious Weed Lists). Additionally, the majority of State weed management laws allow the governing body of a weed management district (usually the county) to designate additional undesirable plants for management within its jurisdiction. For example, in 1990 the Colorado Legislature passed the Colorado Undesirable Plant Management Act (HB 1175) requiring county governments to develop integrated weed management plans that would include Federal agency involvement in controlling specific weeds in Colorado. Therefore, **be sure to check with the appropriate County agency** (usually a Weed Management Board) for county-specific requirements.

11.4 FEE-OWNED VERSUS NON-FEE-OWNED LANDS

Western's land management and rights administration fall within two general areas; fee-owned/withdrawn and non-fee-owned (easements, rights-of-way, permits, etc.). Weed management practices, responsibilities, and liabilities for these two situations are quite different. In the fee-owned/withdrawn situation, Western is the property owner/administrator and must assume the burden of full compliance with the weed laws. In the non-fee-owned situation, Western must defer to the landowner or administrator as the responsible party for compliance with Federal and State laws, while ensuring that any actions taken are not detrimental to the rights held by Western.

Implementation of Western's noxious weed policy should be prioritized according to Western's vested interest in the land. First priority for noxious weed control should be on those lands owned by Western in fee. Second priority for control of noxious weeds should be on non-fee-owned Federal lands where transmission facilities either cross or occupy Federal land and where noxious weed infestations occur within permitted areas. Third priority for control of noxious weeds should be on or across non-Federal government lands.

The following sections are proposed guidelines for Western weed management involvement under the two general areas described above.

11.4.1 Western Fee-Owned/Withdrawn Property

Western shall be responsible for the inventory, treatment, and control of those weed species identified by State and/or county noxious weed laws. While current weed control practices generally involve the eradication of all vegetation within controlled sites, such as substations, other fee-owned property, such as buffer zones, receive minimal weed management effort. Given Western's responsible and liability under the Federal law, Western has looked to State law for coordination and compliance requirements, including the identification of target undesirable plants. Western shall be responsible for the inventory, treatment, and control of those weed species identified by State and/or county noxious weed laws. Where necessary, the Western Regional Office will notify the County Agent or County Board of Western's weed management activities.

Where chemical (herbicide) control is carried out by Western personnel, all spray crew personnel should be familiar with the identification of noxious weed species targeted for management by the state/county. Figures 11-1A through 11-1P provide photos of some common noxious weed species. After targeted weed species are identified, Western-approved herbicides can be selectively applied to remove the undesirable species, while maintaining and encouraging the development of desirable shrubs and grasses. Table 11-1 lists the most common noxious weeds expected to be encountered in Western's service area and the herbicides recommended for each weed. For problem weed infestations such as Canada and musk thistle, knapweeds, and ragweeds outside the substation or yard, the herbicide Transline® provides excellent control. The active ingredient is clopyralid. It is registered for selective control of broadleaf weeds in non-cropland areas, industrial manufacturing and storage sites and rights-of-way. By removing only unwanted weeds and brush, Transline® allows grass to live, thus preserving a grassy ground cover which prevents erosion.

Where vegetation management activities on Western fee-owned land involve contractor application of herbicides, language in statements of work should instruct the contractor to not only control weed growth within the security fence, but also to selectively control the growth of state/county targeted weed species on nearby Western fee-owned land. These fee-owned lands generally include substations and buffer zones, access roads, and electric transmission line approaches.

Noxious Weeds

SCOTCH THISTLE *(Onopordum acanthium)*

(Source: The British Columbia Ministry of Agriculture and Food)

GROWTH HABIT: Biennial, sometimes annual, erect, up to 8 ft. tall. **Rosette formed first year, flowering stem elongates second year**.

LEAVES: Large, coarsely lobed, **hairy on both sides, velvety gray appearance**. Margins lined with sharp conspicuous spines. Basal leaves up to 2 ft. long and 1 ft. wide.

STEMS: Erect, branching, **spiny leaf wings extend down onto stem**, covered with dense fine hairs.

FLOWER: Solitary, terminal, 1 to 2 inches in diameter violet to reddish colored. Bracts spine tipped.

ROOTS: **Large fleshy taproot**.

SEEDS: Deep brown to black, distinctly wrinkled, 3/16 in. long.

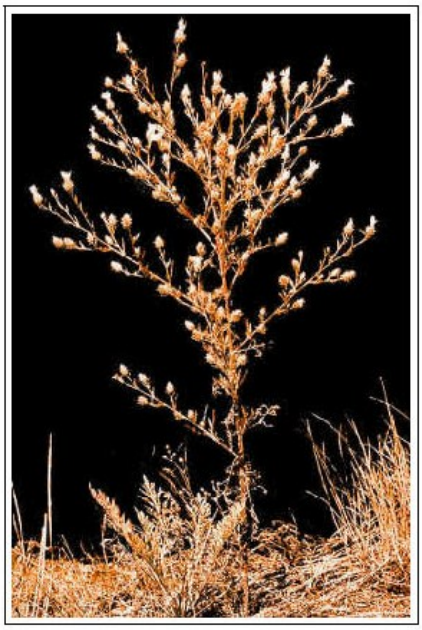
OTHER: **Reproduce by seed only**. Dense stands may be impenetrable to livestock.

FIG. 11-1A

Noxious Weeds

DIFFUSE KNAPWEED *(Centaurea diffusa)*

(Source: The British Columbia Ministry of Agriculture and Food)



Bolting plant

GROWTH HABIT: Annual or biennial, bushy, up to 2 ft. tall. **Rosette formed first year flowering stalk elongates second year**.

LEAVES: **Greyish-green**, alternate, basal leaves whorled, **upper leaves much reduced. Covered with fine hair**.

STEM: **Hairy**, erect, **single main stem** from a rootstock, branched near or above the base.

FLOWER: Solitary, usually white, sometimes pink, rose or lavender; **seedhead bracts end as sharp, rigid spines**.

ROOTS: Elongated taproot.

SEEDS: Oblong, dark brown or grey with **longitudinal lines**.

OTHER: May seriously reduce productive potential of infested rangelands.

Rigid spines on tips of flower bracts

FIG. 11-1B

Noxious Weeds
MUSK THISTLE *(Carduus nutans)*
(Source: The British Columbia Ministry of Agriculture and Food)

Large flowers with spine-tipped bracts "nod" at maturity

GROWTH HABIT: Biennial, or winter annual, erect up to 7' tall. Freely branching. **Rosette formed 1st year, flowering stem elongates 2nd year**.

LEAVES: **Dark green with light midrib, hairless on both sides**, long sharp spines.

STEM: **Hairless**.

FLOWER: Solitary, terminal, **nodding heads 1 1/2" to 3" diameter, deep rose to violet to purple**.

ROOTS: Fleshy **tap root**, hollow near ground surface.

SEEDS: Can be in excess of 20,000 per plan with 90% viable. Ninety percent may germinate in first 2 years. Seeds may germinate after 10 years in soil.

OTHER: **Reproduce by seed only**.

FIG. 11-1C

Noxious Weeds

HOARY CRESS *(Cardaria draba)*

(Source: The British Columbia Ministry of Agriculture and Food)

Heart-shaped seedpods

"White-top" infestation

GROWTH HABIT: Perennial herb, up to 24' tall, erect, **becoming lodged with age**.

LEAVES: Alternate, lance-shaped and slightly irregular, **greyish-green, base of upper leaves clasping stem**.

STEMS: Stoutish, branched toward top.

FLOWERS: Small, white, 4 petals; numerous flower branches and dense flowers give plant a **dense, white, flat-topped appearance**. Numerous white flowers produced at the top of the plant gives rise to its other common name of "white-top".

ROOTS: **Extensive** horizontally and vertically **frequent shoots arising from root stocks**.

SEEDS: Reddish-brown, granular, egg-shaped, contained in heart-shaped pods.

OTHER: **Flowers early** (April and May), **reproduces by seeds, root stocks and creeping roots**.

FIG. 11-1D

Noxious Weeds

FIELD BINDWEED *(Convolvulus arvensis)*

(Source: The British Columbia Ministry of Agriculture and Food)

GROWTH HABIT: Perennial **vine**, reproducing from seeds and roots.

LEAVES: Alternate, simple, **arrowhead-shaped, rounded or blunt tipped**.

STEM: **Prostrate, twining and mat-forming**, up to 10 ft. long.

FLOWER: **Funnel-shaped**, pale pink to white, up to 1 in. wide; **two small scale-like bracts** attached below flower on flower stem.

ROOTS: **Creeping rhizomes**, extensive.

SEEDS: Four per capsule, dark grey to reddish brown, three sided.

OTHER: Seeds viable over 60 years. **Often confused with wild buckwheat which has heart-shaped sharp pointed leaves and tiny inconspicuous flowers**.

FIG. 11-1E

Noxious Weeds

SPOTTED KNAPWEED *(Centaurea maculosa)*

(Source: The British Columbia Ministry of Agriculture and Food)

Flowerhead bracts with black-tipped fringe giving head a "spotted" appearance

GROWTH HABIT: Biennial or short lived perennial, up to 3 ft. tall. **Rosette formed first year flowering stalk elongates second year**.

LEAVES: Long and divided below, **short and narrow above. Covered with fine hair**.

STEM: Erect with slender wiry branches. **Covered with fine hair**.

FLOWER: Seed heads mostly on branch tips solitary, to 1" diameter. **Pink to purple, rarely white. Seed head bracts are black tipped**, with 5 to 7 pairs of short feathery appendages.

ROOTS: Taproot not well developed.

SEEDS: Brownish, 1/8" long, notched on one side of base, short tuft of bristles at tip end.

OTHER: Very aggressive, can infest large areas quickly, offers very little big game or livestock forage value.

FIG. 11-1F

Noxious Weeds

PLUMELESS THISTLE *(Carduus acanthoides)*

(Source: The British Columbia Ministry of Agriculture and Food)

Spiny winged stems

GROWTH HABIT: Biennial, sometimes annual, erect, up to 8 ft. tall. **Rosette formed first year, flowering stem elongates second year**.

LEAVES: **Dark green with a light midrib, hair only on the underside, leaf margin with sharp spines**.

STEMS: To 4 ft. tall, erect, **winged to flowering heads**.

FLOWER: Solitary, terminal or clusters of 2 to 5. Narrow seedhead bracts spine tipped. **Reddish-purple blooms 1/2 to 1 inch diameter**.

ROOTS: Stout fleshy taproot.

SEEDS: Striped lengthwise, slightly curved, with a protrusion at one end.

OTHER: **Reproduce by seed only**.

FIG. 11-1G

Noxious Weeds

RUSSIAN THISTLE *(Salsola kali)*

(Source: The British Columbia Ministry of Agriculture and Food)

Spine-tipped leaves

Seedling

GROWTH HABIT: Annual which reproduces by seed.

LEAVES: Alternate with the first ones being dark green, soft, slender, and 1 to 2 1/2 inches long. These drop off and later leaves are short, stiff, spiny, with two sharp-pointed bracts at the base.

STEM: Rounded, bushy, much branched, annual growth to 1.2 meters in height; stem usually red or purple striped.

FLOWER: Inconspicuous, green with 2 spiny-tipped stiff bracts.

SEEDS: Can produce over 200,000 seeds per plant.

OTHER: Nicknamed "tumbleweed" when mature plants blow on the wind.

FIG. 11-1H

Noxious Weeds

KOCHIA *(Kochia scoparia)*

(Source: The British Columbia Ministry of Agriculture and Food)

Seedling

Flower clusters

GROWTH HABIT: Annual, erect, up to 6 ft. tall, spreading by seeds.

LEAVES: Narrow, bright green, hairy, numerous and attached directly to the stem. The upper leaves are narrow. Entire margins often turn purple in autumn.

STEM: Erect, round, slender, pale green, much branched. Main stem often tinged with red.

FLOWER: Inconspicuous in the axils of upper leaves.

OTHER: Also called Fireweed or Mexican burning bush.

FIG. 11-1I

Noxious Weeds

CANADA THISTLE *(Cirsium arvense)*

(Source: The British Columbia Ministry of Agriculture and Food)

Flowerheads with spineless bracts

Seedling

Young rosette

GROWTH HABIT: Perennial, erect, up to 4 ft. tall.

LEAVES: Varies from **light to dark green, oblong or lance-shaped**, deeply cut, spiny toothed margins (some may be smooth), slightly hairy below. Tremendous leaf variability.

STEM: Smooth to **slightly hairy**, branched at top.

FLOWER: **Small bristly clusters, 3/8 to 5/8 inch in diameter**, light lavender to deep rose purple. Plants are male or female.

ROOTS: Extensive, fleshy, **creeping root stocks**.

SEEDS: Smooth, light to dark brown, tipped by a cupped conical point, approx. 1/8" long.

OTHER: Reproduces by seed and creeping rootstocks.

FIG. 11-1J

Noxious Weeds
LEAFY SPURGE *(Euphorbia esula)*
(Source: The British Columbia Ministry of Agriculture and Food)

Greenish-yellow flower clusters and bracts

Creeping rootstocks

GROWTH HABIT: Perennial, erect, up to 3 ft. tall, spreading by seed or **creeping roots**.

LEAVES: Alternate, **long**, **narrow**, 1/4" wide and 2" long, usually drooping.

STEMS: Branched near top, hairless, **entire plant contains milky sap**.

FLOWERS: Inconspicuous, surrounded by **large heart-shaped floral leaves** which turn **yellow-green** near maturity.

ROOTS: **Brown, numerous pink buds**, deep spreading, very persistent.

OTHER: Grows in nearly all soil types and habitats. Seed is thrown to 20' by exploding seed capsule. All parts of the plant contain a white milky latex that can irritate skin of livestock and humans.

FIG. 11-1K

Noxious Weeds
DALMATIAN TOADFLAX *(Linaria dalmatica)*
(Source: The British Columbia Ministry of Agriculture and Food)

Snapdragon-like flowers

Waxy leaves clasp the stem

GROWTH HABIT: Perennial, often over 3 ft. tall, erect.

LEAVES: Light green, alternate, **broad, heart-shaped**, clasping the stem.

STEM: Branching, light green, smooth, and **leafy**.

FLOWERS: Snapdragon type, **bright yellow**, tinged with orange, **to 1 1/2" long with long spur**, born in upper leaf axils.

ROOTS: Vigorous, deep and extensive, **creeping roots**.

SEEDS: Numerous, irregularly angled.

OTHER: Spread by seed and creeping roots. Likely introduced to North America as an ornamental.

FIG. 11-1L

Noxious Weeds
PURPLE LOOSESTRIFE *(Lythrum salicaria)*
(Source: The British Columbia Ministry of Agriculture and Food)

Purple flowers produced on terminal spikes

Seed-bearing spikes

GROWTH HABIT: Wetland perennial, 1 1/2 to 8 ft. tall in height.

LEAVES: Opposite or sometimes whorled stalkless leaves.

STEM: Stiff, four-sided stem.

FLOWERS: Purple flowers in a dense terminal spike.

ROOTS: Woody taproot and branching fibrous root system.

SEEDS: Can produce over 2.5 million seeds annually.

OTHER: Sometimes confused with fireweed *(Epilobium angustifolium)*, many infestations have resulted from escape of ornamental varieties. Highly aggressive invader species. If left unchecked, a wetland will eventually become a monoculture of loosestrife. This plant poses a severe threat to waterfowl habitat.

Fireweed

FIG. 11-1M

Noxious Weeds
RUSSIAN KNAPWEED *(Acroptilon repens)*
(Source: The British Columbia Ministry of Agriculture and Food)

Purple flower with papery margined bracts

Creeping roots produce dense infestations

GROWTH HABIT: Perennial herb, up to 3 ft. tall, erect, may be in dense clumps. Greyish color.

LEAVES: Alternate, simple, of **several types**:
Upper leaves - small, narrow, unbroken edge;
Stem leaves - intermediate in size, slight toothed margins;
Basal leaves - deeply notched.

STEM: Numerous branched, each ending with a single flower.

FLOWER HEAD: Single, **terminal, lavender, thistle-like, scaly seed head**.

ROOTS: **Dark brown to black and heavily scaled**.

SEEDS: Flattened, ivory-colored, **retained in cup-shaped seed heads**.

OTHER: Leaves and stems covered with short stiff hairs giving **plant an appearance of knap**. Spreads by seeds and creeping rootstocks. It is very poisonous to horses.

FIG. 11-1N

Noxious Weeds

YELLOW STARTHISTLE (*Centaurea solstitialis*)

(Source: California Department of Food and Agriculture)

Flower

Infestation

Rosettes

GROWTH HABIT: Annual, sometimes biennial, erect, to 6 feet tall.

LEAVES: Alternate, mostly linear and somewhat narrowly oblong to oblanceolate.

STEM: Stiff, openly branched from rear or above the base. Leaf bases extend down stems, giving a winged appearance.

FLOWER: Heads ovoid, spiny, solitary on step tips, consisting of numerous yellow disk flowers.

ROOTS: Tap roots grow vigorously early in the season to depths of 3 feet or more.

SEEDS: Barrel-shaped, about 2 – 3 mm long, with broad bases; laterally notched at the base.

OTHER: Usually senesces in late summer or early fall.

FIG. 11-1O

Noxious Weeds

SCOTCH BROOM (*Cytisus scoparius*)

(Source: California Department of Food and Agriculture)

Flower

Infestation

Full view of plant

GROWTH HABIT: Shrubs, up to 7 feet tall.

LEAVES: Alternate, compound, 3 leaflets; sometimes single on new twigs. About 5 - 20 mm long, oblong to obviate.

STEM: Erect, dense, green; sharply 5-angled or ridged, and star-shaped in cross section, often with few leaves.

FLOWER: Bright yellow, pea-like, single or paired in leaf axils. Calyx typically less than 5 mm long, 2-lipped, glabrous.

ROOTS: Taproots deep, branched, associated with nitrogen-fixing bacteria.

SEEDS: Pods mature June – July; are dark brown to black, flattened, about 2 - 5 cm long, densely lined with long silky golden to silvery hairs, and contain an average of 5 - 9 seeds.

OTHER: Tolerate frost, but die back after severe cold. Ants attracted to seed appendages and disperse seed while foraging.

FIG. 11-1P

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TABLE 11-1
HERBICIDES FOR NOXIOUS WEED CONTROL

Noxious Weed (Common Name)	Recommended Herbicide(s)	Optimum Treatment Time	Quantity	Notes
Canada Thistle	Vanquish® +2,4-D	End of bud stage or fall	1 quart each/acre	--
	Tordon® +2,4-D		1 quart each/acre	–
	Tordon® +Vanquish®		1 pint each/acre	--
	Curtail® (Clopyralid +2,4-D)	From rosette (6-8 inches) up to pre-bud stage.	2 quarts/acre	--
	Transline®		12-16 ounces/acre	--
	Telar®	Bud to early bloom or fall.	1 ounce/acre	Roadside/non-crop land use
Musk Thistle	Vanquish® +2,4-D	Rosette stage (spring and fall)	1 pint + 1 quart/acre	--
	Tordon® +2,4-D		.5 pint + 1 quart/acre	--
	Tordon® +Vanquish®		.5 pint + 1 pint/acre	--
	Telar®	After bolt up to early flower stage.	1 ounce/acre	--
	Curtail® (Clopyralid +2,4-D)	Rosette (spring or fall) up to pre-bud stage.	2 quarts/acre	--
	Transline®	Rosette stage (spring and fall) to pre-bud stage.	12-16 ounce/acre	--

TABLE 11-1
(Continued)

Noxious Weed (Common Name)	Recommended Herbicide(s)	Optimum Treatment Time	Quantity	Notes
Leafy Spurge	Tordon® +2,4-D	Spring during true flower stage or fall to regrowth.	1-2 pints + 1 quart/acre	3-4 years consecutive treatment necessary.
	Vanquish® +2,4-D		1-2 quarts + 1 quart/acre	Should combine chemical control with other methods - e.g., chemical or cultural.
	Roundup® +2,4-D	Treat 2-3 times/season with first treatment at true flower stage and subsequent treatments at 30 day intervals.	.5-1 pint + 1-2 pints/acre	Use under trees or combine with reseeding of competitive perennial grass.
Russian Knapweed	Tordon® +2,4-D	Bud Stage or fall.	1 quart each/acre	--
	Vanquish® +2,4-D		1-2 quarts + 1 quart/acre	--
	Curtail® (Clopyralid +2,4-D)	Rosette to early flower.	3 quarts/acre	--
	Transline®		18-24 ounces/acre	--
	Telar®	Fall.	1 ounce/acre	--
Diffuse and Spotted Knapweed	Tordon®	Rosette to early bolt.	1 pint/acre	--
	Tordon® +2,4-D		12 ounces + 1 quart/acre	--
	Tordon® + Vanquish®		.5-1 pint +1-2 pints/acre	--
	Vanquish® +2,4-D		1 pint + 1 quart/acre	--
	Curtail® (Clopyralid +2,4-D)		2 quarts/acre	--

TABLE 11-1
(Concluded)

Noxious Weed (Common Name)	Recommended Herbicide(s)	Optimum Treatment Time	Quantity	Notes
Field Bindweed	Vanquish® +2,4-D	During flower stage or fall.	1 quart each/acre	--
	Tordon® +2,4-D		1 quart each/acre	--
	Tordon® +Vanquish®		1 pint each/acre	--
Hoary Cress (Whitetop)	Telar®	Bud to early bloom stage.	.5-1 ounce/acre	Roadside/noncropland
			.5-.75 ounce/acre	Range/pasture
	2,4-D amine	Apply first treatment at early bloom stage, second treatment at mid summer (July), and third treatment to any fall regrowth.	2-3 quarts/acre	--
Perennial Pepperweed (Tall Whitetop)	Telar®	Bud to early bloom stage and fall rosette.	1 ounce/acre	Roadside/noncropland
	2,4-D amine	Apply first treatment at early bloom stage, second treatment at mid summer (July), and third treatment to any fall regrowth.	2-3 quarts/acre	--
Yellow and Dalmation Toadflax	Tordon®	Bud to early bloom.	1-2 quarts/acre	When using 1 quart/acre treat for 2-3 conservative years
Kochia	Vista®	Apply to actively growing weeds.	2/3 - 1 1/2 pt/ac	--
Yellow Starthistle	Transline®	Apply from rosette to mid-bolt growth stage.	½ - 1 pint/acre	--
	Roundup®	Apply when actively growing.	1 pound AI/acre	--
	HI-DEP®	Apply to rosette.	1-2 pounds AI/acre if late in season	--

Sources: Colorado Weed Management Association, Dow, and UC Davis website.

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Western's completed and approved vegetation management guidance can be used as a vehicle for entering into good neighbor Weed Management Plans, when necessary, with Federal, State, or local government entities. This practice will help to ensure consistency throughout Western. The vegetation management guidance includes any or all of the following:

- Site Specific Weed Inventories
- Integrated Approaches for Control
  - Mechanical Control (Manual, Mowing)
  - Biological Control (Introduce Natural Insect Predators, Grazing)
  - Chemical Control (Herbicides, Fertilizers)
- Environmental Protection Requirements and Best Management Practices
- Herbicide Application Certification Requirements
- New Vegetation Control Methods Procedures
- Monitoring and Reporting Procedures

11.4.2 Western Non-fee-Owned Rights

The administration of Western's rights on other than fee-owned land is difficult to assess in terms of responsibility and liability, especially where weed control is at issue. As stated in the assumptions above and pertaining to weed management responsibility, Western will defer compliance with Federal and State weed control laws and regulations to the landowner or administrator. There is a potential liability issue associated with this assumption in terms of "cause and effect". Weed occurrences may have resulted from or may have been accelerated by construction activities associated with transmission line and related facilities installations. Given the relationship of Western as a right-holder on the land and the fact that it is in Western's best interest to develop a good neighbor policy, Western would provide funding support, where deemed appropriate and where funds are made available, to the government entity responsible for compliance with the Federal and State laws.

The following subsections provide a breakdown of Western's activities involving the various landowner/administrator situations.

<u>Rights On or Across Federal Lands</u>

Western is responsible for the development of Interagency Agreements (IA) which includes the management of noxious weeds (see Section 2.4). Where there are active

county-wide weed management programs, Western will advise the county of its ongoing efforts with other Federal agencies and will support the integration of such efforts when in the best interest of the government to do so.

IAs will be developed with the Federal agency with surface administration jurisdiction, where necessary. As in the case of BLM, an environmental impact statement was finalized in 1991 that specifies their weed control commitment in the Western States, excluding California. BLM assumes the responsibility of weed management planning and implementation on all lands within their administration. If necessary, Western may execute an IA providing for funding support given Western's right-of-way and Western's acceptance of the estimate and availability of funds.

The Colorado River Storage Project Office and the CSO - Office of Environment developed IAs with Colorado western slope Forest Service District Offices in 1994 and 1995. These agreements can serve as examples for other State weed control activities, where necessary.

Executed IAs will be forwarded to the specific County Agent or Board, when applicable, to ensure coordination and as an effort to demonstrate Western's good intentions toward controlling specific weed problems.

Rights On or Across Non-Federal Government Entities (State or Local)

Cooperative agreements will be developed with State or local government entities with surface administration jurisdiction, where necessary. These government entities are responsible for compliance with State laws, as well as the EPA regulations concerning the application of herbicides. The entity would provide Western with a plan and, after approval and availability of funds, Western will direct transfer of funds to the designated representative. Copies of executed cooperative agreements will be forwarded to the County Agent or Board for coordination purposes, where applicable.

Rights On or Across Private-owned Lands

Cooperative agreements will be developed with County Agents or Boards in those counties where weed management plans have been implemented and where private lands containing Western facilities and their associated rights are within identified weed control areas. The County Agent or Board would be responsible for the inventory and

identification of targeted undesirable plants or private lands and the corresponding Western easement. Where Western concurs with the findings and recommendation for control, including cost estimates, funding may then be directed to the respective county representative. Direct coordination with the landowner is not recommended due to the requirements for compliance with State law and EPA regulations. Payments to landowners who are not certified or trained in herbicide application are, in themselves, a liability concern.

11.5 BEST MANAGEMENT PRACTICES FOR NOXIOUS WEED MANAGEMENT

Best Management Practices (BMPs) for weed control will be used to reduce the spread of noxious weed and to increase the effectiveness of treatment. The following lists BMPs that should be considered for use within Western's service area:

- Learn how to identify high-priority weed species. Identification is the first step-know your weeds!
- Report new infestations to the appropriate resource manager.
- Treat intensely when a new or small patch is found; monitor the site periodically and repeat physical removal of the weed or treat with herbicides.
- Inspect roads before maintenance to prevent the spread of weeds by vehicles or equipment.
- Inspect bare soil or disturbed sites frequently for weeds.
- Understand the biology of the weed, including the growth stage, to identify the best and most effective management practices.
- Use seed, hay, and mulch that are certified weed-free.
- Avoid the introduction of ornamental flowers that are on State or county invasive species lists.
- Re-seed areas immediately after disturbance with an appropriate mix of native, competitive species.
- Avoid transporting weed seeds on clothing, vehicles, and equipment.
- Avoid driving in noxious weed infested areas with your vehicle and then traveling to unaffected areas; restrict travel to established roads and trails. .
- Whenever possible, clean all construction and maintenance equipment before moving between sites.
- Drought causes plants to shut down their growth process. Spraying weeds during dry periods is not recommended because effectiveness is greatly

reduced. Treat after rainfall if the weed is still in the proper growth stage for control.

- Not all herbicides work equally on all weeds nor can every herbicide be used in every situation. Read the label, use the information provided in this manual, and consult weed experts and manuals for the most effective treatment method and chemical.