

*Revised*

**Noxious Weed Survey Study Plan for  
Energy Northwest's Packwood Lake  
Hydroelectric Project  
FERC No. 2244  
Lewis County, Washington**

**Submitted to**



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## **1.0 INTRODUCTION**

Energy Northwest's Packwood Lake Hydroelectric Project, FERC No. 2244 (Project), received its initial license in 1960. The majority of the Project is located within the Gifford Pinchot National Forest and consists of an intake canal, a concrete drop structure (dam) and intake building on Lake Creek located about 424 feet downstream from the outlet of Packwood Lake, a 21,691-foot system of concrete pipe and tunnels, a 5,621-foot penstock, a surge tank, and powerhouse with a 26,125 kW turbine generator.

The source of water for the Project, Packwood Lake, is a natural lake situated at an elevation of approximately 2,857 feet above mean sea level (MSL), about 1,800 feet above the powerhouse. Water discharged from the Project is released to the Cowlitz River via a tailrace channel. Power from the Project is delivered over an 8,009-foot 69 kV transmission line to the Packwood substation.

### **1.1 Study Plan Goals and Objectives**

The noxious weed survey of the Packwood Lake Hydroelectric Project will determine the location, distribution and abundance of noxious weed infestations in the Project area, and infestations spreading from the Project to adjacent lands; assess their effects on native plant diversity and habitat quality; and provide a baseline of information for future surveys. In addition, the survey will assist in developing and evaluating alternatives for the management and control of noxious weed infestations. For the proposed work, the term "noxious weed" includes species listed as noxious by the Lewis County Noxious Weed Control Board and any additional species the Gifford Pinchot National Forest may be tracking as noxious weeds. The work will be conducted in consultation with the Gifford Pinchot National Forest, Lewis County Noxious Weed Control Board, Washington Department of Fish and Wildlife (WDFW), U.S. Fish and Wildlife Service (USFWS), and concerned tribes.

## **2.0 AGENCY AND TRIBE RESOURCE MANAGEMENT GOALS AND OBJECTIVES**

The USDA Forest Service, and the WDFW requested this study (USDA Forest Service 2005, WDFW 2005). Their resource management goals and objectives were provided by the agencies and are presented below.

### **2.1 USDA Forest Service**

The 1990 Gifford Pinchot Land and Resource Management Plan contains the following direction pertinent to this study (USDA Forest Service 2005):

- Emphasis must be on prevention and early treatment of unwanted vegetation and public involvement in all aspects of Project planning and implementation (IV-34).

## **2.2 Washington Department of Fish and Wildlife**

WDFW Resource Management goals include (WDFW 2005):

- Manage or eradicate non-native plants.

## **3.0 EXISTING INFORMATION AND NEED FOR ADDITIONAL INFORMATION**

The following sections discuss previous noxious weed surveys in the Packwood Lake Project area and the need for additional information.

### **3.1 Existing Information**

Existing information on noxious weeds and botanical resources generally in and near the Packwood Lake Project area are limited. No known dedicated noxious weed surveys have been conducted in USFS-owned portions of the Project area. A noxious weed survey was done in 2004 along the Project tailrace and stilling basin, and along Lake Creek from its confluence with the Cowlitz River upstream to the Forest Service property boundary (Malkin 2004).

### **3.2 Need for Additional Information**

The lack of past surveys or existing information regarding noxious weeds in much of the Project area indicates the need for baseline information on the species and distribution of noxious weeds within the area influenced by Project operations and maintenance activities. Additional information will help identify species and numbers of noxious weeds and their effects on native plant diversity and habitat quality. In addition, the information gathered from the survey will assist in developing and evaluating alternatives for the management and control of noxious weeds.

## **4.0 NEXUS BETWEEN PROJECT OPERATIONS AND EFFECTS ON RESOURCES**

Noxious weed surveys will provide current baseline information on existing conditions in the Project area and assess Project-related effects. Noxious weed infestations degrade vegetation and wildlife habitats and are typically associated with natural or human caused disturbances. Project related actions, such as water level fluctuations in Packwood Lake, operation and maintenance of Project rights-of-way, leaking pipelines, erosion, recreation effects, potential new construction, and any other Project related activities could help introduce and spread noxious weed infestations. If potentially negative effects from noxious weeds are identified, measures may be developed to reduce or eliminate these effects.

## **5.0 STUDY AREA AND METHODS**

A noxious weed survey in the Packwood Lake Project area will identify noxious weed species, and their distribution and abundance in the Project area. The following sections discuss the planned survey.

## 5.1 Study Area

For purposes of the Packwood Lake noxious weed survey, the study area is defined as including: 100 feet on each side of the Project boundary, including Project facilities, pipeline, penstock corridor, tailrace, transmission line, Pipeline Road (FSR 1260-066), FSR 1260 from the surge tank to the junction with FSR 1260-066, Trail #74, Latch Road (FSR 1262); a 200-foot-wide margin around the perimeter of Packwood Lake (elevation 2860); the mouths of all USFS type 1, 2, and 3 streams (Osprey Creek, Trap Creek, Baker Creek, Crawford Creek, Upper Lake Creek) that have a defined channel from the point where they enter Packwood Lake, upstream as far as weed species are present; and where noxious weeds are present in populations outside the study area that are considered contiguous to populations inside the study area. The survey will identify and include wetland and riparian sites. Lower Lake Creek below the drop structure will be surveyed in riparian areas (stream buffer) with the exception of inaccessible safety areas. In addition, two landslide areas (from 1995 and 2000) near the pipeline will be surveyed for noxious weeds. See Figure 5-1 for a map showing the proposed study area.

## 5.2 Noxious Weed Survey Methodology

The noxious weed survey of the Packwood Lake study area will be performed using commonly accepted botanical survey methods to systematically locate and identify noxious weed infestations. Survey methods are straightforward, and involve visually searching the study area for the presence of noxious weeds. Timing of field surveys is based on flowering times and identifiability of potential weed species. The noxious weed survey will be done concurrently with the rare plant survey.

The focus of the noxious weed survey will be on Class A and B noxious weeds, although the presence of Class C weeds will be noted. Appendix A contains the Lewis County Noxious Weed Control Board noxious weed list (LCNWCB 2004). Class A weeds are non-native species with a limited distribution in the state. Eradication of all Class A weeds is required by state law. Class B weeds are established in some regions of Washington, but are of limited distribution or not present in other regions of the state. Because of differences in distribution, treatment of Class B weeds varies between regions of the state. Class C weeds are non-native species that are already widely distributed in Washington or are of special interest to the state's agricultural industry. Placement on the state Class C noxious weed list allows counties to enforce control if locally desired.

The entire study area will be searched as noxious weed species could be found in many of the habitat types that comprise the Packwood Lake study area, although most noxious weed infestations are typically associated with areas that have had prior disturbance. Where possible, a GPS unit will be used to accurately map noxious weed populations. A moderate survey intensity will be employed in the study area, with higher intensity surveys in areas which appear to have a high potential for noxious weed infestations.

The majority of plants will be identified in the field using the Flora of the Pacific Northwest (Hitchcock and Cronquist 1973). Plant determinations will be supplemented by other information as needed.

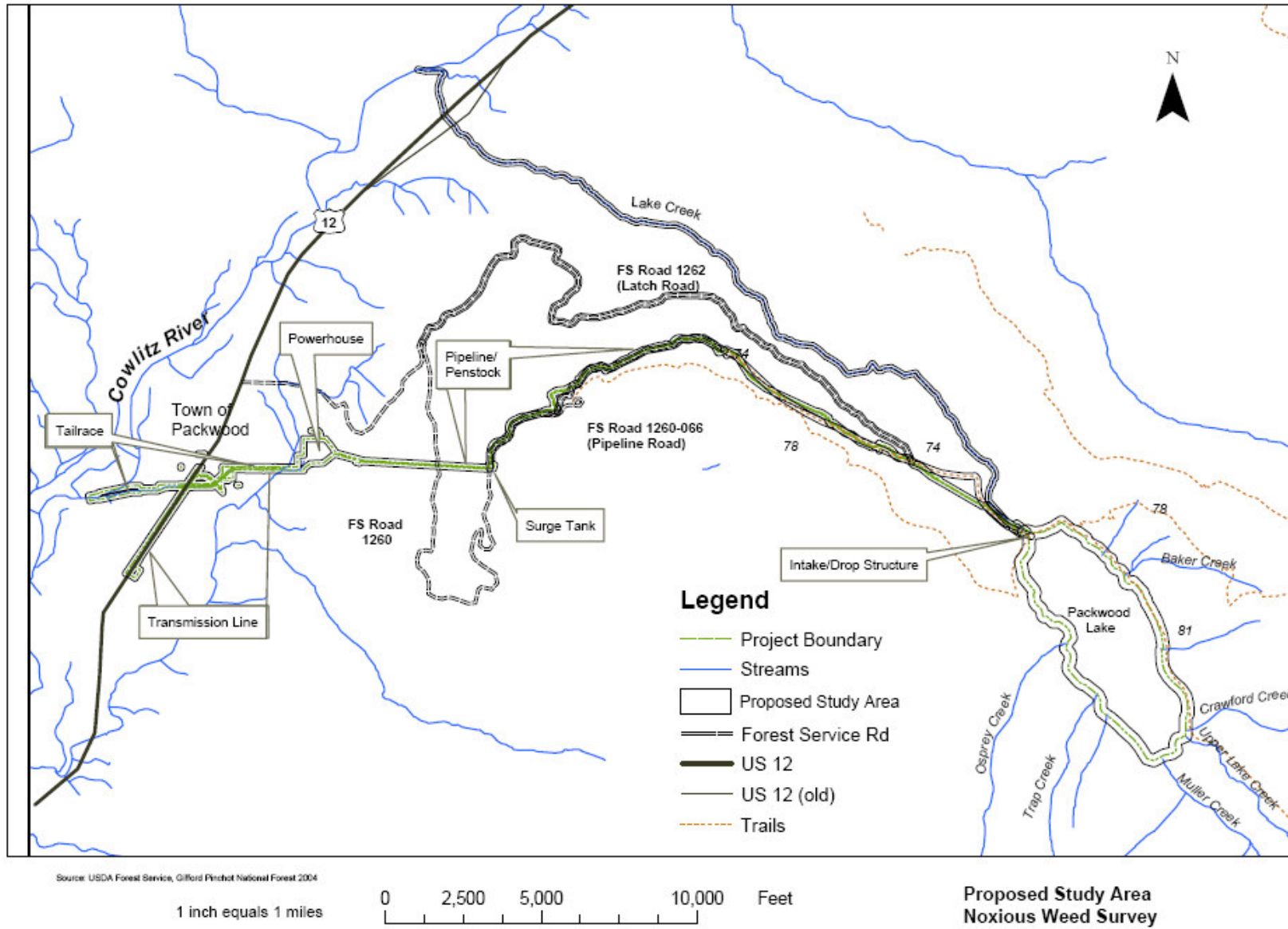


Figure 5-1 Study Area Map

### **5.3 Products**

Products of the Packwood Lake noxious weed survey will include: USDA Forest Service Invasive Plant Inventory Forms for each noxious weed population located. The form includes site information, such as population size, area, habitat, disturbance, and associated species. Invasive Plant Inventory forms will be accompanied by USGS maps with noxious weed infestations mapped on them. A GPS unit will aid in mapping where feasible. A narrative report will be written which will discuss methods, survey results, and potential protection, mitigation and enhancement measures.

Draft copies of the products will be provided to agencies for review and comment. Following production of final products, copies will be provided to agencies for their files.

### **5.4 Consistency with Generally Accepted Scientific Practice**

The planned study methods discussed above are consistent with the methods followed in the Baker Lake Hazard Tree Project (USDA Forest Service 2005) and the Methow Transmission Project and have been accepted by the participating agencies, and parties in those projects.

## **6.0 CONSULTATION WITH AGENCIES, TRIBES AND OTHER STAKEHOLDERS**

Energy Northwest initiated agency consultation in December 2003. Meetings with agency and tribal staff, and other interested stakeholders will take place periodically beginning in May 2005. This may include one or more field visits to the study area, as needed. Stakeholder representatives will be invited to provide information for the study and technical reviews of the draft Project noxious weed report.

## **7.0 PROGRESS REPORTS, INFORMATION SHARING, AND TECHNICAL REVIEW**

Technical reports, including the Proposed and Revised Study Plans and the draft and final reports will be shared with stakeholders and will discuss the progress of the studies. Energy Northwest and its consultant will also report on the methods, progress, and results of the study at stakeholder meetings.

Energy Northwest will provide copies of the draft reports to interested stakeholders for review. Review periods will be 30 days, after which Energy Northwest and its consultant will take review comments into consideration when making revisions and producing final reports.

## **8.0 SCHEDULE**

The noxious weed surveys of the Packwood Lake study area are scheduled to begin during the summer field season of 2005, and completed in spring and summer of 2006. The noxious weed survey will be done concurrently with the rare plant survey. Data analysis and report writing will occur by September 2006. The completed draft noxious weed survey report will be

distributed to the Forest Service, Lewis County Noxious Weed Board Coordinator, WDFW, and other stakeholders for review in mid-September 2006.

## **9.0 LEVEL OF EFFORT AND COST**

The study efforts outlined above are intended to provide relevant information regarding noxious weed infestations in the Project area. Taking into account past planning, research, and studies, and the size, location and nature of the Project, Energy Northwest and its consultants will make a reasonable and good faith effort to conduct a high quality noxious weed survey.

The cost estimate is based on the following assumptions:

Because it would be cost effective to do the Rare Plant Survey concurrently with the Noxious Weed Survey, the following cost estimate includes both surveys.

The time and cost are estimates because rough terrain, difficult access, and a large number of rare plant and noxious weed populations could increase the amount of overall time needed for the survey. Estimated hours required are 390 and estimated cost for these studies is \$30,382. Travel expenses (e.g., mileage, per diem, motel, etc) are included in the estimate.

## **10.0 LITERATURE CITED**

Hitchcock, C.L. and A. Cronquist. 1973. Flora of the Pacific Northwest. University of Washington Press. Seattle, Washington.

Lewis County Noxious Weed Control Board (LCNWCB). 2005. Lewis County Weed List

Malkin, D. 2004. Memorandum from D. Malkin, Devine, Tarbell & Associated, Inc. to Kent Doughty, EES Consulting. Packwood Lake Project Aquatic/Emergent Weed Survey. September 24, 2004.

USDA Forest Service. 2005. Comments on PAD and Scoping Document 1 and Study Requests. Packwood Lake Project Number 2244-012. March 11, 2005.

Washington Department of Fish and Wildlife. 2005. Comments on PAD, Study Requests, Comments on Scoping Document 1. Packwood Lake Hydroelectric Project FERC No. 2244-1012. March 9, 2005.



## APPENDIX A

### Lewis County Noxious Weeds Lists, 2005

#### Class A Noxious Weeds, Lewis County

Common name	Scientific name
Bighead knapweed	<i>Centaurea macrocephala</i>
Buffalobur	<i>Solanum rostratum</i>
Clary sage	<i>Salvia sclarea</i>
Common crupina	<i>Crupina vulgaris</i>
Cordgrass	<i>Spartina densiflora</i>
Dyers woad	<i>Isatis tinctori</i>
Eggleaf spurge	<i>Euphorbia oblongata</i>
Garlic mustard	<i>Alliaria petiolata</i>
Giant hogweed	<i>Heracleum mantegazzianum</i>
Goatsrue	<i>Galega officinalis</i>
Hydrilla	<i>Hydrilla verticillata</i>
Italian thistle	<i>Cardus pycnocephalus</i>
Johnsongrass	<i>Sorghum halepense</i>
Kudzu	<i>Pueraria montana var. lobata</i>
Lawnweed	<i>Soliva sessilis</i>
Meadow clary	<i>Salvia pratensis</i>
Mediterranean sage	<i>Salvia aethiopsis</i>
Milk thistle	<i>Silybum marianum</i>
Purple starthistle	<i>Centaurea calcitrapa</i>
Salt meadow cordgrass	<i>Spartina patens</i>
Silverleaf nightshade	<i>Solanum elaeagnifolium</i>
Slenderflower thistle	<i>Carduus tenuiflorus</i>
Spanish broom	<i>Spartium junceum</i>
Spurge flax	<i>Thymelaea passerine</i>
Syrian bean-caper	<i>Helianthus ciliaris</i>
Texas blueweed	<i>Zygophyllum fabago</i>
Velvetleaf	<i>Abutilon theophrasti</i>
Vochin knapweed	<i>Centaurea nigrescens</i>
Wild four o'clock	<i>Mirabilis nyctaginea</i>
Yellow devil hawkweed	<i>Hieracium floribundum</i>

**APPENDIX A (CONTINUED)**

**Class B Noxious Weeds, Lewis County--Select**

<b>Common name</b>	<b>Scientific name</b>
Bohemian knotweed**	<i>Polygonum Bohemicum</i>
Giant knotweed**	<i>Polygonum sachalinense</i>
Japanese knotweed**	<i>Polygonum cuspidatum</i>
Myrtle spurge	<i>Euphorbia myrsinites</i>
Scotch broom**	<i>Cytisus scoparius</i>
Tansy ragwort**	<i>Senecio jacobaea</i>

\*\*Mandatory control in selected areas of Lewis County.

**Class B Designates Region 8 Lewis County**

<b>Common name</b>	<b>Scientific name</b>
Annual bugloss	<i>Anchusa arvensis</i>
Austrian fieldcress	<i>Rorippa austriaca</i>
Black knapweed	<i>Centaurea nigra</i>
Blackgrass	<i>Alopecurus myosuroides</i>
Blueweed	<i>Echium vulgare</i>
Brazilian elodea	<i>Egeria densa</i>
Brown knapweed	<i>Centaurea jacea</i>
Camelthorn	<i>Alhagi maurorum</i>
Common bugloss	<i>Anchusa officinalis</i>
Common cordgrass	<i>Spartina anglica</i>
Dalmatian toadflax	<i>Linaria dalmatica ssp. dalmatica</i>
Diffuse knapweed	<i>Centaurea diffusa</i>
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Fanwort	<i>Cabomba caroliniana</i>
Garden loosestrife	<i>Lysimachia vulgaris</i>
Gorse	<i>Ulex europaeus</i>
Grass-leaved arrowhead	<i>Sagittaria graminea</i>
Hawkweed oxtongue	<i>Picris hieracioides</i>
Hedgeparsley	<i>Torilis arvensis</i>
Himalayan knotweed	<i>Polygonum polystachyum</i>
Hoary alyssum	<i>Berteroa incana</i>
Indigobush	<i>Amorpha fruticosa</i>
Leafy spurge	<i>Euphorbia esula</i>
Lepyrodiclis	<i>Lepyrodiclis holosteoides</i>
Longspine sandbur	<i>Cenchrus longispinus</i>
Meadow knapweed	<i>Centaurea jacea x nigra</i>
Mouseear hawkweed	<i>Hieracium pillosella</i>

**APPENDIX A (CONTINUED)**

**Class B Designates Region 8 Lewis County (Continued)**

<b>Common name</b>	<b>Scientific name</b>
Musk thistle	<i>Carduus nutans</i>
Orange hawkweed	<i>Hieracium aurantiacum</i>
Parrotfeather	<i>Myriophyllum aquaticum</i>
Perennial pepperweed	<i>Lepidium latifolium</i>
Perennial sowthistle	<i>Sonchus arvensis ssp. arvensis</i>
Plumeless thistle	<i>Carduus acanthoides</i>
Polar hawkweed	<i>Hieracium atratum</i>
Policeman's helmet	<i>Impatiens glandulifera</i>
Purple loosestrife	<i>Lythrum salicaria</i>
Queen-devil hawkweed	<i>Hieracium glomeratum</i>
Rush skeletonweed	<i>Chondrilla juncea</i>
Russian knapweed	<i>Acroptilon repens</i>
Saltcedar	<i>Tamarix ramosissima</i>
Scotch thistle	<i>Onopordum acanthium</i>
Smooth cordgrass	<i>Spartina alterniflora</i>
Smooth hawkweed	<i>Hieracium laevigatum</i>
Spotted knapweed	<i>Centaurea biebersteinii</i>
Swainsonpea	<i>Sphaerophysa salsula</i>
Wand loosestrife	<i>Lythrum virgatum</i>
Water primrose	<i>Ludwigia hexapetala</i>
White bryony	<i>Bryonia alba</i>
Wild chervil	<i>Anthriscus sylvestris</i>
Yellow floating heart	<i>Nymphoides peltata</i>
Yellow hawkweed	<i>Hieracium caespitosum</i>
Yellow nutsedge	<i>Cyperus esculentus</i>
Yellow starthistle	<i>Centaurea solstitialis</i>

**Class B Noxious Weeds, Lewis County**

<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>
Common catsear	<i>Hypochaeris radicata</i>
Kochia	<i>Kochia scoparia</i>
Herb Robert	<i>Geranium robertianum</i>
Houndstongue	<i>Cynoglossum officinale</i>
Oxeye daisy	<i>Leucanthemum vulgare</i>
Puncturevine	<i>Tribulus terrestris</i>
Sulfur cinquefoil	<i>Potentilla recta</i>
Wild carrot	<i>Daucus carota</i>

**APPENDIX A (CONTINUED)**

**Class C Weeds of Local Interest, Lewis County--Select**

<b>Common Name</b>	<b>Scientific Name</b>
Butterfly bush	<i>Buddleja daviddi</i>
Hairy willow-herb	<i>Epilobium hirsutum</i>
Poison hemlock	<i>Conium maculatum</i>

**Class C Noxious Weeds, Lewis County**

COMMON NAME	SCIENTIFIC NAME
Absinth wormwood	<i>Artemisia absinthium</i>
Babysbreath	<i>Gypsophila paniculata</i>
Black henbane	<i>Hyoscyamus niger</i>
Bohemian	<i>Polygonum x Bohemicum</i>
Bull thistle	<i>Cirsium vulgare</i>
Canada thistle	<i>Cirsium arvense</i>
Old man's beard	<i>Clematis vitalba</i>
Cereal rye	<i>Secale cereale</i>
Common groundsel	<i>Senecio vulgaris</i>
Common reed	<i>Phragmites australis</i> (Non-native genotypes)
Common St. Johnswort	<i>Hypericum perforatum</i>
Common tansy	<i>Tanacetum vulgare</i>
Curley-leaf pondweed	<i>Potamogeton crispus</i>
English Ivy	<i>Hedera hibernica</i> 'Hibernica'
English Ivy	<i>Hedera helix</i> 'Baltica'
English Ivy	<i>Hedera helix</i> 'Pittsburgh'
English Ivy	<i>Hedera helix</i> 'Star'
Fragrant water lily	<i>Nymphaea odorata</i>
Field bindweed	<i>Convolvulus arvensis</i>
Hairy whitetop	<i>Cardaria pubescens</i>
Hawkweed	<i>Hieracium spp.</i>
Hoary cress	<i>Cardaria draba</i>
Jointed goatgrass	<i>Aegilops cylindrical</i>
Reed canarygrass	<i>Phalaris arundinacea</i>
Scentless mayweed	<i>Matricaria perforate</i>
Smoothseed alfalfa dodder	<i>Cuscuta approximate</i>
Spikeweed	<i>Hernizonia pungens</i>
Spiny cocklebur	<i>Xanthium spinosum</i>
White cockle	<i>Silene latifolia ssp. Alba</i>

**APPENDIX A (CONTINUED)**

**Class C Noxious Weeds, Lewis County (continued)**

Willowherb	<i>Epilobium hirsutum</i>
Yellow flag iris	<i>Iris pseudocorus</i>
Yellow toadflax	<i>Linaria vulgaris</i>