Final Report

Biological Control of Purple Loosestrife in the Lower Columbia River Estuary

Principal Investigators:
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Submitted to:

Columbia River Foundation
Lower Columbia Estuary Program

March 21st, 2001

The Columbia Slough Watershed Council

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Jay Mower, Coordinator

June 29, 2001

Ms. Elaine Stewart, Manager
Smith & Bybee Lakes Wildlife Area
Metro Region Services, Parks & Greenspaces
600 NE Grand Avenue
Portland, OR 97232

Dear Elaine:

Enclosed is a copy of the Final Report, *Biological Control of Purple Loosestrife in the Lower Columbia River Estuary*, dated March 21, 2001.

Metro contributed $5,000 to the project. Thank you very much.

Further thanks go to all the groups who supported the project:

- Bonneville Power Administration
- City of Portland Bureau of Environmental Services
- Columbia Slough Watershed Council
- Friends of Smith & Bybee Lakes
- Lower Columbia River Estuary Program (LCREP)
- Metro Regional Parks & Greenspaces
- Oregon Department of Agriculture
- Oregon State University
- Oregon State Weed Board
- Port of Portland
- USDA – APHIS

The Columbia Slough Watershed Council was pleased to have brought all these parties together to help improve watershed conditions. Thank you again for your participation and support.

Sincerely,

Jay M. Mower, Coordinator

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Executive Summary:

Biological Control of Purple Loosestrife in the Lower Columbia River Estuary

We report the results of a demonstration project on biological control of purple loosestrife, an invasive plant species that is threatening wetlands throughout the United States. Mechanical control is extremely difficult due to the plant's ability to resprout from any remaining plant part. Chemical control is possible, though not desirable in the wetland habitats that loosestrife prefers. The preferred alternative is biological control using insects from the plant's area of origin that have been screened for safety (showing that they are unable to feed and develop on other plants) and effectiveness (showing they have the capacity to inflict heavy damage on target plant). Three biological control agents, two leaf beetles (*Galerucella pusilla* and *G. calmariensis*) and a root weevil (*Hylobius transversovittatus*), were approved for release in 1992. An additional control agent, the seed weevil (*Nanophyes marmoratus*) was approved for release in 1994.

The objectives of this study are to: (1) refine our assessment of the extent and impact of purple loosestrife invasion, (2) introduce, conserve, and augment control organisms for purple loosestrife biological control, (3) begin monitoring and evaluating target weed suppression and plant succession, and (4) increase public awareness and participation in diagnosing and treating alien species problems. The focus of the study is the Rivergate District in Portland, Oregon due to the dense stands of purple loosestrife and loosestrife's encroachment on the Smith and Bybee Lakes recreation area.

The work accomplished under each objective is summarized below.

1) Refine our assessment of the extent and impact of purple loosestrife invasion

We estimate that 3% of the 7,765 ha wetland area of the Rivergate District is currently infested with dense stands of purple loosestrife based on a ground survey conducted in yr 2000. In addition to these dense stands there are also individual plants scattered throughout the Smith and Bybee Lakes recreation area. Through vegetation analysis we determined that the area of potential purple loosestrife habitat was 2,134.2 ha (27% of total area).

Increasing area and abundance of the invader crowds out native plants and animals. We compared plant species richness between twelve emergent wetland sites in NW Oregon in order to evaluate the effect of invasive species density (both loosestrife and reed canary grass) on the plant community. We expected that as the density of loosestrife and reed canary grass increases, the species richness of the plant community decreases. As expected, we have found that an increasing density reed canary grass from 0-81% cover decreases the number of plant species from 32 to 4. However, since the densities of loosestrife were low in the loosestrife dominated sites (<30% cover), we could not determine the impact of loosestrife on the species richness of the plant community. We will continue to refine our study of the impact of purple loosestrife density on plant and animal diversity in 2001 by sampling a wider range of purple loosestrife densities.

We used moth populations as indicators of animal biodiversity to address the impact of reed canary grass and loosestrife on the animal community. We expected the moth community to be particularly sensitive to vegetation changes because the caterpillars are herbivorous and are often associated with specific host plants. Additionally, changes in the moth community may affect higher trophic levels, such as insectivorous birds and fish. We hypothesized that, as density of loosestrife and reed canary grass increases, the number of plant species will decrease, and moth diversity will consequently decrease. When comparing naturally occurring wetlands we found that as canary grass density increased from 0 to 81%, the number of moth species decreased from 42 to 12. Since the densities of loosestrife were low in the loosestrife dominated sites, we cannot unequivocally determine the impact of loosestrife on the moth community. Contrary to our expectation, created wetlands tended to have low numbers of moth species despite having high numbers of plant species for both the reference and loosestrife invaded mitigation sites. This suggests potential differences between created wetlands and the natural wetlands they are meant to replace.

2) Introduce, conserve, and augment control organisms for purple loosestrife biocontrol

Control organisms released earlier at Rivergate are now well established and are starting to increase and spread. We first evaluated the status of the seven prior releases of biological control agents in the Rivergate area. We found that the agents had become established at all of the sites where they were released. In addition, the leaf beetles had independently migrated 700 meters to colonize a loosestrife stand where they had not previously been released. Although the agents have established where they were released and are beginning to colonize new stands, seven of the eleven stands were without biological control agents. On September 29th, the root weevil, *Hylobius transversovittatus*, was released at four locations. We will release the seed weevil at an additional two locations in July of 2001.

3) Begin annual monitoring to measure weed suppression and plant succession

Quantitative evidence of biocontrol success is starting to emerge. Photos taken before and during the control process already show 100% defoliation along a 100 m linear stand of purple loosestrife in the Rivergate area. We are measuring success of a biological control program of a weed species as a reduction of the abundance of the target weed and a subsequent increase in desirable/native species. To track changes in the plant and animal community we have sampled plant cover and moth abundance at three study sites. The percent cover for each plant species was measured in each sample area. Moth abundance was measured using light traps. These data give a baseline from which to quantitatively evaluate future changes.

4) Increase public awareness and involvement in diagnosing and treating alien species problems.

In the past year, we have targeted over 750,000 people around the Portland area in a campaign to inform the public about the problem of purple loosestrife. We have increased public awareness and involvement through: 1) distributing information pamphlets, 2) giving presentations, and 3) arranging articles in the popular press. With assistance from various community-based groups in the Portland area, we have distributed over 500 purple loosestrife information pamphlets, which contain forms for reporting loosestrife sightings. We have also given nine presentations about purple loosestrife at local and national events and symposia (approx. 800 people). In addition, we have given interviews to the popular press. Coverage on the project appeared on KGW News during the evening of September 10 and reached approximately 150,000 people. An article "Bugs munch way through killer weed", appeared on October 9th in the Oregonian, which has a circulation of 604,600 people.

Biological Control of Purple Loosestrife in the Lower Columbia River Estuary

Introduction

The Problem: Purple loosestrife

Purple loosestrife has arrived in Oregon and is rapidly invading our wetlands. Purple loosestrife (*Lythrum salicaria*) is a tall perennial wetland plant native to Europe. It probably arrived on the East coast of the United States before 1830 in ballast deposited by trading ships from Northern Europe (Thompson 1991). It has since spread across the country, aided recently by road construction and irrigation channels, as well as through the planting of seeds sold in wildflower mixes (Wilcox 1989). A mature plant can produce as many as 2.5 million seeds annually (Malecki et al. 1993), which are dispersed by water or in mud adhering to animals. Its mean rate of spread since 1940 has been estimated at 645 km^2 per year (Thompson 1991).

Purple loosestrife is an ecological problem because it quickly displaces native wetland vegetation and often forms dense monospecific stands that degrade habitat quality for waterfowl and other wetland animal species (Thompson et al. 1987; Balogh and Bookhout 1989). In the U.S. the estimated cost of infestation, in terms of wildlife and agriculture, is $45 million per year (Thompson et al. 1987). However, some believe that the negative effects of purple loosestrife on native species have not been adequately demonstrated or measured (Anderson 1995; Hager and McCoy 1998).

Biological control is the preferred alternative for managing this growing threat. Purple loosestrife is extremely difficult to mechanically control due to its ability to regenerate from any remaining plant part. Chemical control is possible, but usually not recommended in the wetland habitats where loosestrife occurs. Biological control uses host specific insects from the plant's area of origin to control the target weed.

The Solution: Biological Control

New organisms to be released into the environment for the biological control of weeds must first pass tests of host specificity to demonstrate that they do not threaten plants of economic or ecological value. Three biological control agents, two leaf beetles (*Galerucella pusilla* and *G. calmariensis*) and a root weevil (*Hylobius transversovittatus* Goeze), were approved for release in June of 1992 (Malecki et al. 1993). Two other agents have since been approved, the seed weevils *Nanophyes marmoratus* Goeze and *Nanophyes brevis* Boheman. *N. marmoratus* was released in 1994. *N. brevis* has not yet been released in the United States due to a nematode infection in all the European populations examined (Rees et al. 1996).

In a study done at Baskett Slough National Wildlife Refuge (Polk Co., Oregon) *G. pusilla* and *G. calmariensis* were found to inflict significant damage to purple loosestrife populations (Schooler, 1998). Although the beetles are two separate species, they are similar in lifecycle and feeding preferences. In Europe, *G. pusilla* and *G. calmariensis* have similar life histories, ecological niches, geographic distributions, and the two species exist together even in isolated populations of purple loosestrife with less than 10 plants (Blossey 1995). The population growth rate of *G. pusilla* is higher than that of *G. calmariensis*. However, both species appear to respond similarly to variation in environmental conditions (Grevstad 1998). In host specificity tests, they were unable to complete their life cycle on plants other than purple loosestrife (Blossey et al. 1994).

The success of the control organisms is partly due to their reproductive rates. Other things being equal, the reproductive rate increases with the number of generations per year. Two generations (one full generation and a partial second) have been recorded for both species in Oregon while only one is found in the shorter growing seasons of the Midwest and Eastern regions of the United States. Four generations per year have been recorded in Northern Italy (Batra et al. 1986).

Adult beetles of the two species can only be distinguished after the teneral stage (which lasts approximately one week after they become adults). *G. pusilla* is smaller and has solid golden-brown elytra while *G. calmariensis* is slightly larger and orange-brown with two dark stripes that run dorsal-laterally down the beetles' elytra.

The seed feeding weevil, *N. marmoratus*, has been introduced to control the spread of the plant by seed. The adult is a small (approx 2 mm long) reddish weevil with white shoulder-patches. The larvae feed on the immature flower buds and thereby prevent the bud from producing seeds. Pupation occurs within a chamber formed inside the damaged bud. The adult beetles feed on young leaves near the shoot tips. The adult stage overwinters and the weevil generally produces one generation per year (Rees et al. 1996).

The root-feeding weevil, *H. transversovittatus*, has been introduced to reduce the plant energy reserves stored in roots. The adult is a large (approx 2 cm) reddish-brown weevil that has two rows of white tufted hairs across the back. The larvae mine the root tissue and the adult weevils are nocturnal and feed on the lower leaves. All life stages are capable of overwintering and the weevil typically produces one generation every one to two years (Blossey 1993).

Progress of study

In the following pages we summarize the progress accomplished under each objective and task in the proposal. We have found that reed canary grass decreases plant and moth diversity and we have secured funding to continue our study in 2001 to refine our impact estimates for purple loosestrife. We have released and redistributed control organisms and measured the area and intensity of damage inflicted to purple loosestrife in the Rivergate district. We've also educated a large number of Portland residents on the general problem of invasive species and the specific local problem of purple loosestrife.

Objective 1, Task A: Evaluate the actual and potential distribution and abundance of loosestrife in the Rivergate District and Tualatin River Watershed.

We have currently identified eleven wetland areas in the Rivergate District that are infested with stands of Purple loosestrife (see Appendix 1). Six of the areas were located through reported sightings and verified in May of 2000 (see Appendix 1: 1-4, 7, 9). The five additional stands and the individual plants were mapped in a survey from 29-30 August 2000, during which both lakes were circumnavigated on foot along the high water line. We surveyed during peak loosestrife flowering, the optimal time for detecting the plant.

We used Geographic Information Systems (GIS) databases in combination with the field survey to calculate current loosestrife area (Table 1). Then we calculated the potential future distribution of loosestrife using vegetation maps. A 1994 report to Metro Parks and Greenspaces "The Biota of Smith and Bybee Lakes Management Area" by E. Lev *et al.* assigns vegetation cover types to much of the area. The cover types are given in the table below for the loosestrife infested sites. A GIS soils database acquired from the State Service Center for GIS

(www.sscgis.state.or.us) lists soil types throughout Multnomah county. The soil types for the sites infested by purple loosestrife are also given in the table below. We used historical photos (1930, 1975, 1985, 1995) to determine whether the sites had been created or were natural. However, due to continuous flooding created by local and regional water control structures, it is probably inaccurate to consider any of these sites undisturbed.

Table 1. Sites in the Rivergate District currently infested with stands of purple loosestrife

ID	Site name	Vegetation type	Soil type	History	Area (ha)
1	**Substation**	Reed canary grass	Pilchuck-Urban land complex	created	44.1
2	**Ramsey Lake**	Reed canary grass, Pacific willow forest, and Willow Scrub-shrub	Sauvie and Rafton Silt Loam	created	94.3
3	**Stormwater Runoff**	Pacific willow forest	Sauvie Silt Loam	created	52.3
4	**Prison**	Mix deciduous forest	Sauvie Silt Loam	natural	11.0
5	**NW Bybee**	Mix deciduous forest, Reed canary grass, and Shoreline emergent	Rafton Silt Loam	natural	4.4
6	**North Bybee**	Mix deciduous forest and Shoreline emergent	Rafton Silt Loam	natural	1.3
7	**Landfill**	Reed canary grass	Sauvie Silt Loam	natural	2.2
8	**West Smith**	Reed canary grass	Sauvie Silt Loam	natural	2.4
9	**Bird Blind**	Reed canary grass	Sauvie Silt Loam	natural	11.7
10	**Osprey Nest**	Reed canary grass	Sauvie Silt Loam	natural	0.8
11	**East Smith**	Mix deciduous forest	Sauvie Silt Loam	natural	2.4

We calculated the potential loosestrife habitat by totaling the area of the habitats that it is likely to invade. Using ArcView (version 3.2, ESRI) we superimposed the map of loosestrife stands on the vegetation layer and identified invasible habitat types based on the vegetation types it has currently invaded in the Rivergate District. Invasible habitats were; Reed canary grass, Pacific willow forest, Willow scrub-shrub, Shoreline emergent, and Mixed deciduous forest. The total area examined was 7,765.4 ha and the area of potential purple loosestrife habitat was 2,134.2 ha. Approximately 27% of the Smith and Bybee Lakes management area is potential habitat for purple loosestrife. Currently only 226.9 ha of the area (3% of total area) is infested with purple loosestrife. This may be an underestimate of potential loosestrife habitat for three reasons: 1) it is early in the invasion process and we do not know if purple loosestrife cannot invade the other vegetation types or simply has not yet been introduced into those habitats, 2) our estimate does not include habitat data from individual plant locations, and 3) the recent decision to allow the water level to fluctuate by opening the water control structure may make more habitat, which is currently open water, available to purple loosestrife invasion. Additionally, since loosestrife exists on both of the predominant soil types (Rafton and Sauvie Silt Loam) soil type will probably not inhibit spread.

We have also examined 30.4 miles of the mid and lower Tualatin River for infestations of purple loosestrife (Appendix 2). This is approximately 10% of the length of all the streams of the Tualatin River Watershed (333.6 total river miles). The survey was done August 18-21, 2000, mapping plants from the waterway using a canoe and a kayak. Although this was the best time of year to identify loosestrife plants, due to their striking inflorescences, low water levels inhibited surveying areas further upriver. We found very little purple loosestrife established in the area surveyed.

Plants were identified and their locations were mapped (see Appendix 2). We found 29 scattered individual plants clustered around two locations; 1) upriver from HWY 10 bridge (see Appendix 3), and 2) upriver and downriver from I-205 bridge (see Appendix 4). Since these infestations consist mostly of individual plants, mechanical removal is currently the most feasible method of control. The clustering of plants at the two locations may indicate larger infestations, probably located along the immediate upriver tributaries. These upstream populations may seed the Tualatin River. For example, the loosestrife along upper Fanno Creek may be the cause of the two loosestrife plants at the confluence of Fanno Creek and the Tualatin River, and perhaps the plants located further down the watershed as well (see Appendices 2 and 4). Following the plants upstream may be the best method of identifying the larger source loosestrife populations.

Objective 1, Task B: Evaluate the ecological effects of purple loosestrife invasion on the plant community.

We expect that as the density of loosestrife and reed canary grass increases, the species diversity of the plant community will decrease. This will suggest a negative impact of purple loosestrife and reed canary grass on local plant communities. Measures of species diversity include the number of species (species richness) and how evenly the total abundance is shared among species (evenness).

In order to evaluate the effect of purple loosestrife density on the plant community we compared plant species richness and evenness between twelve emergent palustrine wetland sites in NW Oregon. Five of the sites were hydrologically modified mitigation wetlands (MW) and seven were naturally occurring wetlands (NOW). A map of the locations of these sites is given in Appendix 5 and the coordinates are listed in Table 2. In addition to four sites dominated by purple loosestrife (2 MW and 2 NOW), we sampled four sites dominated by reed canary grass (4 NOW), and four "reference" sites, defined as those with neither loosestrife nor reed canary grass (3 MW and 1 NOW). The reed canary grass sites were used for comparison between introduced invasive species while the reference sites are used for comparison of wetlands dominated by exotic species to those of more natural wetland plant communities.

Table 2. Wetland study sites

Site name	Invasive Status	NOW or MW	Latitude (degrees)	Longitude (degrees)	Elev (m)
Minthorn Springs	Reference	MW	45.441520	-122.622250	28
Knez Wetland	Reference	MW	45.430640	-122.760390	53
Apache Bluff Wetland	Reference	MW	45.394950	-122.778970	43
Champoeg State Park	Reference	NOW	45.256650	-122.903530	30
Prison Site South	Phalaris	NOW	45.623240	-122.756070	3
Fanno Creek Park	Phalaris	NOW	45.467520	-122.789280	63
Bird Blind Site	Phalaris	NOW	45.616070	-122.726880	7
Jackson Bottom	Phalaris	NOW	45.502600	-122.982830	43
Horseshoe Lake	Loosestrife	NOW	45.204470	-123.032230	27
Pickle Pond	Loosestrife	MW	45.617840	-122.777030	7
Prison Site North	Loosestrife	NOW	45.629050	-122.754690	3
Ramsey Lake	Loosestrife	MW	45.632780	-122.761700	5

At each study site we located a sample area that consisted of mostly herbaceous vegetation within a 50-meter radius of a central point (total area = 7850 m^2). All sample areas were located in emergent wetlands, and all sample areas dried up during the summer months except the one at Horseshoe Lake. The plant community at each of the twelve sites was sampled in June and July 2000. The percent cover for each plant species was determined for thirty randomly assigned 1 m^2 quadrats (square) in each sample area. A voucher collection that includes all of the plant species sampled was assembled. Dr. Richard Halse (Senior Instructor in Botany at Oregon State University) verified the plant identifications, and voucher specimens will be placed in the Oregon State University herbarium at the end of the study. The plant species list is attached as Appendix 6.

We sampled 98 plant species in our twelve wetland sites. The density of reed canary grass varied from 0-81% cover and loosestrife varied from 0-29% cover (Table 3). Our preliminary results indicate that increasing density of reed-canary grass is correlated with decreasing numbers of plant species (Figure 1a, Table 3). We also found that high reed-canary grass density decreased the evenness of the distribution of plant species (Table 3). However, the density of loosestrife in our loosestrife-dominated sites did not exceed 30% cover and the relationship between loosestrife density and plant species richness is inconclusive (Figure 1b).

An adequate index of community structure incorporates both the number of species and the evenness in the distribution of abundances (or equitability) of those species (Krebs, 1999; Begon et al., 1990). We used four standard diversity indices to quantitatively evaluate the plant and moth communities at each wetland site (Table 3). These are: species richness (S), Shannon-Wiener function (H'), species equitability (J) and, Simpson's Index (D) (Begon et al, 1990, p. 615). Species richness (S) is the total number of species sampled. This is a good beginning measure of community structure, but although a community may have a great number of species, a few species may be dominant among numerous rare species. The Shannon-Wiener function (H') is a measure of the information content of the sample and integrates both species number and abundance. The function is defined as the sum across all species of the total number of

species multiplied by the proportion of the total sample belonging to a particular species. Thus, for a given richness, H' increases with equitability, and for a given equitability, H' increases with richness. Species equitability (J) is a measure of how evenly species abundances are distributed throughout the community. It is calculated as the observed H' of the community divided by the maximum H' of the community. An equitability value of 1 indicates a completely even distribution of species abundances and values decrease with increasing disparity between species abundances. Simpson's index (D) is similar to H' in that it integrates species richness and abundance. It is defined as the reciprocal of the sum across all species of the proportion of each species squared. As for H', for a given richness, D increases with equitability, and for a given equitability, D increases with richness. We found that high percent cover of canary grass resulted in a decrease of all measures of diversity for the plant community. However, the only discernable impact to the moth community was through reduced species richness (Table 3).

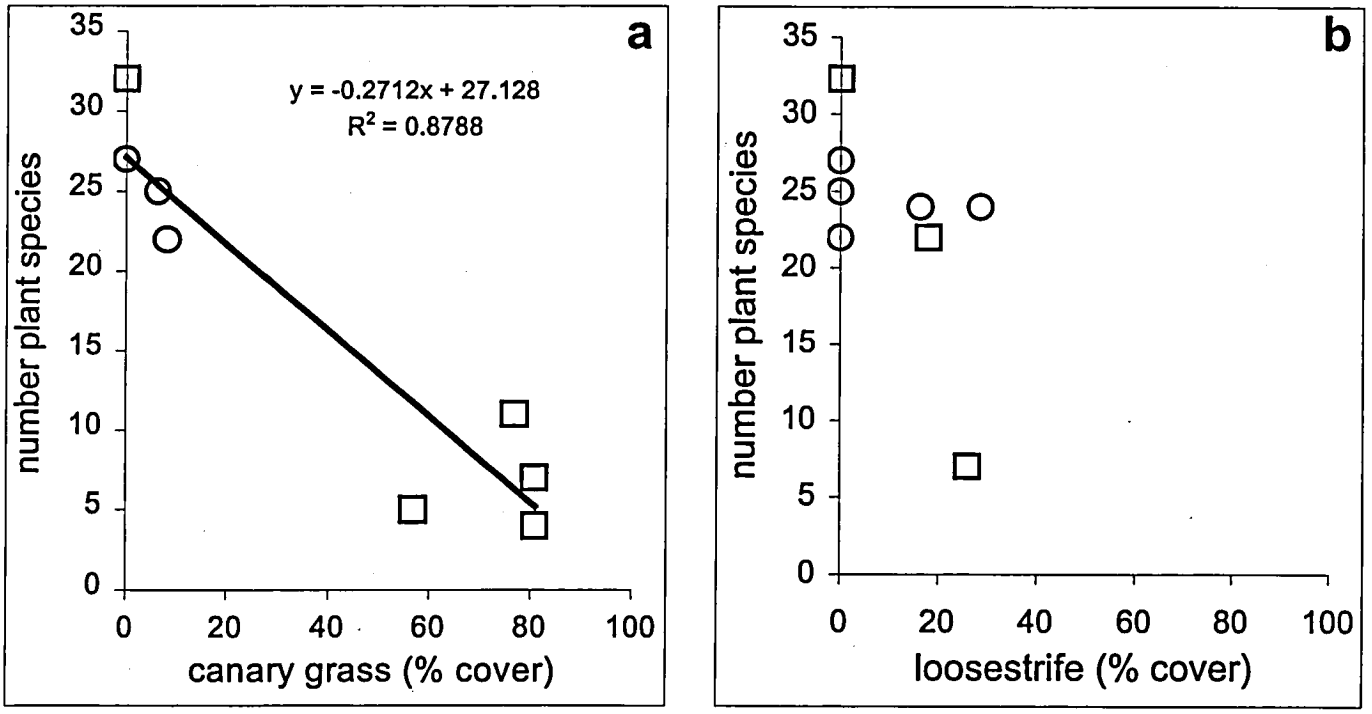

Figure 1a and 1b. a) Plant species richness declines with increasing cover of reed canary grass b) but the impact of loosestrife is inconclusive. The squares represent the naturally occurring wetlands and the circles are the created wetlands.

Objective 1, Task C: Evaluate the ecological effects of purple loosestrife invasion on the animal community.

We expect the moth community to be particularly sensitive to vegetation changes because the larval caterpillars are herbivores and often require specific host plants. Additionally, changes in the moth community may affect higher trophic levels, namely insectivorous birds and fish. We hypothesized that, as the density of loosestrife and reed canary grass increases, plant species richness will decrease, and moth species richness will consequently decrease. Also, no moths native to North America are reported to feed on purple loosestrife so we expect moth abundance to decrease as loosestrife density increases.

The twelve sites listed above for plant community assessment were used to evaluate the ecological effects of purple loosestrife and reed canary grass invasion on the moth community. We sampled the moth community at each site with 8-watt black light traps during three sampling events (late June, July, and August). Sites were sampled on three consecutive moonless nights during each sampling event, totaling 108 samples over the course of the summer. The samples were then frozen and transported to Corvallis for identification of species. A voucher collection for the moths was assembled, and Dr. Paul Hammond (Courtesy Professor of Entomology) at OSU verified identifications. Voucher specimens will be deposited in the Oregon State Arthropod Collection (OSAC) at the end of the study. For the list of moth species collected see Appendix 7.

We sampled 1,115 individual moths, comprising 86 species and 10 families. Our results show that despite having high numbers of plant species, created wetlands tend to have low numbers of moth species (Figure 2a and b). Moth species richness decreases with increasing density of the invasive plant species in naturally occurring wetlands. However, with only one naturally occurring reference wetland, the positive association of moth and plant diversity remains unconfirmed by these data.

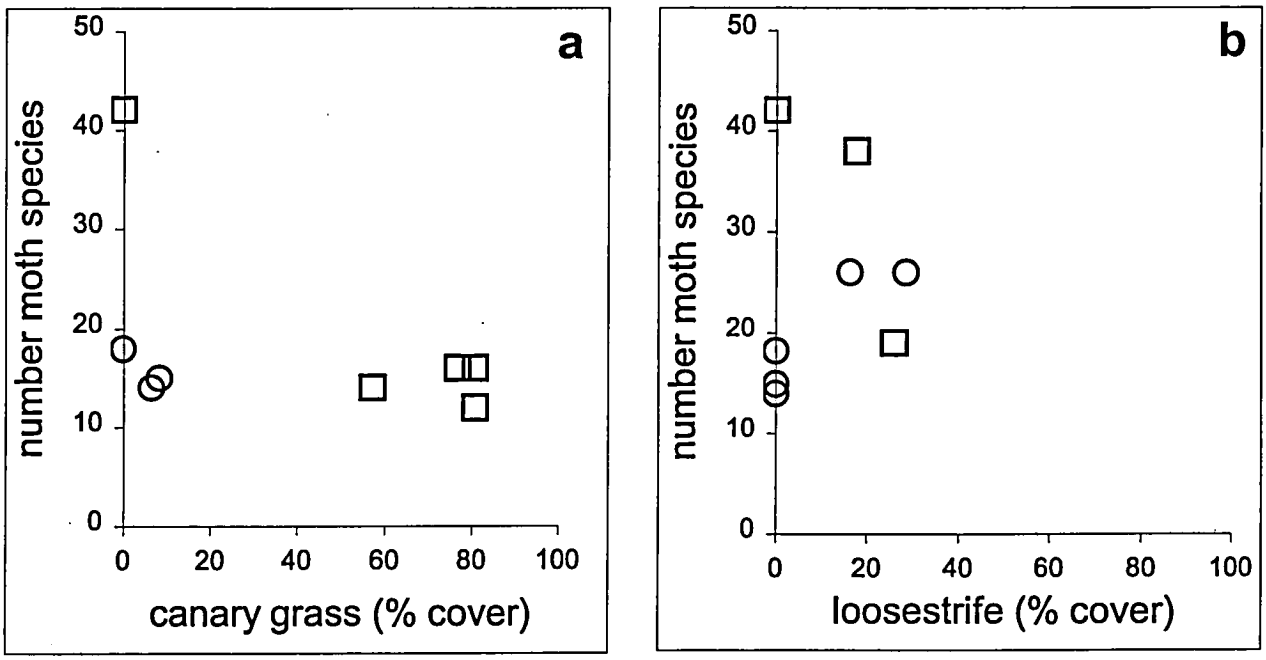

Figure 2a and 2b. Moth species richness appears to decline with increasing density of an invasive species when comparing naturally occurring wetlands (squares). Created wetlands tend to have low numbers of moth species (circles) regardless of the density of invasive species.

Table 3. Diversity Indices for Wetland Study Sites

	Invader Density		Plant Diversity Metrics				Moth Diversity Metrics			
	Phalaris	Loosestrife	S	H'	J	D	S	H'	J	D
Site	% cover	% cover	# species	Shannon-Wiener	Evenness	Simpsons	# species	Shannon-Wiener	Evenness	Simpsons
Champoeg	0.00	0.00	27	3.046	0.641	0.731	42	4.169	0.773	0.904
Minthorn	6.43	0.00	25	3.876	0.835	0.911	14	3.383	0.889	0.906
Knez	8.17	0.00	22	3.485	0.782	0.864	15	3.533	0.904	0.920
Apache	0.00	0.00	32	4.111	0.822	0.900	18	3.773	0.905	0.928
S Prison	80.80	0.00	7	0.755	0.269	0.207	12	3.258	0.909	0.908
Fanno	80.93	0.00	4	0.463	0.231	0.133	16	3.415	0.854	0.889
Bird Blind	76.77	0.00	11	1.226	0.354	0.327	16	3.622	0.905	0.924
Jackson	56.73	0.00	5	0.773	0.333	0.230	14	3.158	0.830	0.874
Horseshoe	0.00	26.00	7	2.205	0.786	0.727	19	2.472	0.582	0.723
Pickle Pond	5.07	28.57	24	3.554	0.775	0.871	26	4.022	0.856	0.921
N Prison	8.03	17.73	22	3.708	0.831	0.909	38	4.535	0.864	0.943
Ramsey	13.00	16.33	25	3.971	0.855	0.919	26	4.024	0.856	0.921

We need to increase the number of sample sites to make more conclusive statements on the impact of purple loosestrife and reed-canary grass on the species richness of the plant and animal communities they invade. In particular, sampling more naturally occurring reference wetland sites, and sites with greater densities of purple loosestrife, will be necessary to complete the picture.

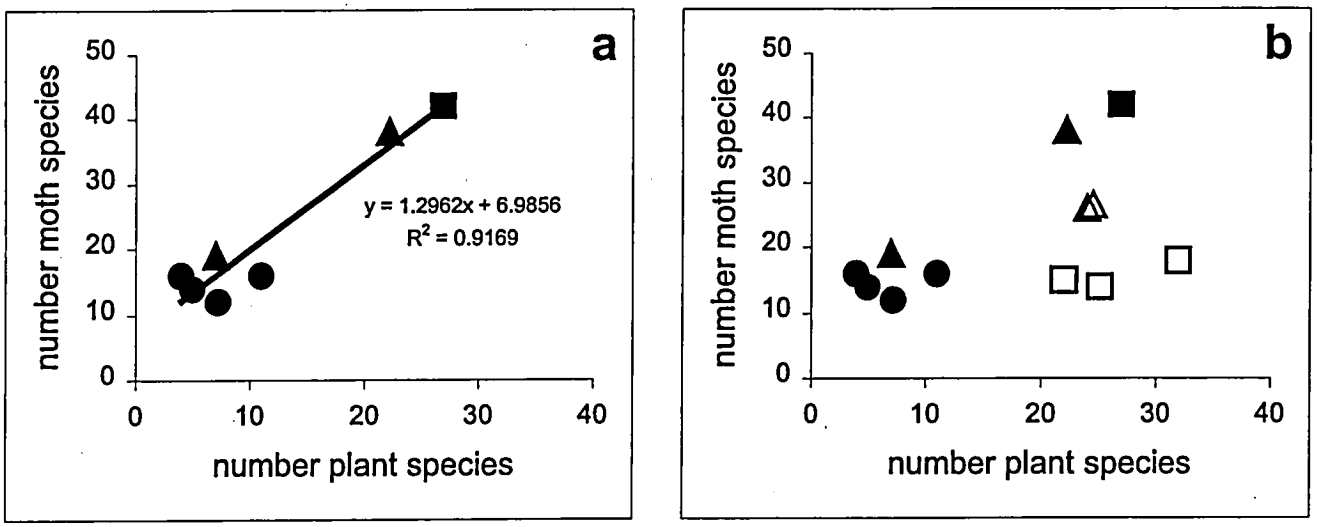

Figure 3a and b. Figure 3a includes only the 7 NOW's and 3b includes all 12 wetlands. There is an apparent positive correlation between the number of plant species and moth species for NOW's (solid symbols) but not for MW's (open symbols). Squares are reference wetlands, triangles are loosestrife dominated wetlands, and circles are canary grass dominated wetlands.

As we expected, the species richness of the moth community increased with the number of potential host plant species in NOW's (Figure 3a). The result that artificial wetlands exhibit low moth species diversity despite high plant species richness is striking (Figure 3b). It may be

that artificial wetlands are too young, are too far from a source of colonists, have unsuitable habitat, or are too small to support many moth species. Whatever the cause, the moth fauna of artificial wetlands does not yet match that of natural wetlands they replace. Further research is necessary to elucidate the cause of the disparity between plant and moth communities in artificial wetlands.

One goal of the project was to assess impact of invasive species on wetland plant and moth communities. Along the way we have gathered much previously unknown knowledge about wetland moth communities. Prior to this study little was known of the abundance and composition of moth communities in wetland systems in the Pacific Northwest. Now we have moth species lists associated with vegetation and information on host-plant associations. We have also discovered one new moth state record (*Noctua comes*: Noctuidae) and are in the process of identifying a locally unknown geometrid species, which is also a likely new state record.

Objective 2, Task A: Evaluate the status of prior releases of *Galerucella spp.* beetles and *Nanophyes marmoratus* weevils

The status of the prior biological control agent releases in the Rivergate District were evaluated by first identifying the locations of the releases. Then we surveyed the loosestrife plants at those locations and the surrounding loosestrife stands during times when the insects were active.

We searched the ODA weed biological control release records and found that six releases of *Galerucella spp.* had been made at three sites in 1997 and one release had been made in 1999 (Table 4). Note that some releases were limited to *G. pusilla* (GAPU) while others included both beetle species (GA). One release of the seed head weevil, *Nanophyes marmoratus* (NAMA), was made in 1999. A map of the release sites is given in Appendix 8.

The leaf beetles were found at all sites where they had previously been released. This is an establishment rate of 100%. We also found that the *Galerucella* beetles had already traversed an area of fill and established a small new population at the Prison site, approximately 700 m from the nearest release site. We assessed populations of the seed-head weevil on August 29, 2000. Feeding damage by the weevil was common on loosestrife seed heads within 50 meters of the release site, but few adults were found.

Table 4. Locations of prior releases of biological control agents

ID	Site	Coordinates of Release (degrees)	Year Released	Number Released	Species	Present 2000
1	Substation	N45.6164, W-122.7681	1997	200	GAPU	Yes
2	Substation	N45.6155, W-122.7698	1997	200	GAPU	Yes
3	Substation	N45.6165, W-122.7658	1997	400	GA	Yes
4	Substation	N45.6185, W-122.7772	1999	500	GA	Yes
5	Substation	N45.6185, W-122.7772	1999	100	NAMA	Yes
6	Stormwater runoff	N45.6229, W-122.7658	1997	100	GA	Yes
7	Ramsey Lake	N45.6313, W-122.7619	1997	100	GAPU	Yes
8	Ramsey Lake	N45.6310, W-122.7612	1997	500	GAPU	Yes

During four sampling events in May we measured the density of purple loosestrife and *Galerucella spp.* at the four sites in the Rivergate District. While sampling we revised our estimates of present purple loosestrife habitat (Appendix 1), which were initially based on

contour maps. Our estimates of mean purple loosestrife plant density ranged from 0.90 to 1.28 plants per 0.25m^2 (Table 5). We defined a plant as one or more stems connected to a single root mass that were greater than 5 cm in height. Beetle prevalence was defined as the probability of any given purple loosestrife plant exhibiting signs (eggs, larvae, or adult beetles) or symptoms (leaf or meristem damage) of beetles. This was calculated by dividing the number of plants that showed signs of beetles by the total number of plants sampled per site and is given as prevalence per 100 plants. Beetle prevalence ranged from 0 to 70 per 100. Prevalence may be a better indicator of beetle activity than the number of adult beetles because plant disturbance and weather conditions while sampling may affect adult beetle density, but will not affect presence of damage, eggs, or larvae. Finally, we calculated the mean density of adult beetles per purple loosestrife plant. Mean beetle density ranged from 0 to 3.15 beetles per plant. Although we visually identified the beetle population at the Prison site, the population was still very small (total area less than 25 m^2) and was not detected by our random sampling procedure.

Table 5. Densities of purple loosestrife and *Galerucella* beetles

Site	Sample Date	No. quadrats N	mean PLS density (plant/0.25m^2)	SD PLS density	Beetle prevalence (per 100)	mean adult density (beetles/plant)	SD adult density
Substation	May 11	36	1.28	2.40	70	3.15	11.12
Stormwater runoff	May 19	10	0.90	1.52	44	0	0
Ramsey Lake	May 25	30	1	1.93	47	0.43	1.09
Prison	May 19	22	0.90	2.83	0	0	0

Objective 2, Task B and C: Weigh alternative strategies for beetle redistribution and select additional sites for release of biological control agents.

Galerucella beetles are well established in Rivergate and are actively colonizing new areas. *Nanophyes marmoratus* is locally established and spreading and *Hylobius transversovittatus* has been released at four new sites. We have secured funding to make additional releases in 2001. *Galerucella* beetles are currently ubiquitous throughout the Substation, Stormwater runoff, and Ramsey lake sites. Because *Galerucella* larvae destroy the apical meristem of purple loosestrife stems, they tend to limit bud production and flowering and hence limit resources for the seed-head weevil, *Nanophyes marmoratus*. Therefore, the seed-head weevil will be introduced in areas with absence or low densities of *Galerucella* beetles.

The root weevil, *Hylobius transversovittatus,* is less affected by *Galerucella* presence because the root weevil larvae feed on the rootstock and adults feed on the lower leaves. Because *Hylobius* feed on roots and lower leaves, they will tend to tolerate above-ground disturbance (clipping and mowing) better than *Galerucella* and *Nanophyes,* which feed on the upper portions of the plant. All of the agents will probably have higher establishment rates in areas with high densities of loosestrife. Areas that are not regularly disturbed (i.e. herbicide, mowing, and fill removal) were given preference over disturbed sites.

We believe that the releases will have greater establishment success and higher initial rates of increase when they are introduced into areas without competition from other biological control agents. These areas will act as nursery sites from which the insects will either be redistributed to other sites by hand or they may emigrate to colonize local loosestrife stands on

their own. Therefore, we will limit additional *Galerucella* releases in areas where they may interfere with the other two agents, especially the seed-head weevil.

In general, as release sizes are increased, establishment probability increases (Grevstad 1999). However, although large releases are preferable, the availability of insects and the release effort may make large releases unfeasible. A prior study of the *Galerucella* beetles found that release sizes of approximately 540 individuals had close to 100% establishment rates (Grevstad 1999). A similar experiment has not been done for *Nanophyes*, so we make our release size recommendations based on the results of Grevstad's study. *Galerucella* beetles and *Nanophyes* weevils are easily collected and released and therefore large release sizes are possible. However, *Hylobius* weevils have a long generation time (2 years) and are difficult to collect as adults, and therefore are usually released as eggs. The eggs must be deposited individually on plant stems, making large releases labor intensive. Generally only lower release sizes (100-200) are feasible.

On September 26th, eggs of *Hylobius transversovittatus* were released at the four sites listed in Table 6. Gary Brown and Laurie Hewitt (USDA/APHIS) acquired the eggs from a USDA laboratory in Texas and were assisted by Shon Schooler in locating sites and inoculating individual loosestrife stems in the Rivergate District and at Horseshoe Lake.

Our recommendations for additional releases of *Nanophyes* and *Galerucella* beetles are listed in Table 6. Large numbers of *Galerucella spp* may be collected for redistribution from the local Substation site or from Morgan Lake in the Baskett Slough National Wildlife Refuge, Polk Co., Oregon. The best time for collection is from late-May to early June. *Nanophyes marmoratus* adults are abundant in mid-July at a site in Ontario State Park, Malheur Co. Oregon. We were limited in making releases in 2000 because the optimal time for detecting new loosestrife stands occurs after the time for collecting and redistributing *Galerucella* and *Nanophyes* beetles. The additional releases of *Galerucella* and *Nanophyes* indicated in Table 6 will be made in 2001.

Table 6. Recommendations for redistribution and release of biological agents

Id	Site name	Area (ha)	PLS density	disturbance	*Galerucella* spp	*Nanophyes marmoratus*	*Hylobious transversovittatus*
1	**Substation**	44.1	high	none	+	+	200 eggs (released)
2	**Ramsey Lake**	94.3	medium	none	+	-	-
3	**Stormwater Runoff**	52.3	medium	herbicide	+	-	-
4	**Prison**	11.0	high	fill removal	+	-	100 eggs (released)
5	**NW Bybee**	4.4	medium	none	-	>540 adults	-
6	**North Bybee**	1.3	medium	none	-	>540 adults	-
7	**Landfill**	2.2	medium	mowing	-	-	-
8	**West Smith**	2.4	high	none	-	-	100 eggs (released)
9	**Bird Blind**	11.7	low	mowing	-	-	-
10	**Osprey Nest**	0.8	high	none	-	>540 adults	-
11	**East Smith**	2.4	low	none	-	>540 adults	-
12	**Whittaker Pond**	3.5	low	none	>540 adults	-	-
13	**Horseshoe Lake**	110.0	high	standing water	+	-	200 eggs (released)

(note "+" = present, "-" = absent at site)

Objective 3: Begin annual monitoring to measure weed suppression and plant succession

At four study sites we have intensively sampled plant cover in order to assess future changes in plant community composition. These are a subset of the sites used in the evaluation of effects of loosestrife on the plant and moth community study described above. The intensive study sites are located at: 1) Ramsey Lake, 2) N Prison site, 3) Pickle Pond, and 4) Horseshoe Lake.

The intensive sample areas consist of a 50 m radius around the center point (7850 m^2). The coordinates for the center of these sites are listed in Table 7. The percent cover for each plant species was determined for thirty randomly assigned 1 m^2 quadrats in each sample area. This gives baseline data from which to evaluate future changes. We expect that as biological control agent populations increase, loosestrife density will decrease and abundance of other plant species will increase. The data for plant and moth community composition are given in Appendices 6 and 7 respectively.

Table 7. Locations of intensive plant community sample sites.

Site name	*Galerucella spp*	*Nanophyes marmoratus*	*Hylobious transversovittatus*	Latitude (degrees)	Longitude (degrees)
Pickle Pond	few present	few present	released in 2000	N45.61784	W-122.77703
Ramsey Lake	few present	none	none	N45.63278	W-122.76170
N Prison	few present	none	released in 2000	N45.62905	W-122.75469
Horseshoe Lake	few present	none	released in 2000	N45.20447	W-123.03223

Objective 4: Increase public awareness and involvement in diagnosing and treating alien species problems.

In the past year, we have targeted over 750,000 people around the Portland area in a campaign to inform the public about the problem of purple loosestrife. We have increased public awareness and involvement through: 1) distributing information pamphlets, 2) giving presentations, and 3) arranging articles in the popular press. With the assistance of various community-based groups in the Portland area, we have distributed over 500 purple loosestrife information pamphlets, which contain forms for reporting loosestrife sightings (see attached pamphlet. Organizations contacted and given pamphlets to distribute include; Tualatin Watershed Council, Columbia Slough Watershed Council, Tualatin Riverkeepers, and SOLV (Stop Oregon Litter and Vandalism). We have also given nine presentations about purple loosestrife at local and national events and symposia (approx. 800 people). The lectures are summarized in Table 8. In addition, we have given interviews to the popular press. On September 10, Shon Schooler, Jay Mower, and Troy Clark met with Stephanie Clark of KGW News (Channel 8) which resulted in a short news story that was aired that night and reached approximately 150,000 people (figure from Rich Barnes, KGW News, personal communication). They also met with Joe Fitzgibbon of the Oregonian. An article "Bugs munch way through killer weed", appeared on October 9th in the Oregonian, which has a circulation of approximately 604,600 people (figure from www.oregonian.com/display/audience) (see attached copy of article).

Table 8. Presentations Involving Impacts and Biocontrol of Purple Loosestrife

Title of Presentation	Venue	Presentor	Date
Biological Control of Purple Loosestrife	Columbia Slough Watershed Council, Portland, OR	P. McEvoy	22 May 2000
Alert: Purple Loosestrife is Invading Our Wetlands	Sixth Annual Columbia Slough Regatta, Portland, OR	S. Schooler J. Mower	30 July 2000
When Good Plants Go Bad	USDA/APHIS TAG meeting, Longview, WA	P. McEvoy	21 Sept 2000
Biological Control of Purple Loosestrife in the Lower Columbia River Estuary	Purple loosestrife Mini-Summit, Portland, OR	S. Schooler	14 Nov 2000
Impacts of Purple Loosestrife on Riparian Habitat	Oregon Department of Agriculture 5th Interagency Noxious Weed Symposium, Corvallis, OR	S. Schooler	6 Dec 2000
A Role for Biological Control in Ecological Restoration	Entomological Society of America national meeting, Montreal, Canada	P. McEvoy	6 Dec 2000
Biological Control of Purple Loosestrife in the Lower Columbia River Estuary	LCREP Implementation Committee Meeting	S. Schooler	11 Jan 2001
The role of biological weed control in ecological restoration	"Invasive Alien Species" Oregon Chapters of the American Fisheries Society and the Wildlife Society, Portland, OR	P. McEvoy	14-16 Feb 2001
Plant Invasions: Causes, Consequences, and Cures	Environmental Horizons 2001 Symposium, University of Illinois, Urbana-Champaign IL	P. McEvoy	March 26-27, 2001

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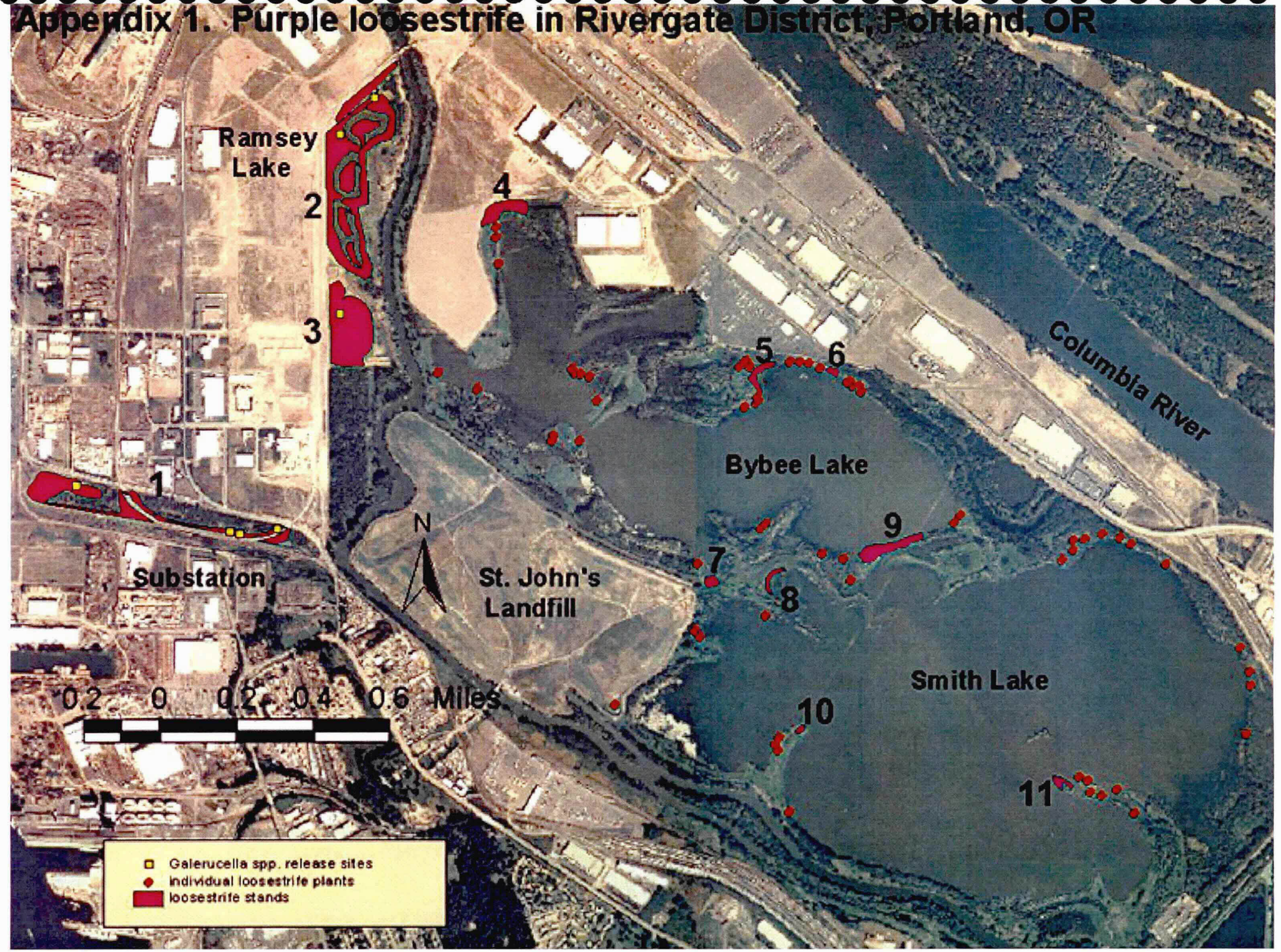
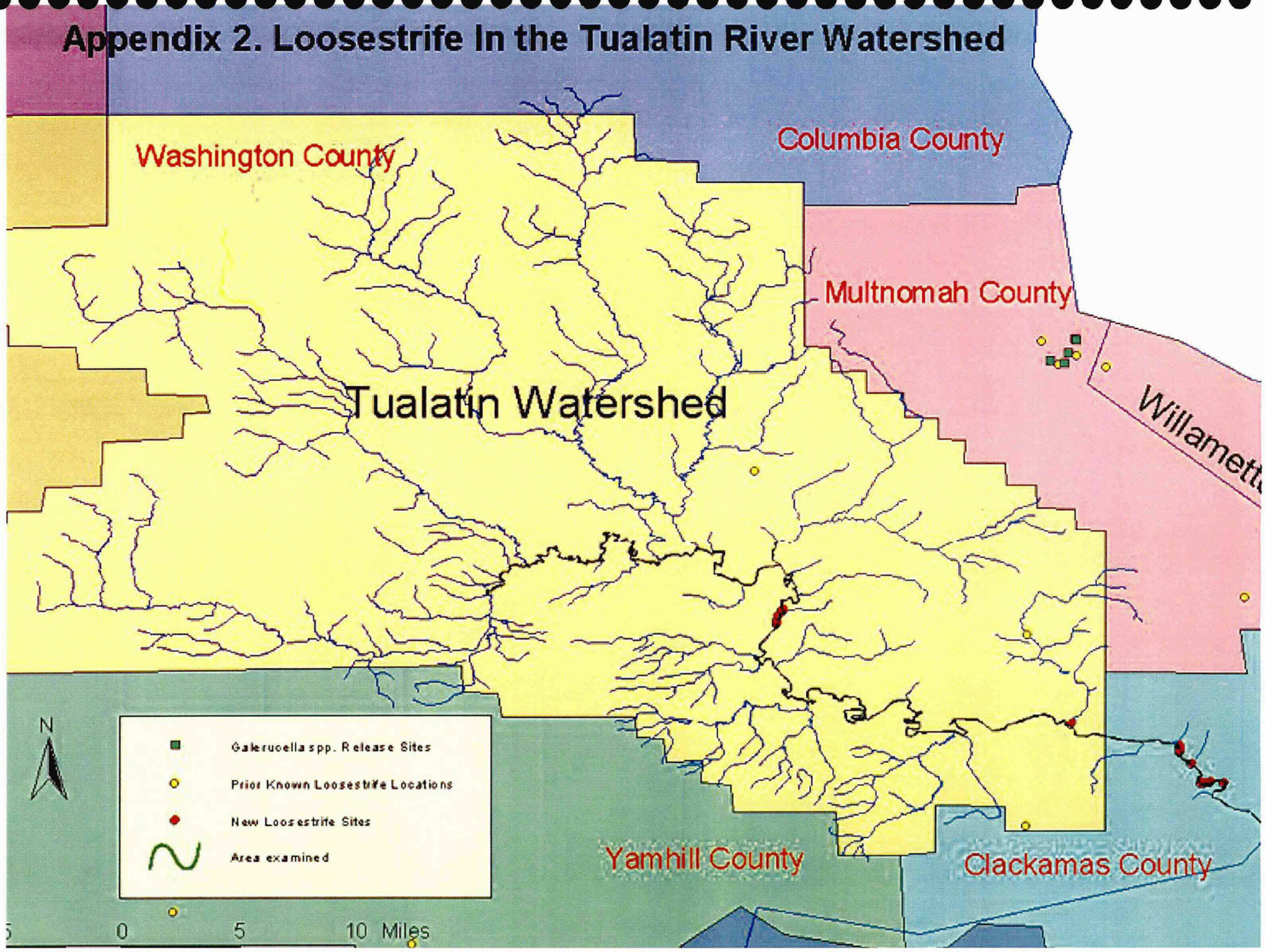
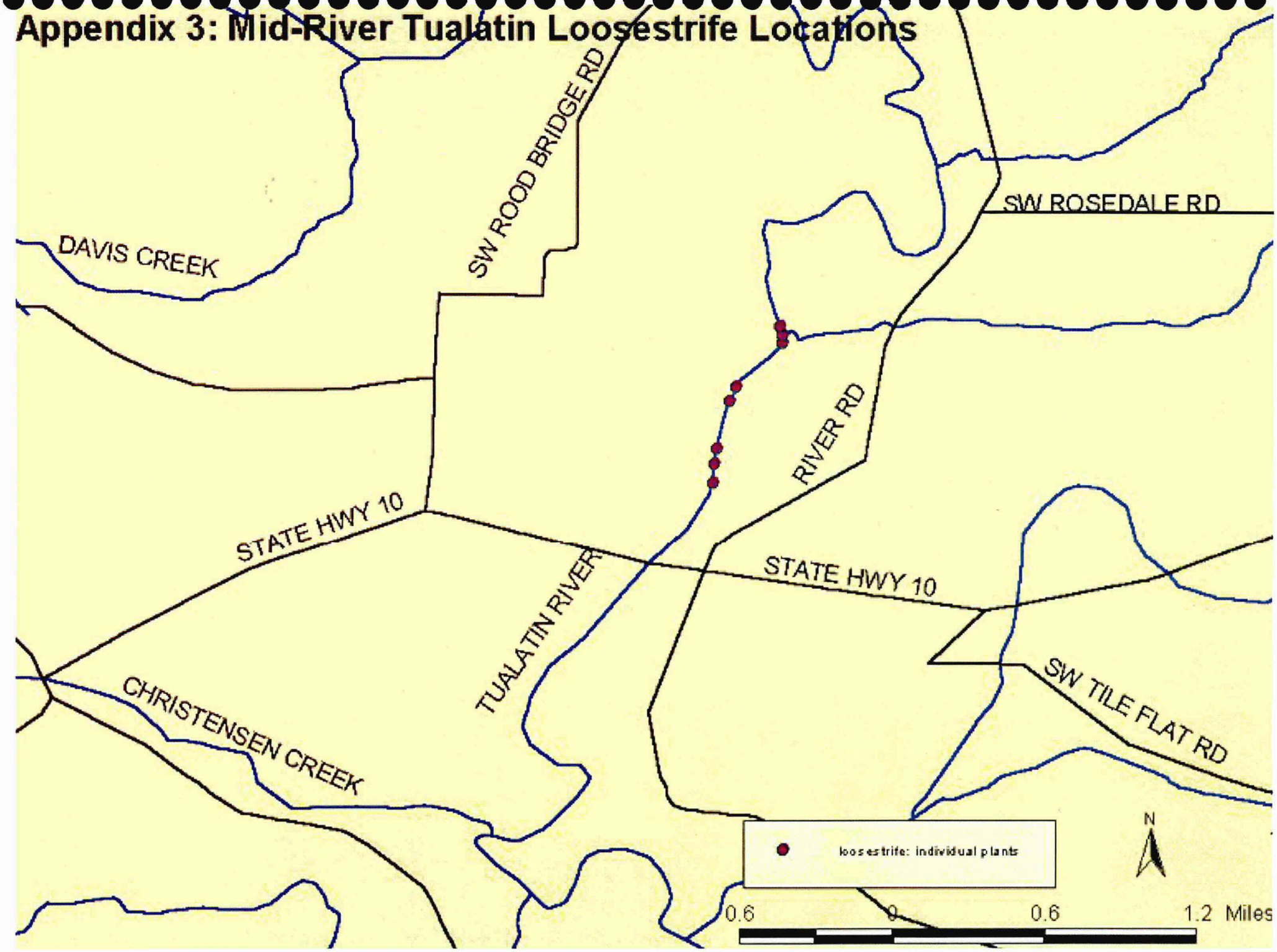
Appendix 1. Purple loosestrife in Rivergate District, Portland, OR



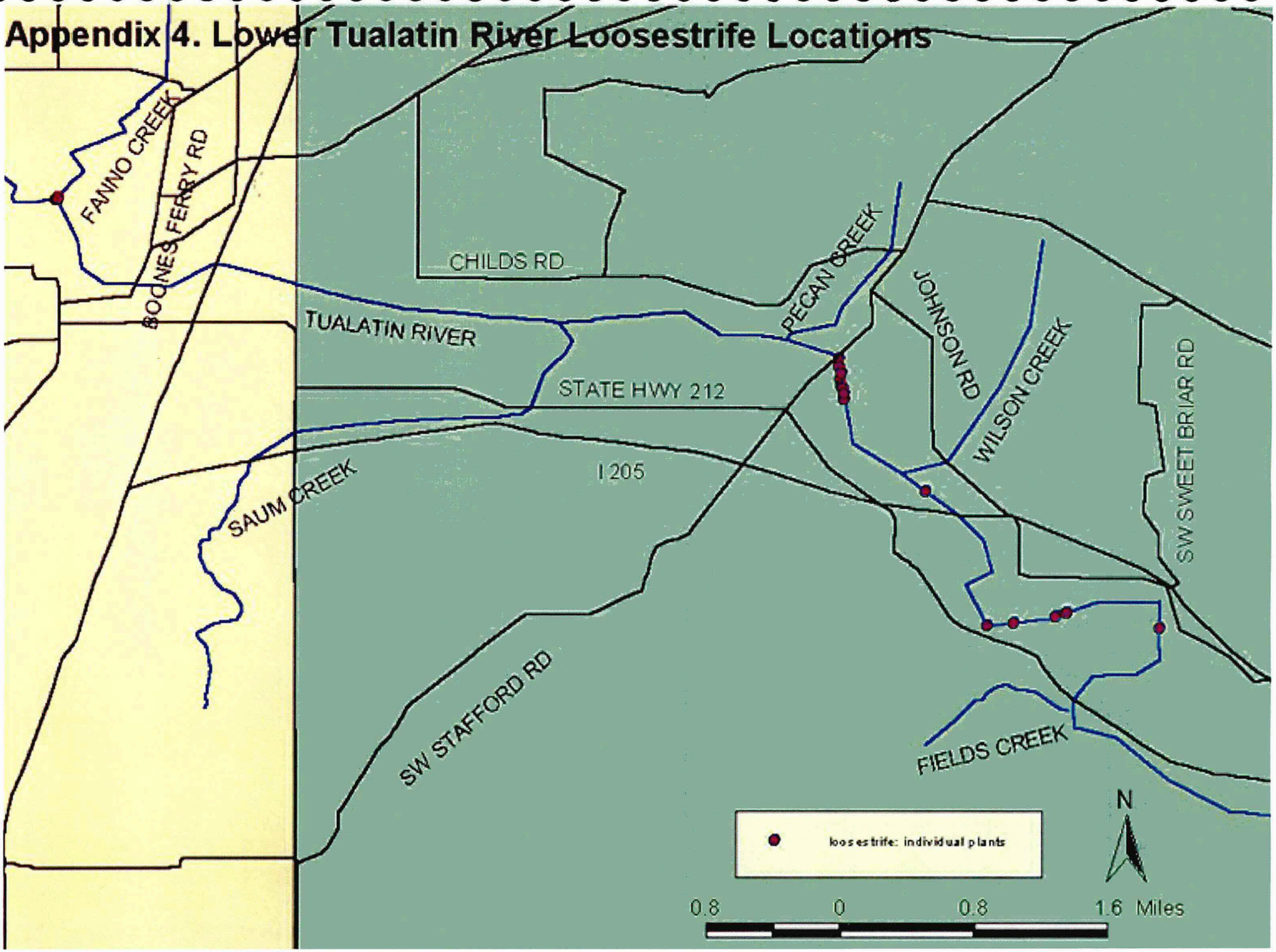
Appendix 2. Loosestrife In the Tualatin River Watershed

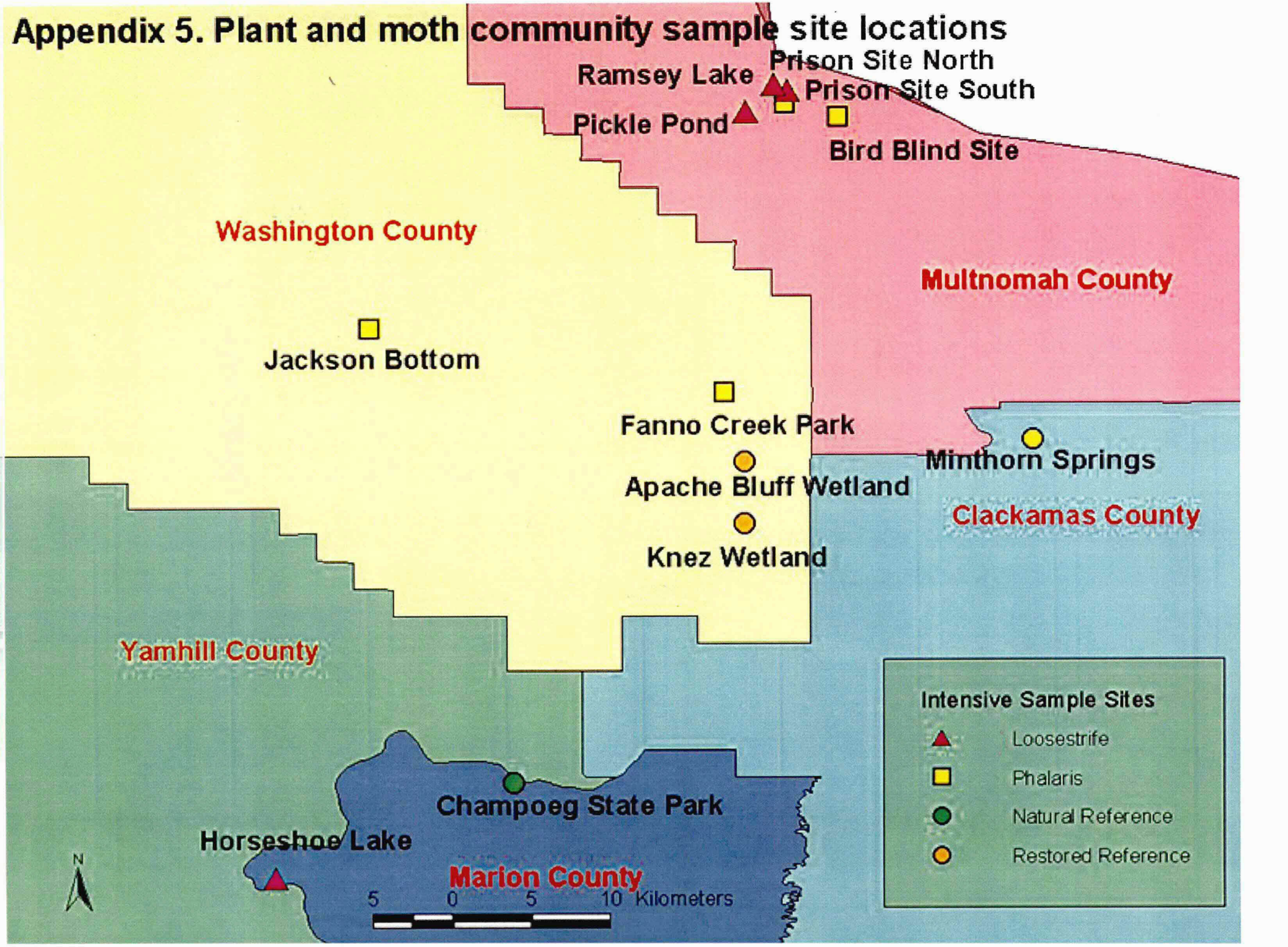


Appendix 3: Mid-River Tualatin Loosestrife Locations



Appendix 4. Lower Tualatin River Loosestrife Locations




Appendix 5. Plant and moth community sample site locations
Ramsey Lake
Prison Site North
Prison Site South
Pickle Pond
Bird Blind Site
Washington County
Multnomah County
Jackson Bottom
Fanno Creek Park
Minthorn Springs
Apache Bluff Wetland
Clackamas County
Knez Wetland
Yamhill County
Champoeg State Park
Horseshoe Lake
Marion County
N
5 0 5 10 Kilometers
Intensive Sample Sites
Loosestrife
Phalaris
Natural Reference
Restored Reference

Appendix 6. Plant Species

Plant Species	Descriptive Variables				Mean Percent Cover											
	Family	Guild	Native or Introduced	NWI status	Minthorn Springs	Knez Wetland	Apache Bluff	Champoeg State Park	S. Prison (Bybee)	Fanno Creek	Bird Blind (Smith)	Jackson Bottom	Horseshoe Lake	Pickle Pond	N. Prison (Bybee)	Ramsey Lake
Agropyron repens	Poaceae	grass	I	FACU			0.03									
Agrostis capillaris	Poaceae	grass	I	FAC				0.23								
Agrostis longiligula	Poaceae	grass	N	FAC			2.13							1.60		1.07
Aira caryophyllea	Poaceae	grass	I	NO			1.63									
Alisma triviale	Alismataceae	herbaceous	N	OBL								0.23				0.50
Alopecurus pratensis	Poaceae	grass	I	FACW		1.40	14.03	57.77						1.07		
Aster subspicatus	Asteraceae	herbaceous	N	FAC+		0.03										
Bellis perennis	Asteraceae	herbaceous	I	NL		0.07										
Bromus sp.	Poaceae	grass	?	?				0.57								
Carex aquatilis	Cyperaceae	sedge	N	FACW							4.43					
Carex densa	Cyperaceae	sedge	N	FACW+	0.03	5.80		2.77								
Carex obnupta	Cyperaceae	sedge	N	OBL		8.67	4.67									
Carex ovalis	Cyperaceae	sedge	N	FAC			4.90									
Carex scoparia	Cyperaceae	sedge	N	NI		0.03		0.07								0.53
Carex sp.	Cyperaceae	sedge	?	?					1.93							
Carex stipata	Cyperaceae	sedge	N	NL		0.73										
Carex unilateralis	Cyperaceae	sedge	N	FACW		0.53	0.03	1.00								
Centaurium erythraeae	Gentianaceae	herbaceous	I	FAC-			0.17	0.37								
Ceratophyllum demersum	Ceratophyllaceae	herbaceous	N	OBL									2.63			
Cirsium arvense	Asteraceae	herbaceous	I	FACU+	0.57	1.60					1.23				0.40	
Cirsium vulgare	Asteraceae	herbaceous	I	FACU	1.40				0.10						0.73	0.57
Conium maculatum	Apiaceae	herbaceous	I	FAC+									3.33			
Convolvulus arvensis	Convulvulaceae	herbaceous	I	NL			0.07									
Cornus servicea	Cornaceae	hardwood	N	FACW	3.27		0.07									0.27
Crategus douglasii	Rosaceae	hardwood	N	FAC			0.57				0.90					
Crategus monogyna	Rosaceae	hardwood	I	FACU+			3.73	1.27		0.07						
Daucus carota	Apiaceae	herbaceous	I	FAC+			1.53	0.87						0.30		
Deschampsia cespitosa	Poaceae	grass	N	FACW		26.20										
Dipsacus sylvestris	Dipsaceceae	herbaceous	I	FAC	3.33											
Eleocharis ovata	Cyperaceae	sedge	N	OBL	0.33									0.10		
Eleocharis palustris	Cyperaceae	sedge	N	OBL											8.20	11.97
Epilobium angustifolium	Onagranaceae	herbaceous	N	FACU+			2.97				0.13					0.87
Epilobium watsonii	Onagranaceae	herbaceous	N	FACW-	0.53			0.27						0.07	0.53	
Equisetum arvense	Equisetaceae	herbaceous	N	FAC	0.17									3.30		
Equisetum hymale	Equisetaceae	herbaceous	N	FACW											0.03	
Festuca arundinaceae	Poaceae	grass	I	FACU-				0.43								
Fraxinus latifolia	Oleaceae	hardwood	N	FACW	0.53					2.67	0.23					
Galium trifidum	Rubiaceae	herbaceous	N	FACU	0.27	0.07		3.53	0.27		0.10					
Geranium dissectum	Geraniaceae	herbaceous	I	NL				0.17								
Gnaphalium uliginosum	Asteraceae	herbaceous	I	FAC+	0.20	0.37										
Holcus lanatus	Poaceae	grass	I	FAC	0.47	3.67	3.47	2.10								
Hypericum perforatum	Hypericaceae	herbaceous	I	NL											0.50	
Hypochaeris radicata	Asteraceae	herbaceous	N	FACU			34.80									
Juncus acuminatus	Juncaceae	rush	N	OBL												2.10
Juncus articulatus	Juncaceae	rush	N	OBL										23.93	3.50	
Juncus effusus	Juncaceae	rush	N	FACW	20.10	0.33		0.30						0.67	3.03	1.80
Juncus ensifolius	Juncaceae	rush	N	FACW				1.47						5.50		
Juncus sp.	Juncaceae	rush	?	?			1.47									
Juncus tenuis	Juncaceae	rush	N	FACW-		4.13										
Lathyrus angulatus	Fabaceae	herbaceous	I	NL	0.70		0.03	0.90	3.93							
Lemna minor	Lemnaceae	herbaceous	N	OBL	0.17	0.03										
Leucanthemum vulgare	Asteraceae	herbaceous	I	NL			0.10								0.27	
Lotus micranthus	Fabaceae	herbaceous	N	NL										0.03	0.13	2.30
Lotus purshiana	Fabaceae	herbaceous	N	NL			0.03									
Lotus uliginosus	Fabaceae	herbaceous	I	FAC		0.87	1.43				2.53				0.90	
Ludwigia palustris	Onagranaceae	herbaceous	I	OBL									1.50	0.60	12.43	12.73
Lupinus polyphyllus	Fabaceae	herbaceous	N	FAC+			8.27									2.83
Lycopus uniflorus	Lamiaceae	herbaceous	N	OBL										0.17		0.43
Lythrum salicaria	Lythraceae	herbaceous	I	OBL									26.00	28.57	17.73	16.33
Melilotus alba	Fabaceae	hardwood	I	FACU								2.00			6.13	
Myosotis laxa	Boraginaceae	herbaceous	N	OBL		7.47		0.67								
Nemophila parviflora	Saxifragaceae	herbaceous	N	OBL				0.33							0.83	
Nuphar polysepalum	Nymphaeaceae	herbaceous	N	OBL									15.33			

Appendix 6. Plant Species (continued)

Plant Species	Descriptive Variables				Mean Percent Cover											
	Family	Guild	Native or Introduced	NWI status	Minthorn Springs	Knez Wetland	Apache Bluff	Champoeg State Park	S. Prison (Bybee)	Fanno Creek	Bird Blind (Smith)	Jackson Bottom	Horseshoe Lake	Pickle Pond	N. Prison (Bybee)	Ramsey Lake
Parentuccellia viscosa	Scrophulariaceae	herbaceous	I	FAC-			0.73							0.17	0.57	1.13
Phalaris arundinaceae	Poaceae	grass	I	FACW	6.43	8.17			80.80	80.93	76.77	56.73		5.07	8.03	13.00
Plantago lanceolata	Plantaginaceae	herbaceous	I	FAC			0.93	0.07						0.73		
Poa sp.	Poaceae	grass	?	?			1.63									
Polygonum hydropiperoides	Polygonaceae	herbaceous	N	OBL								2.17	3.17			
Polygonum persicaria	Polygonaceae	herbaceous	N	FACW								1.33				
Populus balsamifera	Salicaceae	hardwood	N	FAC			3.50		1.00		0.03			6.87		4.00
Potamogeton crispus	Potamogetonaceae	herbaceous	I	OBL									3.07			
Prunella vulgaris	Lamiaceae	herbaceous	I	FACU+			1.73									
Quercus garryana	Fagaceae	hardwood	N	NOL				7.20								
Ranunculus repens	Ranunculaceae	herbaceous	I	FACW	2.53		3.43									
Rosa pisocarpa	Rosaceae	hardwood	N	FAC		0.50									1.33	
Rubus discolor	Rosaceae	hardwood	I	FACU-			1.53	1.90	0.67		0.10			10.30	11.57	
Rubus laciniatus	Rosaceae	hardwood	I	FACU+				0.90								
Rubus ursinus	Rosaceae	hardwood	N	FACU				0.40								1.93
Rumex crispus	Polygonaceae	herbaceous	I	FACW		0.17										
Sagittaria latifolia	Alismataceae	herbaceous	N	OBL												0.43
Salix lucida var. lasiandra	Salicaceae	hardwood	N	FACW+	1.90						0.30			1.23	6.97	6.00
Salix scouleriana	Salicaceae	hardwood	N	FACW												1.93
Salix sessilifolia	Salicaceae	hardwood	N	FACW	8.00											1.50
Sambucus racemosa	Caprifoliaceae	hardwood	N	FACU	1.27											
Scirpus microcarpus	Cyperaceae	sedge	N	OBL	6.20									1.70		1.20
Senecio jacobea	Asteraceae	herbaceous	I	NL										0.07		
Setaria viridis	Poaceae	grass	I	NL											0.10	
Solanum dulcamara	Solanaceae	herbaceous	I	FAC	4.33					1.63						
Solidago canadensis	Asteraceae	herbaceous	N	FACU										1.23		1.77
Spirea douglasii	Rosaceae	hardwood	N	FACW	8.73		3.17									
Symphoricarpos albus	Caprifoliaceae	hardwood	N	FACU				4.23								
Tanacetum vulgare	Asteraceae	herbaceous	I	NL										1.80	0.40	
Trifolium incarnatum	Fabaceae	herbaceous	I	NL			2.40									
Trifolium repens	Fabaceae	herbaceous	I	FACU+			4.07									
Typha latifolia	Typhaceae	herbaceous	N	OBL										2.03		2.30
Vaccinium uliginosum	Ericaceae	hardwood	N	FACW+				0.40								
Veronica americana	Scrophulariaceae	herbaceous	N	OBL	14.73											
Vicia tetrasperma	Fabaceae	herbaceous	I	NL	0.23	0.30		10.70								

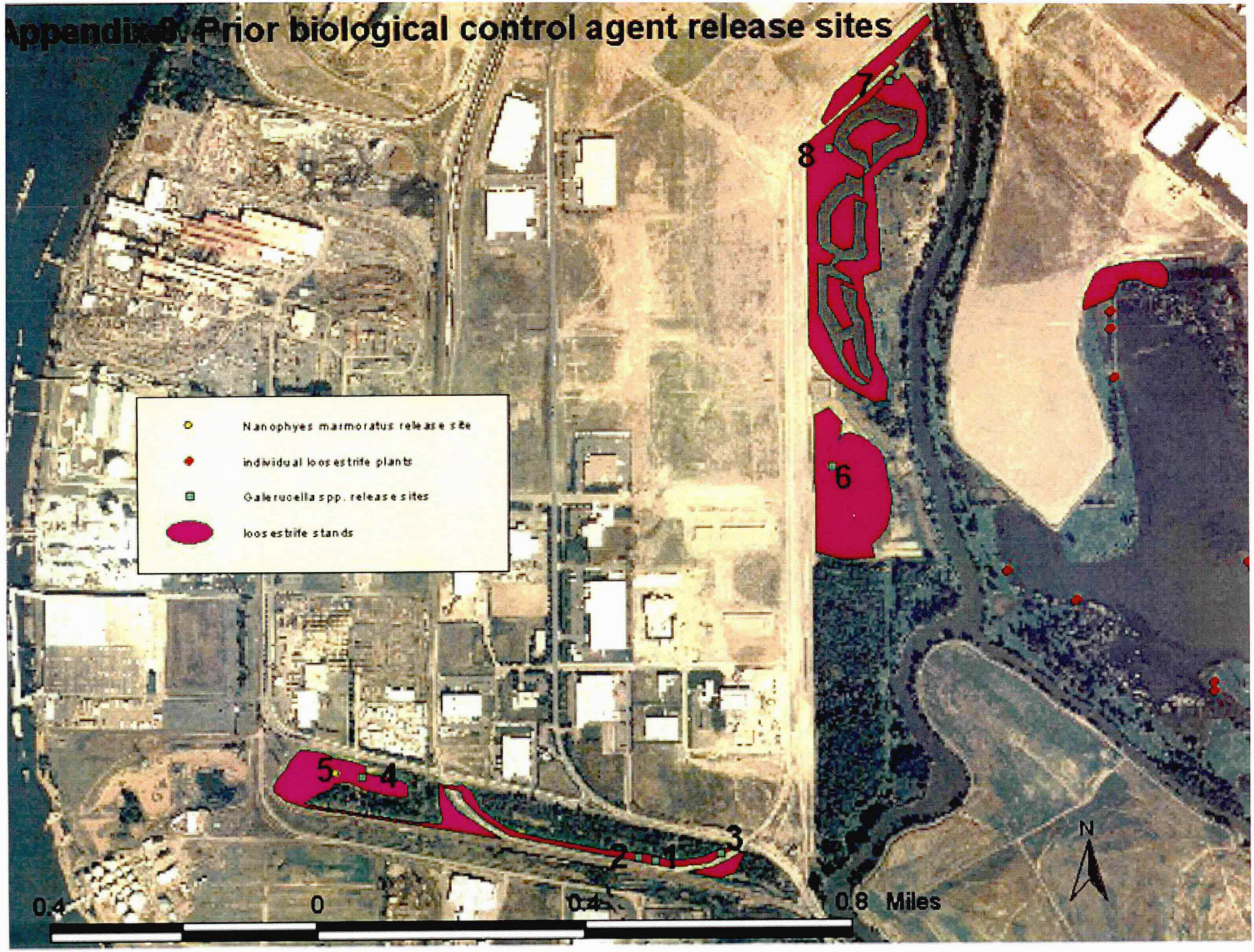
Appendix 7: Moth species

Moth Species	Descriptive Variables			Total Moths Collected											
	Family	Host Plant Association	Native or Introduced	Minthorn Springs	Knez Wetland	Apache Bluff	Champoeg State Park	S. Prison (Bybee)	Fanno Creek	Bird Blind (Smith)	Jackson Bottom	Horseshoe Lake	Pickle Pond	N. Prison (Bybee)	Ramsey Lake
Acronicta marmorata	Noctuidae	hardwood-Quercus	N				1								
Adelphagrotis stellaris	Noctuidae	hardwood	N											2	
Agroperina dubitans	Noctuidae	grass	N		1		1		1						
Agrotis ipsilon	Noctuidae	herbaceous	N											3	2
Agrotis vancouverensis	Noctuidae	herbaceous	N				3								
Aletia oxygala	Noctuidae	grass	N		5	2	8		10	3	4	22	2	14	18
Amphipyra pyramidoides	Noctuidae	grass	N											1	
Apamea amputatrix	Noctuidae	grass	N			1	6								
Apamea castanea	Noctuidae	grass	N				1							1	
Apamea ophiogramma	Noctuidae	hardwood	I	1				1							
Archanara oblonga	Noctuidae	Typha spp.	N												1
Arctia caja	Arctiidae	herbaceous	N				3								
Aseptis adnixa	Noctuidae	hardwood-Oemleria	N				1								
Autographa californica	Noctuidae	herbaceous-Fabaceae	N				1								
Brachylomia algens	Noctuidae	hardwood-Salix	N									1			
Cabera erythemaria	Geometridae	hardwood-Salix	N				1			1			4	3	3
Caenurgina erechtea	Noctuidae	herbaceous-Fabaceae	N			1	2	2		5	1		3		2
Caradrina morpheus	Noctuidae	herbaceous-Fabaceae	I				1		1						
Choristoneura rosaceana	Tortricidae	hardwood	N										1	4	
Chrysoteuchia topiaria	Pyralidae	grass	N		7	2	9	1	7	1		1	1	1	
Cisseps fulvicollis	Arctiidae	grass	N	1	4					1					1
Clostera apicalis	Notodontidae	hardwood-Salix	N											3	
Cosmia calami	Noctuidae	hardwood-Quercus	N				33								
Crambus leachellus	Pyralidae	grass	N					1					13	5	7
Crambus pascuellus	Pyralidae	grass	N		1	1			1		2				
Crambus plumbifimbriellus	Pyralidae	grass	N		4	2			1						
Crymodes devastator	Noctuidae	grass	N	3	1	5	47		3		8	155	14	4	2
Dargida procincta	Noctuidae	grass	N											1	
Diarsia rosaria	Noctuidae	grass	N	1	1		4		1		1	8		3	
Ethmia marmorea	Oecophoridae	?	N				1								
Euchromius ocellus	Pyralidae	?	N		4	5	22	6	2	3		55	3	4	5
Eulithis xylina	Geometridae	hardwood	N				1								
Eupithecia columbiata	Geometridae	hardwood	N	1	1				1				1		
Eupithecia misturata	Geometridae	hardwood	N				1								
Eupithecia sp.	Geometridae	?	N	1										1	
Evergestis pallidata	Pyralidae	herbaceous-Brassicaceae	N											1	
Feltia herilis	Noctuidae	herbaceous	N												1
Feltia jaculifera	Noctuidae	herbaceous	N				1	1		2			3	5	2
Furcula scolopendrina	Notodontidae	hardwood-Salix	N		1							1			
Helotropha reniformis	Noctuidae	sedge	N	3	2	1			1		4	1	9	8	8
Hemeroplanis finitima	Noctuidae	?	N	1	1										
Herpetogramma pertextalis	Pyralidae	?	N			1	1					2			
Hyles lineata	Sphingidae	herbaceous-Onagraceae	N											1	
Hyphantria cunea	Arctiidae	hardwood	N					1						1	
Idia aemula	Noctuidae	lichen	N										1		
Idia americalis	Noctuidae	lichen	N				1			1			1		
Lacinipolia stricta	Noctuidae	herbaceous	N										1		1
Leucania farcta	Noctuidae	grass	N				3								
Lithacodia albidula	Noctuidae	grass	N			1	4	2	3	2	12			5	9
Luperina venosa	Noctuidae	?	N								1				
Malacosoma californicum	Lasiocampidae	hardwood	N	1	1	3			1	1	12	2	1	10	6
Malacosoma disstria	Lasiocampidae	hardwood	N				1				9	47			
Melipotis jucunda	Noctuidae	hardwood-Salix	N												1
Nematocampa resistaria	Geometridae	hardwood-Salix	N									10		1	1
Nemoria darwiniata	Geometridae	hardwood	N											1	
Neoalcis californiaria	Geometridae	hardwood	N											1	
Noctua comes	Noctuidae	herbaceous	I			2							1	1	

Appendix 7: Moth species (continued)

Moth Species	Descriptive Variables			Total Moths Collected											
	Family	Host Plant Association	Native or Introduced	Minthorn Springs	Knez Wetland	Apache Bluff	Champoeg State Park	S. Prison (Bybee)	Fanno Creek	Bird Blind (Smith)	Jackson Bottom	Horseshoe Lake	Pickle Pond	N. Prison (Bybee)	Ramsey Lake
Ochropleura plecta	Noctuidae	hardwood-Salix	N	1								1	1	7	1
Oligo tonsa	Noctuidae	?	N				1								
Oligia indirecta	Noctuidae	rush	N				2								
Ostrinia penitalis	Pyralidae	herbaceous-Nymphaeaceae	N					4		7				7	2
Palthis angulalis	Noctuidae	hardwood	N									1			
Paonias excaecatus	Sphingidae	hardwood	N			1									
Pediasia trisecta	Pyralidae	grass	N							1			2	1	1
Pero mizon	Geometridae	hardwood	N				2								
Petrophilia cunfusalis	Pyralidae	algae	N				4					17	1		
Phyllodesma americana	Lasiocampidae	hardwood	N				6								
Plusia nicholiae	Noctuidae	rush	N									1		1	
Prionoxystus robiniae	Cossidae	hardwood	N				1						1		
Protitame matilda	Geometridae	hardwood-Salix	N				2					1			
Proxenus miranda	Noctuidae	herbaceous-Fabaceae	N				1				1		2		
Pyralid spp.	Pyralidae	?	N			1									
Pyrrharctia isabella	Arctiidae	herbaceous	N				5							1	
Rhynchagrotis exertistigma	Noctuidae	herbaceous	N				1				1				
Semiothisa neptaria	Geometridae	hardwood-Salix	N							1			2	23	5
Sicya crocearia	Geometridae	hardwood	N				1			1					
Sicya morsicaria	Geometridae	hardwood-Quercus, mistletoe	N				3								
Smerinthus cerisyi	Sphingidae	hardwood-Salix	N								1			3	1
Spilosoma virginica	Arctiidae	herbaceous	N	7			1	1	1	1	1	2	3	4	1
Tortricid spp.	Tortricidae	?	N			2									
Tyria jacobea	Arctiidae	herbaceous-Senecio	I				1		1						
Udea ltysalis	Pyralidae	herbaceous	N					4		4				17	2
Unknown Geometrid #1	Geometridae	?	I?	1		1	7					1		1	
Xanthorhoe defensaria	Geometridae	hardwood	N	2									1	3	1
Xestia dolosa	Noctuidae	herbaceous	N										1	1	
Xestia xanthographa	Noctuidae	grass	I	5	3	8	11	2	2				5		1

Appendix 8. Prior biological control agent release sites



PLACE STAMP HERE

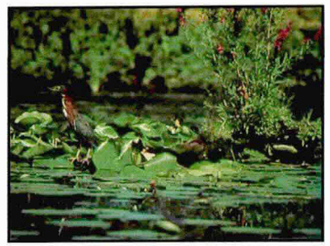
NOXIOUS WEED CONTROL PROGRAM
Oregon Department of Agriculture
635 Capitol Street, N.E.
Salem, OR 97310-0110

PURPLE LOOSESTRIFE, A WEED FROM EUROPE, IS INVADING OUR STATE...

WHAT IS THE PROBLEM?

Purple loosestrife is an aggressive invader of wetland sites. Its ability to develop pure stands can affect fish and wildlife, native plants, agriculture, public recreation and wetland resources.

Native Plants, Fish and Wildlife



- Seeds are not eaten by native songbirds.
- Plants eliminate food sources for aquatic fur-bearers.
- Waterfowl, especially ducks, avoid using loosestrife invaded wetlands.
- Wildlife habitat diversity is decreased.
- Wetland-dependent threatened, rare or endangered species can be eliminated by loosestrife.

Agriculture

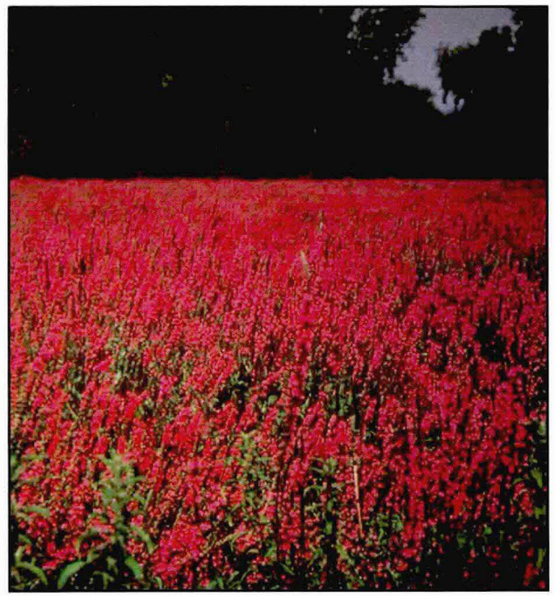
- Loosestrife clogs irrigation and drainage canals.
- Loosestrife invades wet areas in cultivated fields.
- Production costs for agricultural products are increased through higher weed control costs.

Public Recreation

- Waterfowl hunting is affected by habitat loss.
- Fishing access is eliminated by the dense tangle of vegetation.
- Open waterways for canoeing and swimming become too clogged to use.

WHAT IS OREGON DOING?

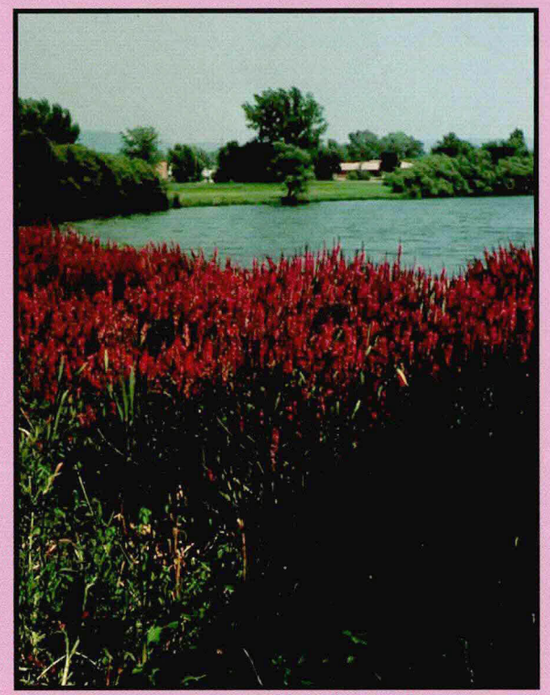
- Collecting information on the amount and distribution of purple loosestrife.
- Supporting further research on the use of insects for biological control.
- Monitoring the effects of biological control insects released against purple loosestrife.
- Prohibiting the importation, sale and distribution of purple loosestrife and its horticultural varieties.



This pamphlet was developed by the following cooperators:

- Oregon State University
- Oregon Department of Agriculture
- Oregon Division of State Lands
- Yamhill County Soil and Water Conservation District
- Northwest Resource Conservation and Development.

PURPLE LOOSESTRIFE, A WEED FROM EUROPE, IS INVADING OUR STATE...



PLEASE HELP STOP THE SPREAD!

WHAT IS PURPLE LOOSESTRIFE?

What Purple Loosestrife looks like:

- Upright perennial plant
- Grows up to 10 feet tall
- Has a spike of pink to purple flowers, 5-7 petals each closely attached to a square or angular stem
- Leaves usually opposite, elongated with smooth edges attached directly to the stem
- Has a woody tap root and small roots forming a thick dense mat

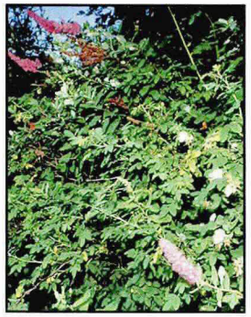
Where to look for Purple Loosestrife:

- Most easily seen when blooming from mid-June through mid-September
- Damp soils or shallow standing water
- Rivers, streams, irrigation canals, drainage ditches
- Lake shores, wet meadows, marshes

How Purple Loosestrife spreads:

- Seeds (up to 3 million per plant annually) which can last several years in the soil
- Seeds transported on waterways
- Sprouts from broken plant parts and underground roots

Purple Loosestrife is not...

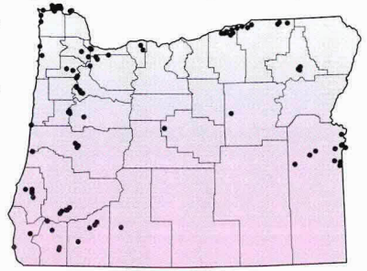


Douglas spiraea

Fireweed

Purple Loosestrife invades Oregon!

Purple loosestrife is a wetland plant that is gaining a foothold in Oregon. It was brought to the US from Europe as an ornamental plant in the early 1800s, escaped to the wild and spread throughout the northeast and midwest. It is now a serious problem in the west and has been found in 25 of 36 counties in Oregon.



WHAT CAN YOU DO?

- **Complete the report form.** This information will help focus control efforts.

- Discourage any and all new plantings. Do not plant horticultural varieties that are known by these names:

Rose Queen	*Columbia Pink*	*Fire Candle*
Morden Pink	*Dropmore Purple*	*The Rocket*
Morden Rose	*Lady Sackville*	*Robert's*
Brightness	*The Beacon*	*Mr. Robert's*
Purple Spire	*Atropurpureum*	

- Talk to nursery owners and friends about the problems with purple loosestrife.

- STOP THE SPREAD!

  Join volunteer programs for eradication.
  Support biological control efforts.
  Try these control efforts on your own populations:

  - Pull new plants, taking as much of the rootstock as possible.
  - Mow to prevent seed set; repeated mowing will weaken the plants.
  - Burn to remove canopy of old plants.
  - **For chemical control information, contact your county OSU Extension Service Office or the Oregon Department of Agriculture Noxious Weed Control Office.**

For more information see the PNW Extension publication on purple loosestrife (PNW380) available from OSU Extension Offices.

PURPLE LOOSESTRIFE REPORT FORM

Name _____

Address _____

City _____ State _____ Zip _____

( ) _____

Phone

Location of purple loosestrife site

County: _____

Township: _____ Range: _____

Section: _____ Quarter: _____

Nearest road or intersection: _____

Nearest town: _____

Please include map, if possible. ❒

Survey Dates

Date visited: _____

Was site previously reported by you? ❒ yes ❒ no

If yes, please specify date: _____
month day year

Type of Area

❒ Marsh/wetland ❒ River
❒ Meadow/pasture ❒ Stream/creek
❒ Pond/lake ❒ Garden
❒ Drainage ditch ❒ Irrigation canal
❒ Roadside ❒ Other: _____

Number of Plants

❒ 1 - 10 ❒ 30 - 100 ❒ more than 1,000
❒ 10 - 30 ❒ 100 - 1,000

Estimated area of infestation ft² (m²) or acres (ha):

_____

* Please complete one form for each patch of purple loosestrife, add postcard postage, and mail it to the address on the reverse side.

For more information call:

ODA Weed Control Program (~~503~~) 378-4987 541
OSU Dept. of Entomology (~~503~~) 737-5534 541

nd

News/Downtown office 503-221-8199
Fax 503-294-5023
News Neighborhood Bureau 503-294-5902
Fax 503-493-1202
E-mail ..... portland@news.oregonian.com
Newspaper delivery 503-221-8240
Classified ads 503-221-8000
On the web ..... www.oregonlive.com/news/oregonian/local.ssf

Bugs munch way through killer weed

The leaf bugs love to make a meal of purple loosestrife, an out-of-town invader that threatens wetlands

By JOE FITZGIBBON
SPECIAL TO THE OREGONIAN

A quiet war between tiny leaf beetles and a noxious weed in North Portland could determine the future of thousands of acres of wetlands throughout Oregon.

Over the past dozen years, purple loosestrife has spread unchecked into nearly every county in Oregon. The brightly flowering weed produces about 2.5 million seeds on a single stalk and is crowding out native vegetation and wildlife habitats. "It's hard, frustrating work trying to dig it up," said Troy Clark, president of Friends of Smith and Bybee Lakes. "Every time I go out hiking or canoeing, I find twice as many patches as I saw the last time."

Two entomologists from Oregon State University are bringing in winged help in the form of thumbnail-sized leaf beetles that love to feast on the pink and purple flowers.

"When we saw how they controlled the spread of loosestrife in the Midwest and East, we wanted see how they'd do in our climate," said Peter McEvoy, an insect expert from the university. "We've been looking at photographs of before and after and, so far, it's very promising.

In 1992, McEvoy released a handful of the hungry bugs, both *Galerucella pusilla* and *Galerucella calmariensis*, on several test sites, including wetlands in the Rivergate area in North Portland. To his delight, the beetles attacked the flowers before they could seed. As the insects reproduced, they hopped onto nearby loosestrife and continued the feast.

In fact, the experiment was so promising that last year, McEvoy's assistant and fellow researcher, Shon Schooler, received a $61,000 grant to expand the study area. They released thousands of insects throughout that area's wetlands and along creek beds.

"They're really effective because they eat the young flowers and prevent the plant from reproducing," said Schooler, as he studied a small field of dead and dying plants near Pickle Pond, just off of North Lombard Street. "Since they're host-specific, they have no interest in other plants and their own life cycle is dependent on the number of loosestrife plants."

MICHAEL LLOYD/THE OREGONIAN

Shon Schooler, a researcher for Oregon State University, studies stalks of purple loosestrife, an invasive plant that is causing problems near Smith and Bybee Lakes in North Portland. Schooler is involved in studies to eradicate the plant by attacking it with a beetle.

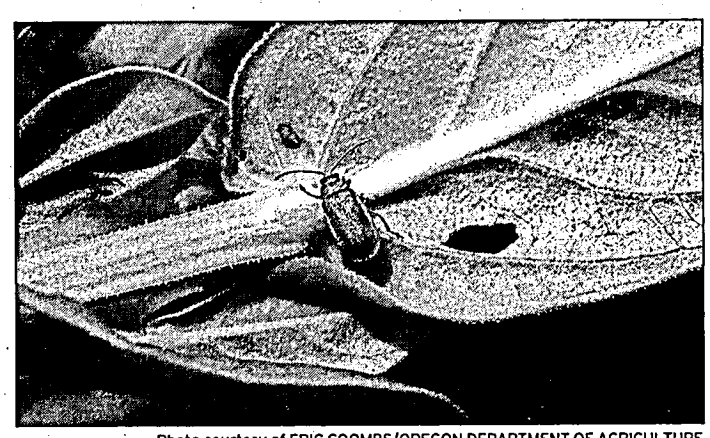


Photo courtesy of ERIC COOMBS/OREGON DEPARTMENT OF AGRICULTURE

Galerucella calmariensis, which loves to lunch on purple loosestrife, is playing a key role in efforts to destroy the invasive plant. Here, one of the beetles goes to work on a plant in the Rivergate area.

It's worked in other counties

Similar experiments proved successful in Marion, Malheur, Morrow and Umatilla counties.

Bruce Sutherland, administrator with the Lower Columbia River Estuary Program, said his agency contributed $10,000 of the study grant because the beetles offered an environmentally friendly solution to the weed problem.

"We wanted to support a biological approach," Sutherland said. "If it works, as it seems to be, we'd like to see it tried in places like the islands in the Columbia River where the loosestrife is taking over."

Purple loosestrife is a perennial plant native to Europe and was brought to the United States more than 150 years ago. It blooms in summer months and germinates in nearly any kind of damp soil.

Over the years, the plant was carried westward and into Oregon by travelers, birds and wind.

The willowy plants are flourishing in the state, growing in thick clumps to heights of 10 feet or more. Despite the bell-shaped flowers, bees and most insects avoid contact with it. And, like Himalayan blackberry and canary grass, purple loosestrife has no natural enemies.

Once popular for landscaping yards, it is now banned by the state, both for sale and transplanting.

"We kept hearing from people who'd say that they had seen it all around the area," said Jay Mower, director of the Columbia Slough Watershed Council. "So we summoned a purple loosestrife summit and decided to give our backing to Shon and Peter's work."

Weevils on the way

This fall, the Oregon State scientists will widen their attack by introducing a German root weevil that destroys the loosestrife below the ground. The two men will also continue monitoring the success of the beetles and encourage agencies like the Oregon Department of Agriculture to adopt this nonchemical practice if results continue successfully.

Early results have made a believer out of Clark.

On a recent Sunday afternoon, he trekked along a stretch of the Burlington Northern railroad tracks, then jogged down an embankment to grab a handful of the lifeless weeds. "Look how those bugs are doing their jobs," he called out. "I'm not a fan of dead plants but these look pretty good to me."

WEEDING OUT A PROBLEM

Name: Purple loosestrife, or *Lythrum salicaria*
What they look like: Thick bushes, up to 10 feet high, with spiky stalks of pink and purple bell-shaped flowers.
Problem: Each plant produces 2.5 million seeds that can fill in wetlands and choke out natural wildlife habitats.
How treated: Tiny beetles, *Galerucella pusilla* and *Galerucella calmariensis*, feast on the flowers.
What to do if you find loosestrife on your property:
a) dig up all of the plant, grabbing as much of the root as possible;
b) mow to prevent the seeds from setting;
c) burn or send to the landfill, don't recycle or put in mulch pile;
d) call Oregon Department of Agriculture or local watershed council for assistance.
For information: ODA Weed Control Program, 503-378-4987, or OSU Department of Entomology, (503) 737-5534.

OREGON DEPARTMENT OF AGRICULTURE
BIOLOGICAL CONTROL AGENT RELEASE FORM

Target Weed Purple Loosestrife (Common name) Date 7 / 9 / 19 97 (MM DD YY)

Agent Galerucella calmariensis : G. pusilla (Scientific name) Number Released 100

County Multnomah T___ R___ Sec___ 1/4___ (Township N S, Range E W, Section)

Lat 45 37.865 .6310 (Latitude) Long 122 45.677 .7612 (Longitude) GPS Derived Yes___ No___

Land Owner: BLM___ USFS___ PRIVATE___ USFWS___ STATE___ OTHER X

Land Manager Portland Environmental Services METRO
(BLM District & Resource Area / National Forest & Ranger District / Refuge / ODOT / BPA / City / County / Rancher, etc.)

SITE NAME Storm Water run off Site at Rivergate / Ramsey Lake area
(Use geographical reference : mountain, river, valley, road, campground, powerline, etc.)

SITE DATA : CHECK ALL ITEMS THAT APPLY AND FILL IN BLANKS. (Draw map on back of form.)

Nearest Town Portland Road North Columbia Mile Post___

Weather: Clear___ Partly cloudy X Cloudy___ Temp 65°-70°F Wind 5 mph

Slope: None X Slight___ Moderate___ Steep___ Aspect: S___ E___ W___ N___

Soil: Sandy X Loam X Silt___ Gravel___ Clay___ Elevation___

Terrain: Valley___ Foothill___ Mountain___ Plain___ River X Lake/Pond X

Vegetation: Grassland___ Shrub land___ Crop land___ Riparian___ Conifer Forest___ Deciduous Forest___ Mixed Forest___ Other___

Plant Cover: (Estimate %) Target Weed___ Forbs (not including target)___ Grasses___ Shrubs___ Trees___ Litter___ Bare Ground___

Dominant Plant Species Blackberry

Land Use: Range___ Timber___ Wildlife___ Right of Way___ Pasture___ Crop___ Vacant___ Wetland X Recreation___ Mining___ Other___

Disturbance Factors: Grazing___ Logging___ Road___ Fire___ Flood___ Cultivation___ Construction X Other___

Infestation Type: Isolated___ Patchy X Linear___ Continuous___

Size of Infestation: (Acres) ≤1 X 2-10___ 11-50___ 51-99___ ≥100___

Target Weed Height: (ft.) <1___ 1-2 X 3-6___ ≥7___

Weed Density: (sq. yd.) 1 X 2-5___ 6-10___ 11-25___ 26-99___ ≥100___

Stage of Development: Seedling___ Rosette___ Bolting___ Budding X Flowering X (% Flower 50) Seeding___ Dormant___

Other Bioagents Present (List) No

Source of Agents Baskett Slough Date Collected 7/8/97

Stage Released: Egg___ Larva___ Pupa___ Adult X (In Plant Material)___

Cooperators Portland Environmental Services

Reported by Tom Forney

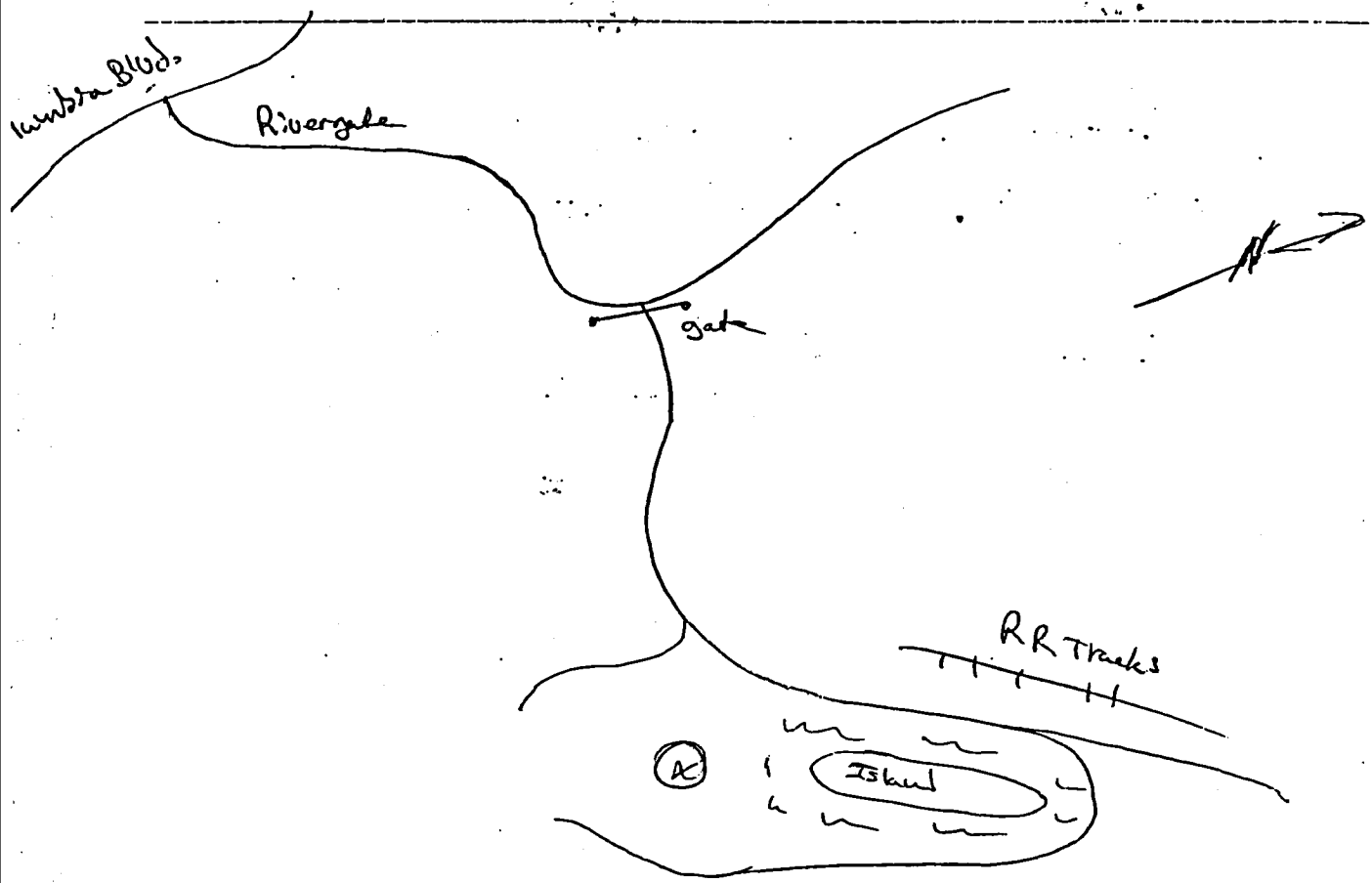
Office Data Base Record Number___ (D)

SHoppSchooler

Directions to release site: Rivergate

(From nearest town)

Please draw or attach a map to the release site: Indicate the release site with an 'X' in a circle. Indicate North with an arrow. Label roads and features.



Remarks: (Condition of insects, breeding or egg laying observed, predators, etc.)

USDA - APHIS / ARS Release Rec. No. (If applicable) _____

RETURN ORIGINAL FORM TO: WEED CONTROL, 635 CAPITOL ST. NE , SALEM, OR 97310

Retain a copy for your records. If you have any questions, call 503-986-4621.

ODA BCRF-5/17/95

OREGON DEPARTMENT OF AGRICULTURE
BIOLOGICAL CONTROL AGENT RELEASE FORM

Target Weed Purple Loosestrife (Common name) Date 7 / 9 19 ~~98~~ 97 (MM / DD / YY)

Agent ~~Hylobius transversovittatus~~ Galerucella spp. (Scientific name) Number Released 2 releases 250 ea 500 ✓

County Multnomah T 2N (Township N S) R 1W (Range E W) Sec 25 (Section) 1/4 _____

Lat 45.6229 (Latitude) Long 122.7658 (Longitude) GPS Derived Yes ___ No X

Land Owner: BLM ___ USFS ___ PRIVATE ___ USFWS ___ STATE ___ OTHER _____

Land Manager Portland Bureau of Environmental Services
(BLM District & Resource Area / National Forest & Ranger District / Refuge / ODOT / BPA / City / County / Rancher, etc.)

SITE NAME Ramsey Lake
(Use geographical reference : mountain, river, valley, road, campground, powerline, etc.)

SITE DATA : CHECK ALL ITEMS THAT APPLY AND FILL IN BLANKS. (Draw map on back of form.)

Nearest Town Portland Road North Columbia Blvd. Mile Post _____
Weather: Clear X Partly cloudy ___ Cloudy ___ Temp 80° Wind _____
Slope: None X Slight ___ Moderate ___ Steep ___ Aspect: S ___ E ___ W ___ N ___
Soil: Sandy X Loam X Silt ___ Gravel ___ Clay ___ Elevation _____
Terrain: Valley ___ Foothill ___ Mountain ___ Plain ___ River ___ Lake/Pond X
Vegetation: Grassland ___ Shrub land ___ Crop land ___ Riparian X Conifer Forest ___
Deciduous Forest ___ Mixed Forest ___ Other _____
Plant Cover: (Estimate %) Target Weed 10-20 Forbs (not including target) 10
Grasses 25 Shrubs 20 Trees 20 Litter ___ Bare Ground 10

Dominant Plant Species Blackberry ; Reed canary grass
Land Use: Range ___ Timber ___ Wildlife X Right of Way ___ Pasture ___ Crop ___
Vacant ___ Wetland ___ Recreation ___ Mining ___ Other Water Containment
Disturbance Factors: Grazing ___ Logging ___ Road ___ Fire ___ Flood X Cultivation ___
Construction ___ Other _____
Infestation Type: Isolated ___ Patchy X Linear ___ Continuous ___
Size of Infestation: (Acres) ≤1 X 2-10 ___ 11-50 ___ 51-99 ___ ≥100 ___
Target Weed Height: (ft.) <1 ___ 1-2 ___ 3-6 X ≥7 ___
Weed Density: (sq. yd.) 1 X 2-5 ___ 6-10 ___ 11-25 ___ 26-99 ___ ≥100 ___
Stage of Development: Seedling ___ Rosette ___ Bolting ___ Budding ___
Flowering X (% Flower 50) Seeding ___ Dormant ___

Other Bioagents Present (List) _____
Source of Agents Basket Slough Date Collected 7/9/98
Stage Released: Egg ___ Larva ___ Pupa ___ Adult X (In Plant Material) ___

Cooperators _____

Reported by Tom Forney

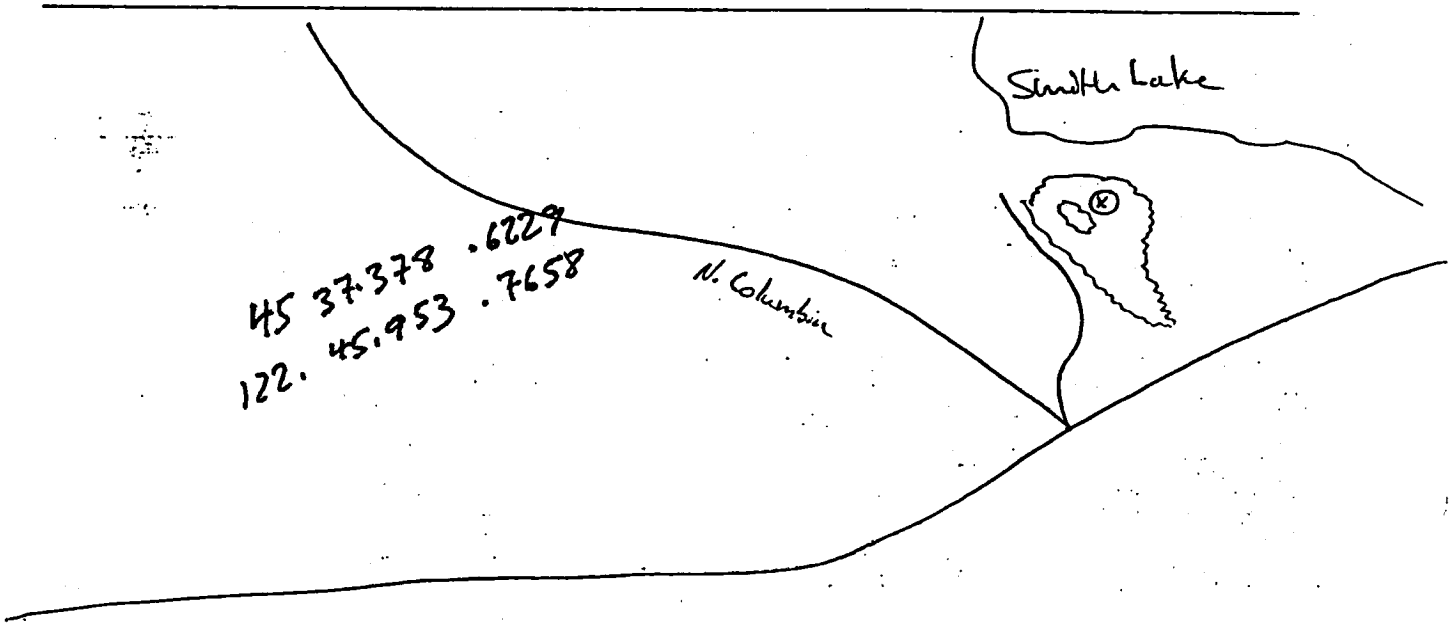
Office Data Base Record Number _____

(h)

Shon Schopp

Directions to release site: Off N. Columbia Blvd in The Port of Portland
(From nearest town)
Killingsworth area.

Please draw or attach a map to the release site: Indicate the release site with an 'X' in a circle. Indicate North with an arrow. Label roads and features.



Remarks: (Condition of insects, breeding or egg laying observed, predators, etc.)

USDA - APHIS / ARS Release Rec. No. (If applicable) _____

RETURN ORIGINAL FORM TO: WEED CONTROL, 635 CAPITOL ST. NE , SALEM, OR 97310

Retain a copy for your records. If you have any questions, call 503-986-4621.

ODA BCRF-5/17/95

OREGON DEPARTMENT OF AGRICULTURE
BIOLOGICAL CONTROL AGENT RELEASE FORM

Target Weed Purple Loosestrife (Common name) Date 7 / 16 / 1997 (MM DD YY)

Agent Galerucella pusilla (Scientific name) Number Released 2 Releases 200

County Multnomah T______ (Township N S) R______ (Range E W) Sec.______ 1/4______ (Section)

Lat 45 36.985 / 45 36.954 .6164 (Lattitude) Long 122 46.089 / 122 46.203 .7681 (Longitude) GPS Derived Yes X No____

Land Owner: BLM____ USFS____ PRIVATE ____ USFWS____ STATE____ OTHER ______

Land Manager BPA Rivergate Substation
(BLM District & Resource Area / National Forest & Ranger District / Refuge / ODOT / BPA / City / County / Rancher, etc.)

SITE NAME Rivergate Sub
(Use geographical reference : mountain, river, valley, road, campground, powerline, etc.)

SITE DATA : CHECK ALL ITEMS THAT APPLY AND FILL IN BLANKS. (Draw map on back of form.)

Nearest Town Portland Road N Columbia Mile Post______

Weather: Clear X Partly cloudy____ Cloudy____ Temp______ Wind______

Slope: None X Slight____ Moderate____ Steep____ Aspect: S____ E____ W____ N____

Soil: Sandy X Loam____ Silt____ Gravel____ Clay____ Elevation______

Terrain: Valley____ Foothill____ Mountain____ Plain____ River____ Lake/Pond X

Vegetation: Grassland____ Shrub land____ Crop land____ Riparian X Conifer Forest____ Deciduous Forest____ Mixed Forest____ Other______

Plant Cover: (Estimate %) Target Weed 75% Forbs (not including target)______ Grasses 10 Shrubs 10 Trees 5 Litter______ Bare Ground______

Dominant Plant Species Loosestrife

Land Use: Range____ Timber____ Wildlife____ Right of Way X Pasture____ Crop____ Vacant____ Wetland X Recreation____ Mining____ Other______

Disturbance Factors: Grazing____ Logging____ Road____ Fire____ Flood____ Cultivation____ Construction____ Other______

Infestation Type: Isolated X Patchy____ Linear____ Continuous____

Size of Infestation: (Acres) ≤1 X 2-10____ 11-50____ 51-99____ ≥100____

Target Weed Height: (ft.) <1____ 1-2____ 3-6 X ≥7____

Weed Density: (sq. yd.) 1____ 2-5 X 6-10____ 11-25____ 26-99____ ≥100____

Stage of Development: Seedling____ Rosette____ Bolting____ Budding____ Flowering X (% Flower 80%) Seeding____ Dormant____

Other Bioagents Present (List)______

Source of Agents Basket Slough Date Collected 7/15/97

Stage Released: Egg____ Larva____ Pupa____ Adult X (In Plant Material)____

Cooperators BPA : Port of Portland

Reported by Tom Forney

*Office Data Base Record Number*______ (1)

Shan Schooler

Directions to release site: _____

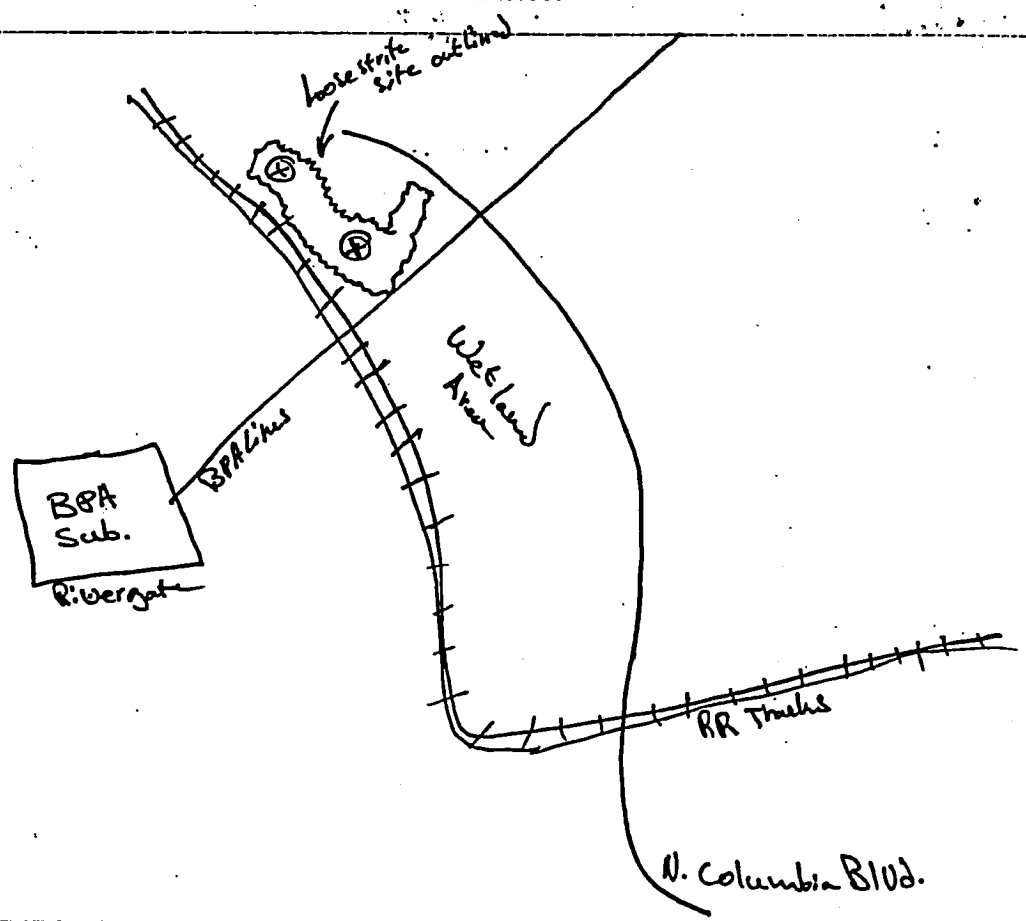
(From nearest town)

_____

_____

_____

Please draw or attach a map to the release site: Indicate the release site with an 'X' in a circle. Indicate North with an arrow. Label roads and features.



Remarks: (Condition of insects, breeding or egg laying observed, predators, etc.)

USDA - APHIS / ARS Release Rec. No. (If applicable) _____

RETURN ORIGINAL FORM TO: WEED CONTROL, 635 CAPITOL ST. NE , SALEM, OR 97310

Retain a copy for your records. If you have any questions, call 503-986-4621.

ODA BCRF-5/17/95

✓

OREGON DEPARTMENT OF AGRICULTURE
BIOLOGICAL CONTROL AGENT RELEASE FORM

Target Weed Purple Loosestrife (Common name) **Date** 7 / 16 / 19 97 (MM DD YY)

Agent Galerucella pusilla (Scientific name) **Number Released** 100

County Multnomah **T**____ (Township N S) **R**____ (Range E W) **Sec.**____ (Section) 1/4____

Lat 45° 37.883 .6313 (Lattitude) **Long** 122° 45.719 .7619 (Longitude) GPS Derived Yes X No___

Land Owner: BLM___ USFS___ PRIVATE___ USFWS___ STATE___ OTHER___

Land Manager METRO Portland Environmental Services
(BLM District & Resource Area / National Forest & Ranger District / Refuge / ODOT / BPA / City / County / Rancher, etc.)

SITE NAME Stormwater Containment Site / Ramsey Lake area
(Use geographical reference: mountain, river, valley, road, campground, powerline, etc.)

SITE DATA: CHECK ALL ITEMS THAT APPLY AND FILL IN BLANKS. (Draw map on back of form.)

Nearest Town Portland **Road** Off North Columbia **Mile Post**____

Weather: Clear X Partly cloudy___ Cloudy___ **Temp** 75°F **Wind** 5 MpH

Slope: None___ Slight___ Moderate___ Steep___ **Aspect:** S___ E___ W___ N___

Soil: Sandy X Loam___ Silt___ Gravel___ Clay___ **Elevation**____

Terrain: Valley___ Foothill___ Mountain___ Plain___ River___ Lake/Pond___

Vegetation: Grassland___ Shrub land___ Crop land___ Riparian X Conifer Forest___ Deciduous Forest___ Mixed Forest___ Other____

Plant Cover: (Estimate %) Target Weed 5-10% Forbs (not including target) 20% Grasses 60% Shrubs 10% Trees___ Litter___ Bare Ground___

Dominant Plant Species Reed Canarygrass

Land Use: Range___ Timber___ Wildlife___ Right of Way___ Pasture___ Crop___ Vacant___ Wetland X Recreation___ Mining___ Other____

Disturbance Factors: Grazing___ Logging___ Road___ Fire___ Flood___ Cultivation___ Construction X Other____

Infestation Type: Isolated X Patchy___ Linear___ Continuous___

Size of Infestation: (Acres) ≤1 X 2-10___ 11-50___ 51-99___ ≥100___

Target Weed Height: (ft.) <1___ 1-2___ 3-6 X ≥7___

Weed Density: (sq. yd.) 1 X 2-5___ 6-10___ 11-25___ 26-99___ ≥100___

Stage of Development: Seedling___ Rosette___ Bolting___ Budding___ Flowering X (% Flower 80) Seeding___ Dormant___

Other Bioagents Present (List)____

Source of Agents Basket Slough **Date Collected** 7/15/97

Stage Released: Egg___ Larva___ Pupa___ Adult X (In Plant Material)___

Cooperators____

Reported by Tom Forney

*Office Data Base Record Number*____

Sh6op

Directions to release site: _____

(From nearest town)

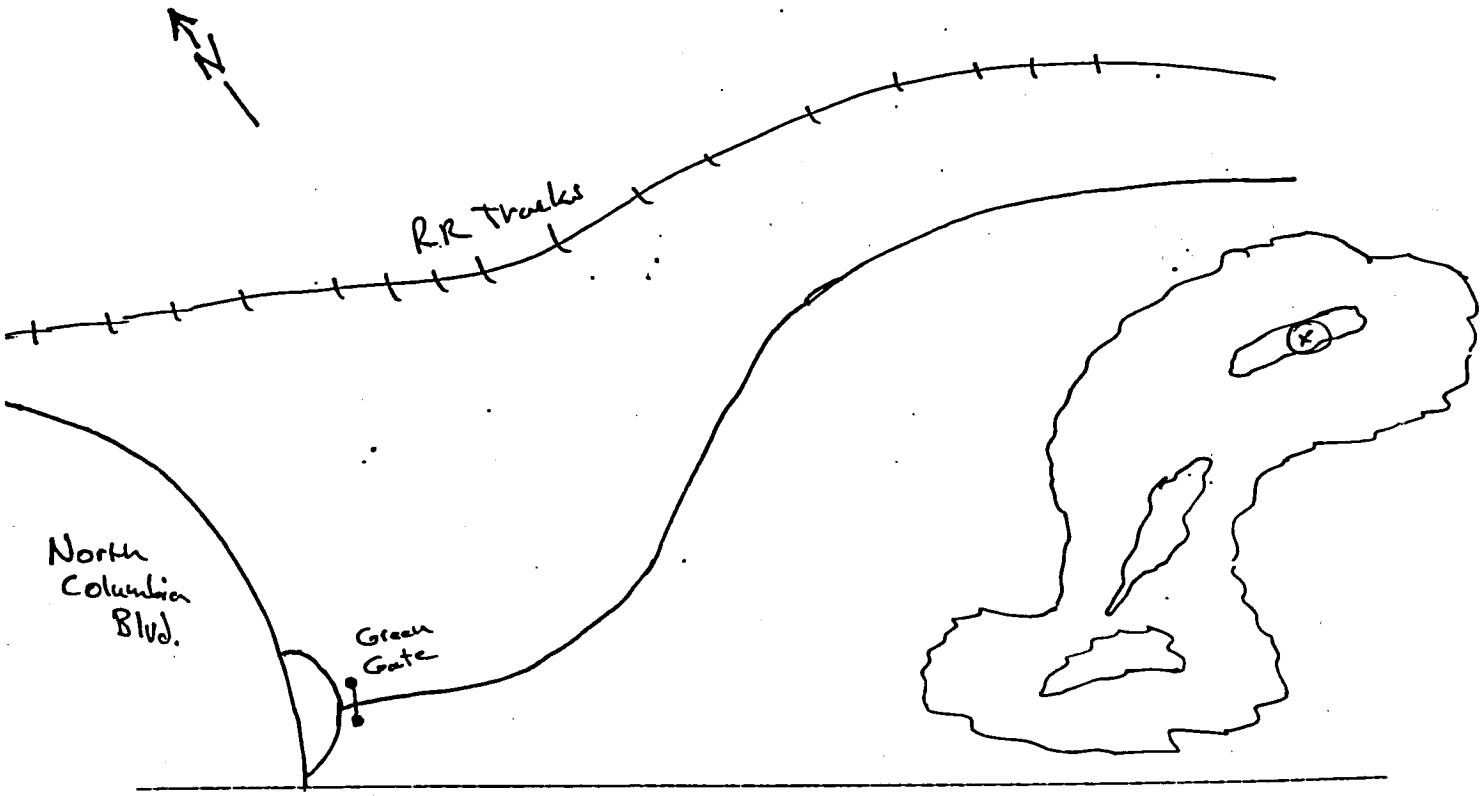
_____

_____

_____

Please draw or attach a map to the release site: Indicate the release site with an 'X' in a circle. Indicate North with an arrow. Label roads and features.

_____



Remarks: (Condition of insects, breeding or egg laying observed, predators, etc.)

USDA - APHIS / ARS Release Rec. No. (If applicable) _____

RETURN ORIGINAL FORM TO: WEED CONTROL, 635 CAPITOL ST. NE , SALEM, OR 97310

Retain a copy for your records. If you have any questions, call 503-986-4621.

ODA BCRF-5/17/95

OREGON DEPARTMENT OF AGRICULTURE
BIOLOGICAL CONTROL AGENT RELEASE FORM

Target Weed Purple Loosestrife (Common name) Date 7 / 16 19 97
MM DD YY

Agent GAPU (Scientific name) Number Released Mixed lots 200

County Multnomah T_____ R_____ Sec_____ 1/4_____
Township N S Range E W Section

Lat 45 36.985 .6164 .554 Long 122 46.089 .7681 .280 .203 GPS Derived Yes X No____
Latitude Longitude

Land Owner: BLM____ USFS____ PRIVATE____ USFWS____ STATE____ OTHER X

Land Manager Port of Portland BPA
(BLM District & Resource Area / National Forest & Ranger District / Refuge / ODOT / BPA / City / County / Rancher, etc.)

SITE NAME_____
(Use geographical reference : mountain, river, valley, road, campground, powerline, etc.)

SITE DATA : CHECK ALL ITEMS THAT APPLY AND FILL IN BLANKS. (Draw map on back of form.)

Nearest Town Portland Road North Columbia Mile Post_____
Weather: Clear X Partly cloudy____ Cloudy____ Temp_____ Wind 0-5MPH
Slope: None____ Slight____ Moderate____ Steep____ Aspect: S____E____W____N____
Soil: Sandy X Loam____ Silt____ Gravel____ Clay____ Elevation_____
Terrain: Valley____ Foothill____ Mountain____ Plain____ River____ Lake/Pond____
Vegetation: Grassland____ Shrub land____ Crop land____ Riparian X Conifer Forest____
Deciduous Forest____ Mixed Forest____ Other_____
Plant Cover: (Estimate %) Target Weed 100 Forbs (not including target) _____
Grasses_____ Shrubs_____ Trees_____ Litter_____ Bare Ground_____

Dominant Plant Species Grasses around the area
Land Use: Range____ Timber____ Wildlife____ Right of Way X Pasture____ Crop____
Vacant____ Wetland X Recreation____ Mining____ Other_____
Disturbance Factors: Grazing____ Logging____ Road____ Fire____ Flood____ Cultivation____
Construction____ Other_____
Infestation Type: Isolated X Patchy____ Linear____ Continuous____
Size of Infestation: (Acres) ≤1____ 2-10 X 11-50____ 51-99____ ≥100____
Target Weed Height: (ft.) <1____ 1-2____ 3-6____ ≥7____
Weed Density: (sq. yd.) 1____ 2-5____ 6-10____ 11-25____ 26-99____ ≥100____
Stage of Development: Seedling____ Rosette____ Bolting____ Budding____
Flowering____ (% Flower _____) Seeding____ Dormant _____

Other Bioagents Present (List)_____
Source of Agents Basket Slough Date Collected 7/15/97
Stage Released: Egg____ Larva____ Pupa____ Adult X (In Plant Material) ____

Cooperators_____

Reported by Tom Forney

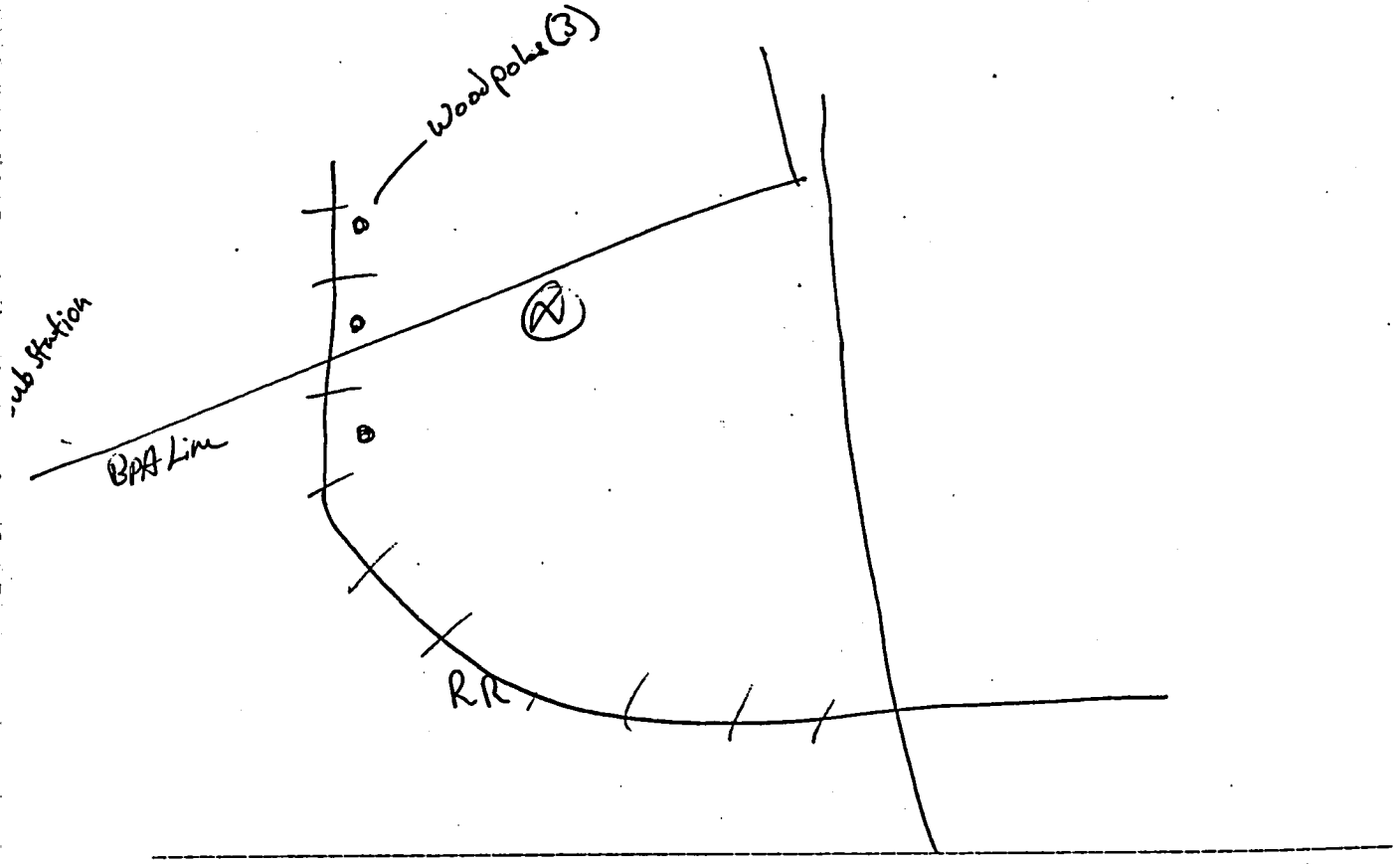
9

*Office Data Base Record Number*_____

Shon Sipp

Directions to release site: Under BPA Power in the River Gate area
(From nearest town)

Please draw or attach a map to the release site: Indicate the release site with an 'X' in a circle. Indicate North with an arrow. Label roads and features.



Remarks: (Condition of insects, breeding or egg laying observed, predators, etc.)

USDA - APHIS / ARS Release Rec. No. (If applicable) _____

RETURN ORIGINAL FORM TO: WEED CONTROL, 635 CAPITOL ST. NE , SALEM, OR 97310

Retain a copy for your records. If you have any questions, call 503-986-4621.

ODA BCRF-5/17/95

OREGON DEPARTMENT OF AGRICULTURE
BIOLOGICAL CONTROL AGENT RELEASE FORM

Target Weed Purple Loosestrife (Lythrum salicaria) G. Calmariensis **Date** 08 / 07 / 19 97
(Common name) MM DD YY

Agent ~~[illegible]~~ Galerucella pusilla **Number Released** 400
(Scientific name)

County Multnomah **T** 2N **R** 1W **Sec** ~~25~~ 26 **1/4** SE
Township N S Range E W Section

sorting site **Lat** W45.61653 **Long** W 122.76575 GPS Derived Yes____ No ✓
Lattitude Longitude

Land Owner: BLM____ USFS____ PRIVATE ✓ USFWS____ STATE____ OTHER X

Land Manager Metro Regional Parks & Greenspaces County
(BLM District & Resource Area / National Forest & Ranger District / Refuge / ODOT / BPA / City / County / Rancher, etc.)

SITE NAME Railroad right of way - Rivergate Industrial District
(Use geographical reference : mountain, river, valley, road, campground, powerline, etc.)

SITE DATA : CHECK ALL ITEMS THAT APPLY AND FILL IN BLANKS. (Draw map on back of form.)

Nearest Town Portland, OR **Road** N. Lombard **Mile Post**____
Weather: Clear ✓ Partly cloudy____ Cloudy____ **Temp** 55°F **Wind** 5mph
Slope: None ✓ Slight____ Moderate____ Steep____ **Aspect:** S ✓ E____ W____ N____
Soil: Sandy____ Loam____ Silt____ Gravel____ Clay ✓ **Elevation** 28 Ft
Terrain: Valley____ Foothill____ Mountain____ Plain____ River____ Lake/Pond ✓
Vegetation: Grassland ✓ Shrub land____ Crop land____ Riparian____ Conifer Forest____
Deciduous Forest____ Mixed Forest____ Other Wetland
Plant Cover: (Estimate %) Target Weed____ Forbs (not including target)____
Grasses____ Shrubs____ Trees____ Litter____ Bare Ground____

Dominant Plant Species Willow
Land Use: Range____ Timber____ Wildlife____ Right of Way ✓ Pasture____ Crop____
Vacant____ Wetland____ Recreation____ Mining____ Other____
Disturbance Factors: Grazing____ Logging____ Road____ Fire____ Flood____ Cultivation____
Construction____ Other Railroad
Infestation Type: Isolated____ Patchy____ Linear ✓ Continuous____
Size of Infestation: (Acres) ≤1____ 2-10 ✓ 11-50____ 51-99____ ≥100____
Target Weed Height: (ft.) <1____ 1-2____ 3-6 ✓ ≥7____
Weed Density: (sq. yd.) 1____ 2-5____ 6-10____ 11-25____ 26-99____ ≥100____
Stage of Development: Seedling____ Rosette____ Bolting____ Budding____
Flowering ✓ (% Flower____) Seeding____ Dormant____

Other Bioagents Present (List)____
Source of Agents Baskett Slough **Date Collected**____
Stage Released: Egg____ Larva____ Pupa____ Adult X (In Plant Material)____

Cooperators Port of Portland

Reported by Emily Roth - Metro Regional Parks and Greenspaces 503-797-1515

Office Data Base Record Number 3830 (C)

9-2-98 Abundant beetles - 30% damage - expect 'boom' next year
Cooperators Movement at least [illegible] from release
McElroy Second site herbicide killed plant - evidence of beetle damage

Copy Shon Schooler

OREGON DEPARTMENT OF AGRICULTURE
BIOLOGICAL CONTROL AGENT RELEASE FORM

Target Weed Purple loosestrife (Common name) Lysa (Scientific name) Nanophyes marmoratus Date 08/06 19 99 (MM DD YY)

Agent Nama Number Released ~100

County Multnomah .6185 T 2N (Township N S) R 1W (Range E W) Sec 35 (Section) 1/4 ____

Lat 45° 37.111 N (Latitude) Long 122° 46.632W (Longitude .7772) GPS Derived Yes ✓ No ___

Land Owner: BLM ___ USFS ___ PRIVATE ___ USFWS ___ STATE ___ OTHER ✓

Land Manager Port of Portland
(BLM District & Resource Area / National Forest & Ranger District / Refuge / ODOT / BPA / City / County / Rancher, etc.)

SITE NAME Pickle Pond
(Use geographical reference : mountain, river, valley, road, campground, powerline, etc.)

SITE DATA : CHECK ALL ITEMS THAT APPLY AND FILL IN BLANKS. (Draw map on back of form.)

Nearest Town Portland Road N. Riverside Mile Post ____
Weather: Clear ___ Partly cloudy ___ Cloudy ✓ Temp 80 Wind —
Slope: None ✓ Slight ___ Moderate ___ Steep ___ Aspect: S ___ E ___ W ___ N ___
Soil: Sandy ___ Loam ___ Silt ✓ Gravel ___ Clay ___ Elevation 90
Terrain: Valley ___ Foothill ___ Mountain ___ Plain ___ River ___ Lake/Pond ✓
Vegetation: Grassland ___ Shrub land ✓ Crop land ___ Riparian ___ Conifer Forest ___
Deciduous Forest ✓ Mixed Forest ___ Other ____
Plant Cover: (Estimate %) Target Weed 40 Forbs (not including target) 20
Grasses 10 Shrubs 10 Trees 20 Litter ___ Bare Ground 0

Dominant Plant Species Lysa, cottonwood
Land Use: Range ___ Timber ___ Wildlife ___ Right of Way ___ Pasture ___ Crop ___
Vacant ✓ Wetland ✓ Recreation ___ Mining ___ Other ____
Disturbance Factors: Grazing ___ Logging ___ Road ✓ Fire ___ Flood ___ Cultivation ___
Construction ___ Other ____
Infestation Type: Isolated ___ Patchy ✓ Linear ___ Continuous ___
Size of Infestation: (Acres) ≤1 ___ 2-10 ✓ 11-50 ___ 51-99 ___ ≥100 ___
Target Weed Height: (ft.) <1 ___ 1-2 ___ 3-6 ___ ≥7 ✓
Weed Density: (sq. yd.) 1 ___ 2-5 ✓ 6-10 ___ 11-25 ___ 26-99 ___ ≥100 ___
Stage of Development: Seedling ___ Rosette ___ Bolting ___ Budding ___
Flowering ✓ (% Flower 90) Seeding ___ Dormant ___

Other Bioagents Present (List) ____
Source of Agents Aquatic Gardens Date Collected 8-5-99
Stage Released: Egg ___ Larva ___ Pupa ___ Adult ✓ (In Plant Material) ___

Cooperators APHIS

Reported by GW Brown

Office Data Base Record Number ____

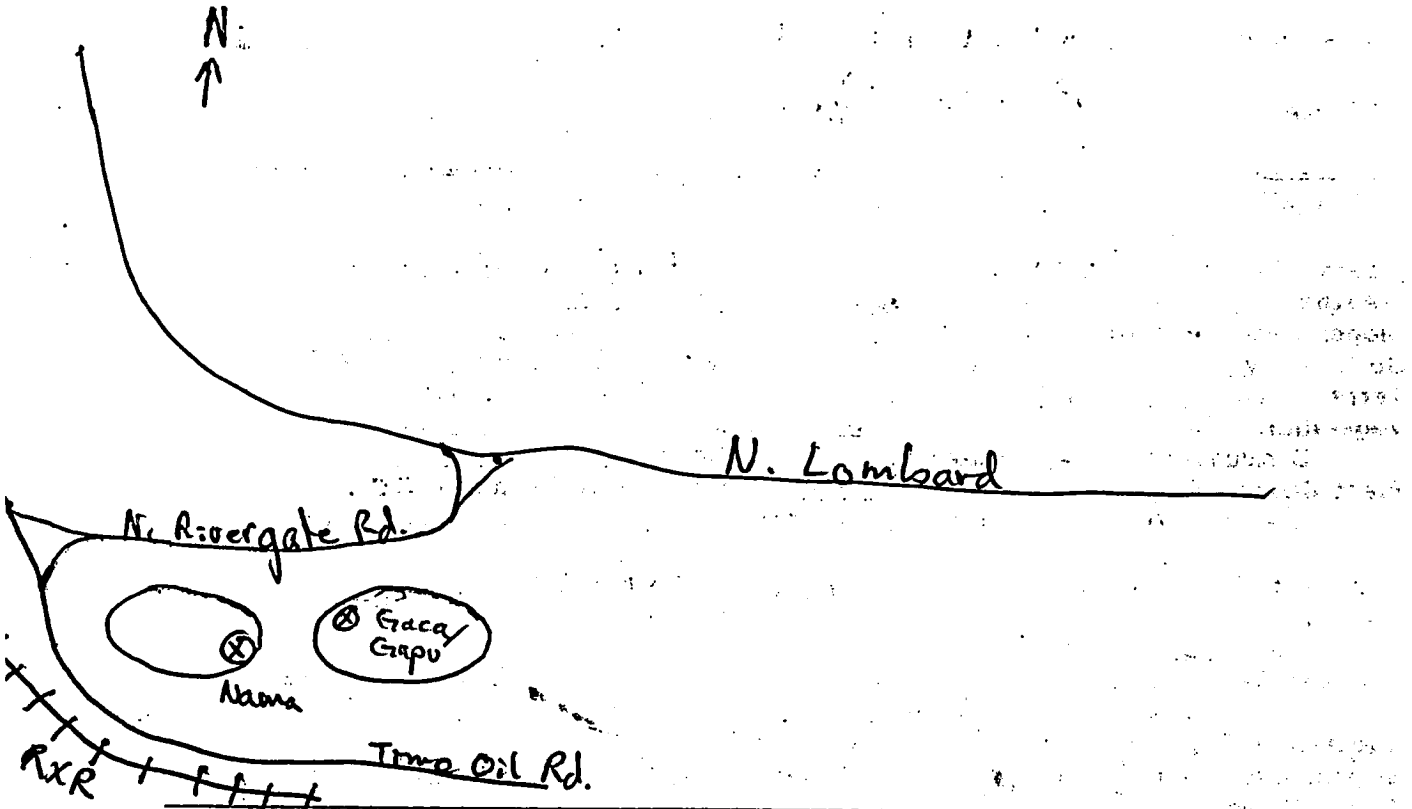
(A)

Shon Schooler

350

Directions to release site: N. Lombard St in Rivergate District, ~~At Lom~~ SW on N. Rivergate Rd ~ 0.4mi; ponds across from Sternfeld's Pickle Plant (S).
(From nearest town)

Please draw or attach a map to the release site: Indicate the release site with an 'X' in a circle. Indicate North with an arrow. Label roads and features.



Remarks: (Condition of insects, breeding or egg laying observed, predators, etc.)

USDA - APHIS / ARS Release Rec. No. (If applicable) _____

RETURN ORIGINAL FORM TO: WEED CONTROL, 635 CAPITOL ST. NE , SALEM, OR 97310

Retain a copy for your records. If you have any questions, call 503-986-4621.

ODA BCRF-5/17/95

OREGON DEPARTMENT OF AGRICULTURE
BIOLOGICAL CONTROL AGENT RELEASE FORM

Target Weed Purple Loosestrife Lysa (Common name) Date 08 / 06 19 99 (MM / DD / YY)

Agent Galerucella Pusilla & calmariensis (Scientific name) Gaca / Gapu Number Released ~500

County Multnomah T 2N (Township N S) R 1W (Range E W) Sec 35 (Section) 1/4 ____

Lat 45° 37.111 N (Latitude) Long 122° 46.632 W (Longitude) GPS Derived Yes ✓ No ____

.6185 .7772

Land Owner: BLM ____ USFS ____ PRIVATE ____ USFWS ____ STATE ____ OTHER ✓

Land Manager Port of Portland
(BLM District & Resource Area / National Forest & Ranger District / Refuge / ODOT / BPA / City / County / Rancher, etc.)

SITE NAME Pickle Pond
(Use geographical reference : mountain, river, valley, road, campground, powerline, etc.)

SITE DATA : CHECK ALL ITEMS THAT APPLY AND FILL IN BLANKS. (Draw map on back of form.)

Nearest Town Portland Road N Rivergate Mile Post ____
Weather: Clear ____ Partly cloudy ____ Cloudy ✓ Temp 80 Wind light
Slope: None ✓ Slight ____ Moderate ____ Steep ____ Aspect: S ____ E ____ W ____ N ____
Soil: Sandy ____ Loam ____ Silt ✓ Gravel ____ Clay ____ Elevation ~90
Terrain: Valley ____ Foothill ____ Mountain ____ Plain ____ River ____ Lake/Pond ✓
Vegetation: Grassland ____ Shrub land ✓ Crop land ____ Riparian ____ Conifer Forest ____
Deciduous Forest ✓ Mixed Forest ____ Other ____
Plant Cover: (Estimate %) Target Weed 50 Forbs (not including target) 20
Grasses 10 Shrubs 10 Trees 20 Litter ____ Bare Ground 0

Dominant Plant Species Lysa - cottonwood
Land Use: Range ____ Timber ____ Wildlife ____ Right of Way ____ Pasture ____ Crop ____
Vacant ✓ Wetland ✓ Recreation ____ Mining ____ Other ____
Disturbance Factors: Grazing ____ Logging ____ Road ✓ Fire ____ Flood ____ Cultivation ____
Construction ____ Other ____
Infestation Type: Isolated ____ Patchy ✓ Linear ____ Continuous ____
Size of Infestation: (Acres) ≤1 ____ 2-10 ✓ 11-50 ____ 51-99 ____ ≥100 ____
Target Weed Height: (ft.) <1 ____ 1-2 ____ 3-6 ____ ≥7 ✓
Weed Density: (sq. yd.) 1 ____ 2-5 ✓ 6-10 ____ 11-25 ____ 26-99 ____ ≥100 ____
Stage of Development: Seedling ____ Rosette ____ Bolting ____ Budding ____
Flowering ✓ (% Flower 90) Seeding ____ Dormant ____

Other Bioagents Present (List) ~~Galerucella~~
Source of Agents Aquatic Gardens Date Collected 8-5-99
Stage Released: Egg ____ Larva ____ Pupa ____ Adult ✓ (In Plant Material) ____

Cooperators GW Brown APHIS

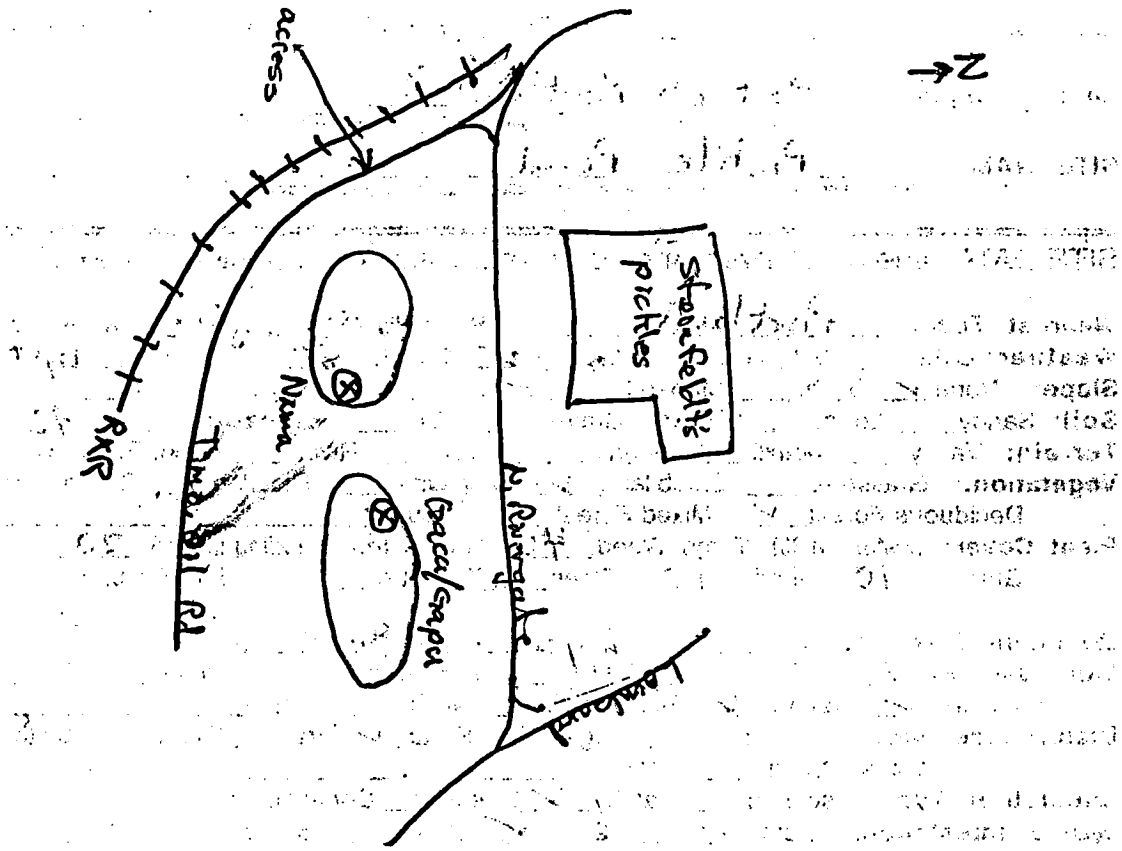
Reported by ____

Office Data Base Record Number ____ (12)

Shop Schouten 343

Directions to release site: North Portland Rivergate Dist.
(From nearest town)
N. Lombard St, 0.4mi SW on Rivergate Rd -
Across from Sternfeld's Pickles

Please draw or attach a map to the release site: Indicate the release site with an 'X' in a circle. Indicate North with an arrow. Label roads and features.



Remarks: (Condition of insects, breeding or egg laying observed, predators, etc.)

USDA - APHIS / ARS Release Rec. No. (If applicable) _____

RETURN ORIGINAL FORM TO: WEED CONTROL, 635 CAPITOL ST. NE , SALEM, OR 97310

Retain a copy for your records. If you have any questions, call 503-986-4621.

ODA BCRF-5/17/95

OREGON DEPARTMENT OF AGRICULTURE
BIOLOGICAL CONTROL AGENT RELEASE FORM

Target Weed (Common name) Lysa **Date** 09 / 26 / 2000 (MM / DD / YY)

Agent (Scientific name) Hytr **Number Released** 208

County Multnomah **T** ____ **R** ____ **Sec** ____ 1/4 ____
(Township N S, Range E W, Section)

Lat 45.62889 N **Long** 122.75494 W **GPS Derived** Yes X No ___
(Lattitude, Longitude)

Land Owner: BLM ___ USFS ___ PRIVATE ___ USFWS ___ STATE ___ OTHER X

Land Manager Metro
(BLM District & Resource Area / National Forest & Ranger District / Refuge / ODOT / BPA / City / County / Rancher, etc.)

SITE NAME Prison site #4
(Use geographical reference : mountain, river, valley, road, campground, powerline, etc.)

SITE DATA : CHECK ALL ITEMS THAT APPLY AND FILL IN BLANKS. (Draw map on back of form.)

Nearest Town Portland **Road** N Lead Setter Rd **Mile Post** .2
Weather: Clear X Partly cloudy ___ Cloudy ___ **Temp** 74° **Wind** —
Slope: None X Slight ___ Moderate ___ Steep ___ **Aspect:** S ___ E ___ W ___ N ___
Soil: Sandy ___ Loam ___ Silt X Gravel ___ Clay ___ **Elevation** ___
Terrain: Valley ___ Foothill ___ Mountain ___ Plain ___ River ___ Lake/Pond X
Vegetation: Grassland ___ Shrub land ___ Crop land ___ Riparian X Conifer Forest ___
Deciduous Forest ___ Mixed Forest ___ Other ___
Plant Cover: (Estimate %) Target Weed 40 Forbs (not including target) 10
Grasses 10 Shrubs 15 Trees 20 Litter ___ Bare Ground 5

Dominant Plant Species Lysa, willow
Land Use: Range ___ Timber ___ Wildlife ___ Right of Way ___ Pasture ___ Crop ___
Vacant ___ Wetland X Recreation X Mining ___ Other ___
Disturbance Factors: Grazing ___ Logging ___ Road X Fire ___ Flood X Cultivation ___
Construction ___ Other ___
Infestation Type: Isolated ___ Patchy ___ Linear X Continuous ___
Size of Infestation: (Acres) ≤1 ___ 2-10 X 11-50 ___ 51-99 ___ ≥100 ___
Target Weed Height: (ft.) <1 ___ 1-2 ___ 3-6 X ≥7 ___
Weed Density: (sq. yd.) 1 ___ 2-5 X 6-10 ___ 11-25 ___ 26-99 ___ ≥100 ___
Stage of Development: Seedling ___ Rosette ___ Bolting ___ Budding ___
Flowering ___ (% Flower ___) Seeding X Dormant ___

Other Bioagents Present (List) Gaca/pv
Source of Agents APHIS mission Lab **Date Collected** 9-25-00
Stage Released: Egg X Larva ___ Pupa ___ Adult ___ (In Plant Material) ___

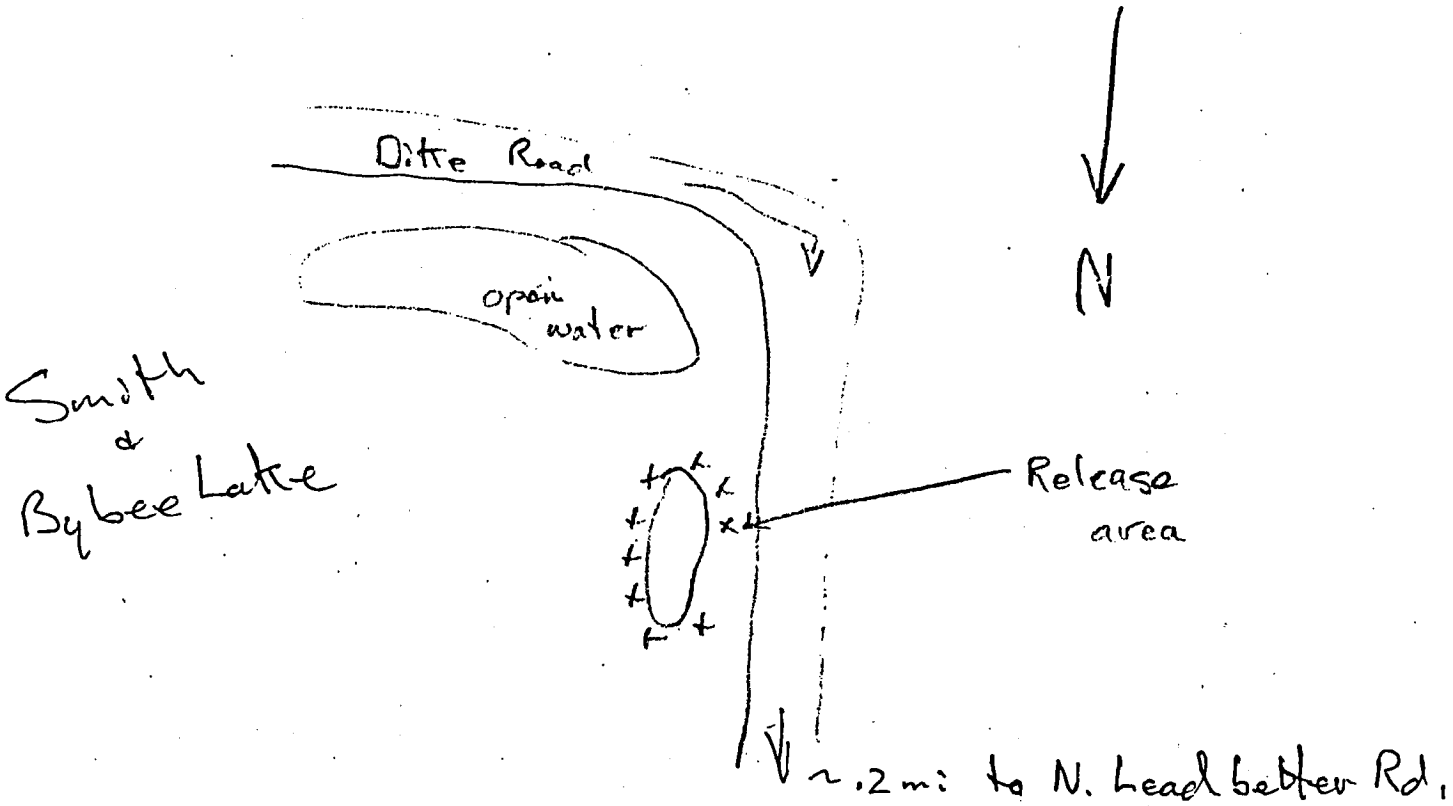
Cooperators S. Schooler, L. Hewitt, G.W Brown

Reported by GWBrown

Office Data Base Record Number ___

Directions to release site: See attached map, site #4
(From nearest town)

Please draw or attach a map to the release site: Indicate the release site with an 'X' in a circle. Indicate North with an arrow. Label roads and features.



Remarks: (Condition of insects, breeding or egg laying observed, predators, etc.)

USDA - APHIS / ARS Release Rec. No. (If applicable) _____

RETURN ORIGINAL FORM TO: WEED CONTROL, 635 CAPITOL ST. NE , SALEM, OR 97310

Retain a copy for your records. If you have any questions, call 503-986-4621.

ODA BCRF-5/17/95

OREGON DEPARTMENT OF AGRICULTURE
BIOLOGICAL CONTROL AGENT RELEASE FORM

Target Weed (Common name) Lysa **Date** 09 / 26 / 2000 (MM / DD / YY)

Agent (Scientific name) Hylc **Number Released** 82

County Multnomah **T** ____ **R** ____ **Sec** ____ 1/4 ____
(Township N S, Range E W, Section)

Lat 45.61787 N (Lattitude) **Long** 122.77677 W (Longitude) **GPS Derived** Yes X No ___

Land Owner: BLM ___ USFS ___ PRIVATE ___ USFWS ___ STATE ___ OTHER X

Land Manager Bonneville Power
(BLM District & Resource Area / National Forest & Ranger District / Refuge / ODOT / BPA / City / County / Rancher, etc.)

SITE NAME Pickle Pond
(Use geographical reference : mountain, river, valley, road, campground, powerline, etc.)

SITE DATA : CHECK ALL ITEMS THAT APPLY AND FILL IN BLANKS. (Draw map on back of form.)

Nearest Town Portland **Road** N. Rivergate **Mile Post** .5
Weather: Clear X Partly cloudy ___ Cloudy ___ **Temp** 76 **Wind** ___
Slope: None X Slight ___ Moderate ___ Steep ___ **Aspect:** S ___ E ___ W ___ N ___
Soil: Sandy X Loam ___ Silt ___ Gravel ___ Clay ___ **Elevation** ___
Terrain: Valley ___ Foothill ___ Mountain ___ Plain ___ River ___ Lake/Pond X
Vegetation: Grassland ___ Shrub land ___ Crop land ___ Riparian X Conifer Forest ___
Deciduous Forest ___ Mixed Forest ___ Other ___
Plant Cover: (Estimate %) Target Weed 25 Forbs (not including target) 15
Grasses 20 Shrubs 10 Trees 25 Litter ___ Bare Ground 5

Dominant Plant Species Lysa, willow
Land Use: Range ___ Timber ___ Wildlife ___ Right of Way ___ Pasture ___ Crop ___
Vacant ___ Wetland X Recreation ___ Mining ___ Other ___
Disturbance Factors: Grazing ___ Logging ___ Road ___ Fire ___ Flood X Cultivation ___
Construction ___ Other ___
Infestation Type: Isolated ___ Patchy X Linear ___ Continuous ___
Size of Infestation: (Acres) ≤1 ___ 2-10 X 11-50 ___ 51-99 ___ ≥100 ___
Target Weed Height: (ft.) <1 ___ 1-2 ___ 3-6 X ≥7 ___
Weed Density: (sq. yd.) 1 ___ 2-5 X 6-10 ___ 11-25 ___ 26-99 ___ ≥100 ___
Stage of Development: Seedling ___ Rosette ___ Bolting ___ Budding ___
Flowering ___ (% Flower ___) Seeding X Dormant ___

Other Bioagents Present (List) Cecidochares Nova
Source of Agents APHIS Mission, TX **Date Collected** 9-25-00
Stage Released: Egg X Larva ___ Pupa ___ Adult ___ (In Plant Material) ___

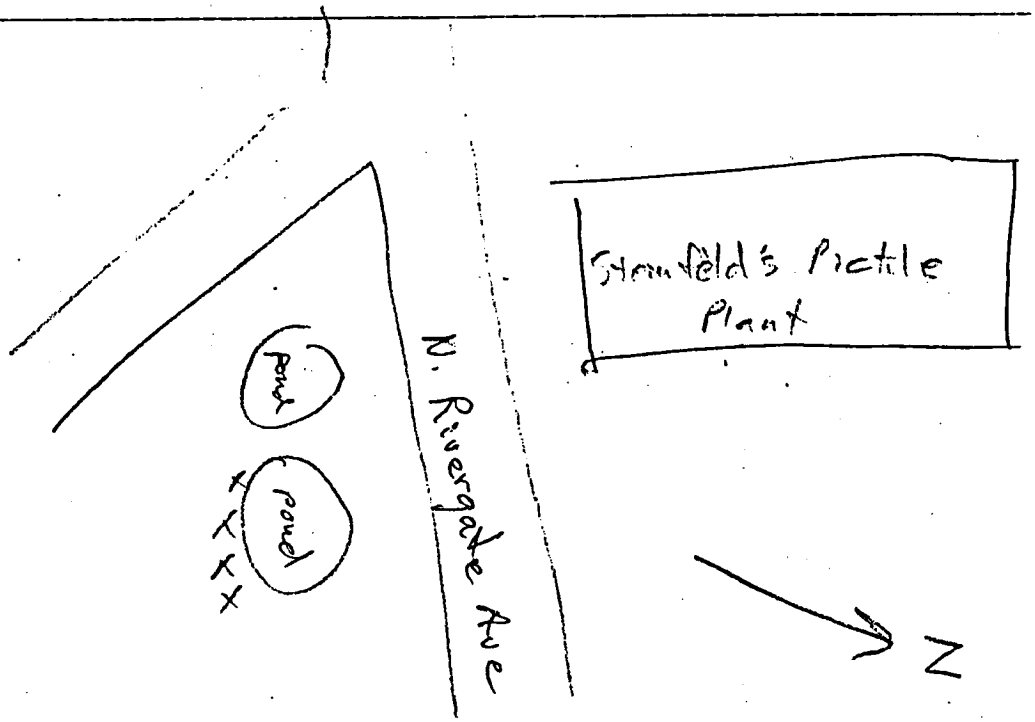
Cooperators G. Snyder, L. Hewitt, G.W. Brown

Reported by G.W. Brown

Office Data Base Record Number ___

Directions to release site:
(From nearest town) S shore of East Pond
see attached map, site #1

Please draw or attach a map to the release site: Indicate the release site with an 'X' in a circle. Indicate North with an arrow. Label roads and features.



Remarks: (Condition of insects, breeding or egg laying observed, predators, etc.)

USDA - APHIS / ARS Release Rec. No. (If applicable) _____

RETURN ORIGINAL FORM TO: WEED CONTROL, 635 CAPITOL ST. NE , SALEM, OR 97310

Retain a copy for your records. If you have any questions, call 503-986-4621.

ODA BCRF-5/17/95

OREGON DEPARTMENT OF AGRICULTURE
BIOLOGICAL CONTROL AGENT RELEASE FORM

Target Weed (Common name) Lysa **Date** 09 / 26 / 2000 (MM / DD / YY)

Agent (Scientific name) Hyt r **Number Released** 128

County Multnomah **T** (Township N S) **R** (Range E W) **Sec** (Section) **1/4**

Lat (Latitude) 45.61645 N **Long** (Longitude) 122.76895 W **GPS Derived** Yes X No

Land Owner: BLM ___ USFS ___ PRIVATE ___ USFWS ___ STATE ___ OTHER X

Land Manager Bonneville Power
(BLM District & Resource Area / National Forest & Ranger District / Refuge / ODOT / BPA / City / County / Rancher, etc.)

SITE NAME Substation
(Use geographical reference : mountain, river, valley, road, campground, powerline, etc.)

SITE DATA : CHECK ALL ITEMS THAT APPLY AND FILL IN BLANKS. (Draw map on back of form.)

Nearest Town Portland **Road** N. Lombard **Mile Post** .2
Weather: Clear X Partly cloudy ___ Cloudy ___ **Temp** 78 **Wind** ___
Slope: None X Slight ___ Moderate ___ Steep ___ **Aspect:** S ___ E ___ W ___ N ___
Soil: Sandy ___ Loam ___ Silt X Gravel ___ Clay ___ **Elevation** ___
Terrain: Valley ___ Foothill ___ Mountain ___ Plain ___ River ___ Lake/Pond X
Vegetation: Grassland ___ Shrub land ___ Crop land ___ Riparian X Conifer Forest ___
Deciduous Forest ___ Mixed Forest ___ Other ___
Plant Cover: (Estimate %) Target Weed 45 Forbs (not including target) 30
Grasses 5 Shrubs ___ Trees 20 Litter ___ Bare Ground ___

Dominant Plant Species Lysa, willow, polygonum
Land Use: Range ___ Timber ___ Wildlife ___ Right of Way X Pasture ___ Crop ___
Vacant ___ Wetland X Recreation ___ Mining ___ Other ___
Disturbance Factors: Grazing ___ Logging ___ Road X Fire ___ Flood ___ Cultivation ___
Construction ___ Other RxR
Infestation Type: Isolated ___ Patchy ___ Linear X Continuous ___
Size of Infestation: (Acres) ≤1 ___ 2-10 X 11-50 ___ 51-99 ___ ≥100 ___
Target Weed Height: (ft.) <1 ___ 1-2 ___ 3-6 X ≥7 ___
Weed Density: (sq. yd.) 1 ___ 2-5 X 6-10 ___ 11-25 ___ 26-99 ___ ≥100 ___
Stage of Development: Seedling ___ Rosette ___ Bolting ___ Budding ___
Flowering ___ (% Flower ___) Seeding X Dormant ___

Other Bioagents Present (List) Gracapu
Source of Agents APHIS Mission, TX **Date Collected** 9-25-00
Stage Released: Egg X Larva ___ Pupa ___ Adult ___ (In Plant Material) ___

Cooperators S Schrader, L. Hewitt, G.W. Brown

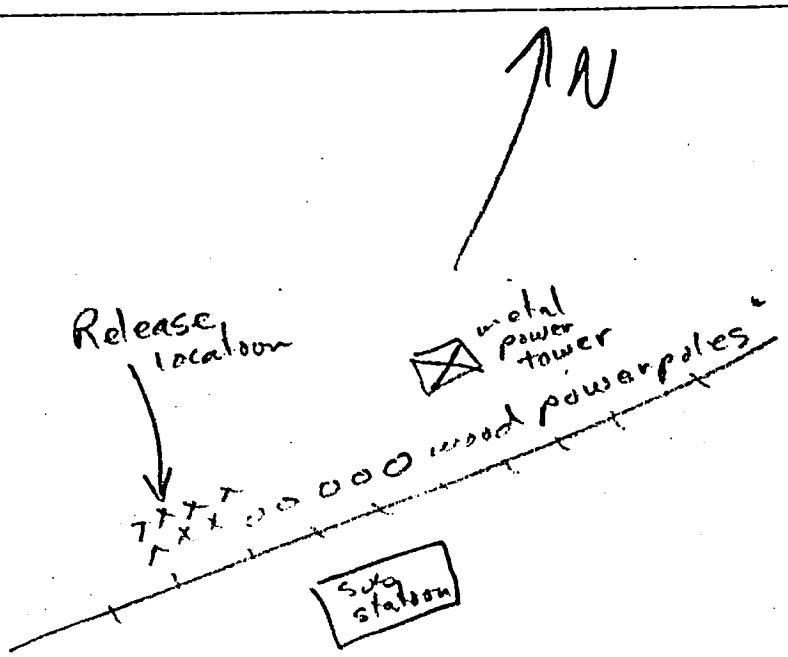
Reported by G.W. Brown

Office Data Base Record Number ___

Directions to release site: W on R x R tracks from N. Lombard, ~.2mi W off Columbia Blvd, to sub station where power lines cross perpendicular W side of R x R track, see attached map, site #1

(From nearest town)

Please draw or attach a map to the release site: Indicate the release site with an 'X' in a circle. Indicate North with an arrow. Label roads and features.



Remarks: (Condition of insects, breeding or egg laying observed, predators, etc.)

USDA - APHIS / ARS Release Rec. No. (If applicable) _____

RETURN ORIGINAL FORM TO: WEED CONTROL, 635 CAPITOL ST. NE , SALEM, OR 97310

Retain a copy for your records. If you have any questions, call 503-986-4621.

ODA BCRF-5/17/95

OREGON DEPARTMENT OF AGRICULTURE
BIOLOGICAL CONTROL AGENT RELEASE FORM

Target Weed (Common name) Lysa **Date** 09/26/2000 (MM/DD/YY)

Agent (Scientific name) Hytr **Number Released** ~100

County Multnomah **T** _____ **R** _____ **Sec** _____ **1/4** _____
(Township N S, Range E W, Section)

Lat 45.61509 N **Long** 122.73997 W **GPS Derived** Yes X No ___
(Lattitude, Longitude)

Land Owner: BLM ___ USFS ___ PRIVATE ___ USFWS ___ STATE ___ OTHER X

Land Manager Metro
(BLM District & Resource Area / National Forest & Ranger District / Refuge / ODOT / BPA / City / County / Rancher, etc.)

SITE NAME Land fill East #8
(Use geographical reference : mountain, river, valley, road, campground, powerline, etc.)

SITE DATA : CHECK ALL ITEMS THAT APPLY AND FILL IN BLANKS. (Draw map on back of form.)

Nearest Town Portland **Road** Columbia Blvd **Mile Post** _____
Weather: Clear X Partly cloudy ___ Cloudy ___ **Temp** 68° **Wind** light breeze
Slope: None X Slight ___ Moderate ___ Steep ___ **Aspect:** S ___ E ___ W ___ N ___
Soil: Sandy ___ Loam ___ Silt X Gravel ___ Clay ___ **Elevation** 15'
Terrain: Valley ___ Foothill ___ Mountain ___ Plain ___ River ___ Lake/Pond X
Vegetation: Grassland ___ Shrub land ___ Crop land ___ Riparian X Conifer Forest ___
Deciduous Forest ___ Mixed Forest ___ Other _____
Plant Cover: (Estimate %) Target Weed 10 Forbs (not including target) 70
Grasses 10 Shrubs 5 Trees 5 Litter _____ Bare Ground _____

Dominant Plant Species smartweed
Land Use: Range ___ Timber ___ Wildlife ___ Right of Way ___ Pasture ___ Crop ___
Vacant ___ Wetland X Recreation ___ Mining ___ Other _____
Disturbance Factors: Grazing ___ Logging ___ Road ___ Fire ___ Flood X Cultivation ___
Construction ___ Other _____
Infestation Type: Isolated ___ Patchy X Linear ___ Continuous ___
Size of Infestation: (Acres) ≤1 X 2-10 ___ 11-50 ___ 51-99 ___ ≥100 ___
Target Weed Height: (ft.) <1 ___ 1-2 ___ 3-6 X ≥7 ___
Weed Density: (sq. yd.) 1 ___ 2-5 X 6-10 ___ 11-25 ___ 26-99 ___ ≥100 ___
Stage of Development: Seedling ___ Rosette ___ Bolting ___ Budding ___
Flowering ___ (% Flower _____) Seeding X Dormant ___

Other Bioagents Present (List) none
Source of Agents APHIS Mission Lab **Date Collected** 9-25-00
Stage Released: Egg X Larva ___ Pupa ___ Adult ___ (In Plant Material) ___

Cooperators S. Schooler, L. Hewitt, G.W. Brown

Reported by G.W. Brown

Office Data Base Record Number _____

Directions to release site: ~.3 mi E of jct. w/ N. Lombard (From nearest town) (Rivergate Dist.) on Columbia Blvd., take dirt road thru landfill gate ~.7 mi to intersection site is ~.7 mi hike thru wetland. See attached map, site #8

Please draw or attach a map to the release site: Indicate the release site with an 'X' in a circle. Indicate North with an arrow. Label roads and features.

Remarks: (Condition of insects, breeding or egg laying observed, predators, etc.)

USDA - APHIS / ARS Release Rec. No. (If applicable) _____

RETURN ORIGINAL FORM TO: WEED CONTROL, 635 CAPITOL ST. NE , SALEM, OR 97310

Retain a copy for your records. If you have any questions, call 503-986-4621.

ODA BCRF-5/17/95

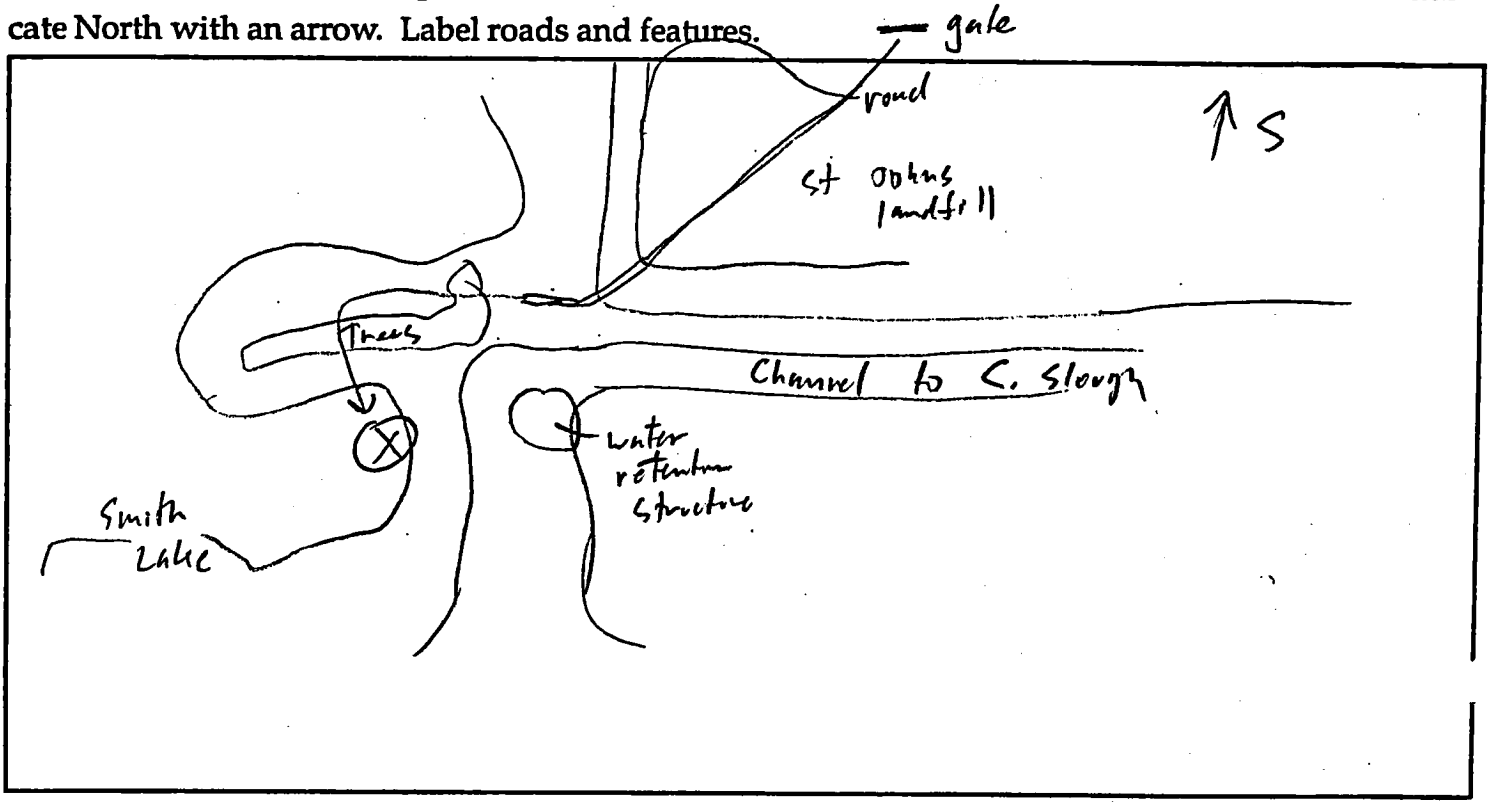
ODA BIOLOGICAL CONTROL AGENT RELEASE FORM

Target Weed: Purple loosestrife **Date:** 05 / 30 / 2001
(Common Name) MM DD YYYY
Agent: HYTR **Number Released:** 100
(Scientific Name)
County: Multnomah **T** _____ **R** _____ **Sec** _____ **1/4** ___
(Township) (Range) (Section)
Lat: 45.61549 **Long:** -122.73956 **GPS Derived?** Yes ☒ No ☐
(Decimal degrees)
Land Owner: BLM ☐ USFS ☐ Private ☐ USFWS ☐ State ☐ Other ☒ Metro
Land Manager: Metro
(BLM Districts & Resource Area / National Forest & Ranger District / Refuge / ODOT / BPA / City / County / Rancher / Etc.)
Site Name: Smith Lake
(Use geographical reference, mountain, river, valley, road, campground, powerline, etc.)

Site Data: Check all items that apply and fill in the blanks. (Draw map on back.)
Nearest Town Portland **Road** Columbia Blvd **Mile Post** _____
Weather Clear ☒ Partly Cloudy ☐ Cloudy ☐ Rain ☐ **Temp** 85 **Wind** slight
Slope None ☒ Slight ☐ Moderate ☐ Steep ☐ **Aspect** N ☐ S ☐ E ☐ W ☐
Soil Sandy ☒ Loam ☐ Silt ☐ Gravel ☐ Clay ☐ **Elevation** 10 ft
Terrain Valley ☐ Foothill ☐ Mountain ☐ Plain ☐ River ☐ Lake/Pond ☒
Vegetation Grassland ☐ Shrubland ☐ Cropland ☐ Riparian/Wetland ☒ Conifer forest ☐
Deciduous Forest ☐ Mixed Forest ☐ Other ☐ _____
Plant Cover (Estimate %) Target Weed 20 Forbs(excluding target) 30 Grasses 30
Shrubs 10 Trees 0 Litter 5 Bare Ground 5
Dominant Plant Species (list) water smartweed / RCG / other polygonum
Land Use Range ☐ Timber ☐ Wildlife ☐ Right of Way ☐ Pasture ☐ Crop ☐ Vacant ☐
Wetland ☒ Recreation ☐ Mining ☐ Other ☐ _____
Disturbance Factor Grazing ☐ Logging ☐ Road ☐ Fire ☐ Flood ☒ Cultivation ☐
Construction ☐ Other ☐ _____
Infestation Type Isolated ☐ Patchy ☒ Linear ☐ Continuous ☐
Size of Infestation (acres) ≤1 ☐ 2-10 ☒ 11-50 ☐ 51-99 ☐ ≥100 ☐
Target Weed Height (ft.) <1 ☐ 1-2 ☒ 3-6 ☐ ≥7 ☐
Weed Density (Sq. yd.) ≤1 ☐ 2-5 ☒ 6-10 ☐ 11-25 ☐ 26-99 ☐ ≥100 ☐
Stage of Development Seedling ☒ Rosette ☐ Bolting ☐ Budding ☒ Flowering ☐ % ___
Seeding ☐ Dormant ☐
Is this BC Agent already present? Yes ☒ No ☐ **Abundance per minute** larvae in knots
Other BC Agents Present (list): GACA & GAPH
Source of Agents: Bashett Slough NWR **Date:** 5/29/2001
Stage Released Egg ☐ Larva ☐ Pupa ☐ Adult ☒ In plant material ☐ Galls ☐
Cooperators: USDA APHIS / ODA / OSU / CSWC / Port / Metro / BES
Reported by: Shon Schoder & Gary Brown **Database record no.** _____

Directions to release site: through St Johns Landfill to NE corner
(From Nearest Town) walk East 200 m & 100 m N
Pls rings slough

Please draw or atttach a map to the release site: Indicate the release site with an 'X' in a circle. Indicate North with an arrow. Label roads and features.



Non Target Info: Are there native plants in the same tribe or genus present at the release site?
☐Yes ☒No List:

Remarks: (Condition of insects, breeding or egg laying observed, predators, other species present, etc.)

USDA - APHIS / ARS Release Rec. No. (if applicable):

RETURN ORIGINAL FORM TO: WEED CONTROL, 635 CAPITOL STREET NE SALEM, OR 97301-2532

Retain copy for your records. If you have any questions, call 503-986-4621

ODA BIOLOGICAL CONTROL AGENT RELEASE FORM

Target Weed: Purple loosestrife **Date:** 05 / 30 / 2001 (MM / DD / YYYY)

(Common Name)

Agent: HYTR marked m **Number Released:** 100

(Scientific Name)

County: Multnomah **T** _____ **R** _____ **Sec** _____ **1/4** ___

(Township) (Range) (Section)

Lat: 45.62893 **Long:** -122.75474 **GPS Derived?** Yes ☑ No ☐

(Decimal degrees)

Land Owner: BLM ☐ USFS ☐ Private ☐ USFWS ☐ State ☐ Other ☒ Metro

Land Manager: Metro

(BLM Districts & Resource Area / National Forest & Ranger District / Refuge / ODOT / BPA / City / County / Rancher / Etc.)

Site Name: Jail Landfill East

(Use geographical reference, mountain, river, valley, road, campground, powerline, etc.)

Site Data: Check all items that apply and fill in the blanks. (Draw map on back.)

Nearest Town Portland **Road** N Leadbetter **Mile Post** _____

Weather Clear ☒ Partly Cloudy ☐ Cloudy ☐ Rain ☐ **Temp** 90°F **Wind** lime

Slope None ☒ Slight ☐ Moderate ☐ Steep ☐ **Aspect** N ☐ S ☐ E ☐ W ☐

Soil Sandy ☑ Loam ☐ Silt ☐ Gravel ☐ Clay ☐ **Elevation** 10 ft

Terrain Valley ☐ Foothill ☐ Mountain ☐ Plain ☐ River ☐ Lake/Pond ☒

Vegetation Grassland ☐ Shrubland ☐ Cropland ☐ Riparian/Wetland ☒ Conifer forest ☐
Deciduous Forest ☐ Mixed Forest ☐ Other ☐ _____

Plant Cover (Estimate %) Target Weed 25 Forbs(excluding target) 20 Grasses 15
Shrubs 20 Trees 10 Litter _____ Bare Ground 10

Dominant Plant Species (list) blackberry, willow, water smartweed

Land Use Range ☐ Timber ☐ Wildlife ☐ Right of Way ☐ Pasture ☐ Crop ☐ Vacant ☐
Wetland ☒ Recreation ☐ Mining ☐ Other ☐ _____

Disturbance Factor Grazing ☐ Logging ☐ Road ☐ Fire ☐ Flood ☒ Cultivation ☐
Construction ☐ Other ☐ _____

Infestation Type Isolated ☐ Patchy ☒ Linear ☐ Continuous ☐

Size of Infestation (acres) ≤1 ☐ 2-10 ☒ 11-50 ☐ 51-99 ☐ ≥100 ☐

Target Weed Height (ft.) <1 ☐ 1-2 ☐ 3-6 ☒ ≥7 ☐

Weed Density (Sq. yd.) ≤1 ☐ 2-5 ☒ 6-10 ☐ 11-25 ☐ 26-99 ☐ ≥100 ☐

Stage of Development Seedling ☑ Rosette ☐ Bolting ☐ Budding ☒ Flowering ☐ % ___
Seeding ☐ Dormant ☐

Is this BC Agent already present? Yes ☒ No ☐ **Abundance per minute** ~1 larvae in nooks

Other BC Agents Present (list): GACA / GAPU / HYTR larvae (released as eggs ~ 200)

Source of Agents: Basket Slough NWR **Date:** 5/29/2001

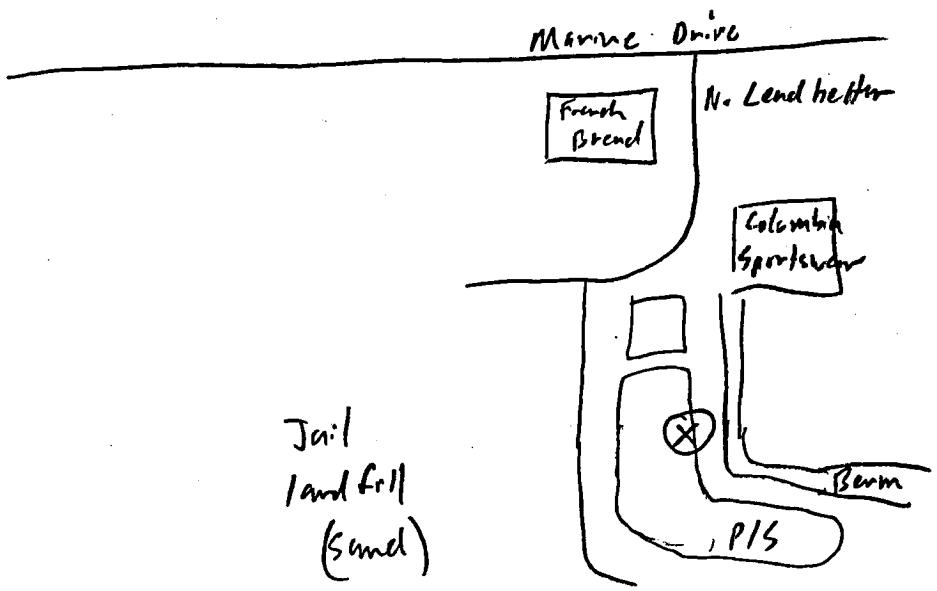
Stage Released Egg ☐ Larva ☐ Pupa ☐ Adult ☐ In plant material ☐ Galls ☐

Cooperators: USDA APHIS / ODA / OSU / BES / CSWC / Port

Reported by: Shon Schooler Gary Brown **Database record no.** _____

Directions to release site: Marine Drive to N Lendbetter
(From Nearest Town) turn left over curb down sandy road
100 m look to left

Please draw or atttach a map to the release site: Indicate the release site with an 'X' in a circle. Indicate North with an arrow. Label roads and features.



Non Target Info: Are there native plants in the same tribe or genus present at the release site?
☐ Yes ☒ No List:

Remarks: (Condition of insects, breeding or egg laying observed, predators, other species present, etc.)

USDA - APHIS / ARS Release Rec. No. (if applicable):

RETURN ORIGINAL FORM TO: WEED CONTROL, 635 CAPITOL STREET NE SALEM, OR 97301-2532

Retain copy for your records. If you have any questions, call 503-986-4621

ODA BIOLOGICAL CONTROL AGENT RELEASE FORM

Target Weed: Purple loosestrife **Date:** 05 / 30 / 2001 (MM / DD / YYYY)

(Common Name)

Agent: HYTR **Number Released:** 1012

(Scientific Name)

County: Multnomah **T** _____ (Township) **R** _____ (Range) **Sec** _____ (Section) **1/4** ___

Lat: 45.61778 **Long:** -122.77693 **GPS Derived?** Yes ☐ No ☐

(Decimal degrees)

Land Owner: BLM ☐ USFS ☐ Private ☐ USFWS ☐ State ☐ Other ☒ Port of Portland

Land Manager: Port of Portland

(BLM Districts & Resource Area / National Forest & Ranger District / Refuge / ODOT / BPA / City / County / Rancher / Etc.)

Site Name: Pickle Pond

(Use geographical reference, mountain, river, valley, road, campground, powerline, etc.)

Site Data: Check all items that apply and fill in the blanks. (Draw map on back.)

Nearest Town Portland **Road** Lombard **Mile Post** _____

Weather Clear ☒ Partly Cloudy ☐ Cloudy ☐ Rain ☐ **Temp** 85 **Wind** slight

Slope None ☒ Slight ☐ Moderate ☐ Steep ☐ **Aspect** N ☐ S ☐ E ☐ W ☐

Soil Sandy ☒ Loam ☐ Silt ☐ Gravel ☐ Clay ☐ **Elevation** 10 ft

Terrain Valley ☐ Foothill ☐ Mountain ☐ Plain ☐ River ☐ Lake/Pond ☒

Vegetation Grassland ☐ Shrubland ☐ Cropland ☐ Riparian/Wetland ☒ Conifer forest ☐
Deciduous Forest ☐ Mixed Forest ☐ Other ☐ _____

Plant Cover (Estimate %) Target Weed 35 Forbs(excluding target) 20 Grasses 10
Shrubs 25 Trees 5 Litter _____ Bare Ground 5

Dominant Plant Species (list) willow / typha / water smartweed / hvl rush / equisetum

Land Use Range ☐ Timber ☐ Wildlife ☐ Right of Way ☐ Pasture ☐ Crop ☐ Vacant ☐
Wetland ☒ Recreation ☐ Mining ☐ Other ☐ _____

Disturbance Factor Grazing ☐ Logging ☐ Road ☐ Fire ☐ Flood ☒ Cultivation ☐
Construction ☐ Other ☐ _____

Infestation Type Isolated ☐ Patchy ☐ Linear ☐ Continuous ☒

Size of Infestation (acres) ≤1 ☐ 2-10 ☐ 11-50 ☒ 51-99 ☐ ≥100 ☐

Target Weed Height (ft.) <1 ☐ 1-2 ☐ 3-6 ☒ ≥7 ☐

Weed Density (Sq. yd.) ≤1 ☐ 2-5 ☐ 6-10 ☒ 11-25 ☐ 26-99 ☐ ≥100 ☐

Stage of Development Seedling ☒ Rosette ☐ Bolting ☐ Budding ☒ Flowering ☐ % ___
Seeding ☐ Dormant ☐

Is this BC Agent already present? Yes ☒ No ☐ Abundance per minute larvae in roots

Other BC Agents Present (list): GACA / GAPU / NAMA

Source of Agents: Basket Slough **Date:** 05/29/2001

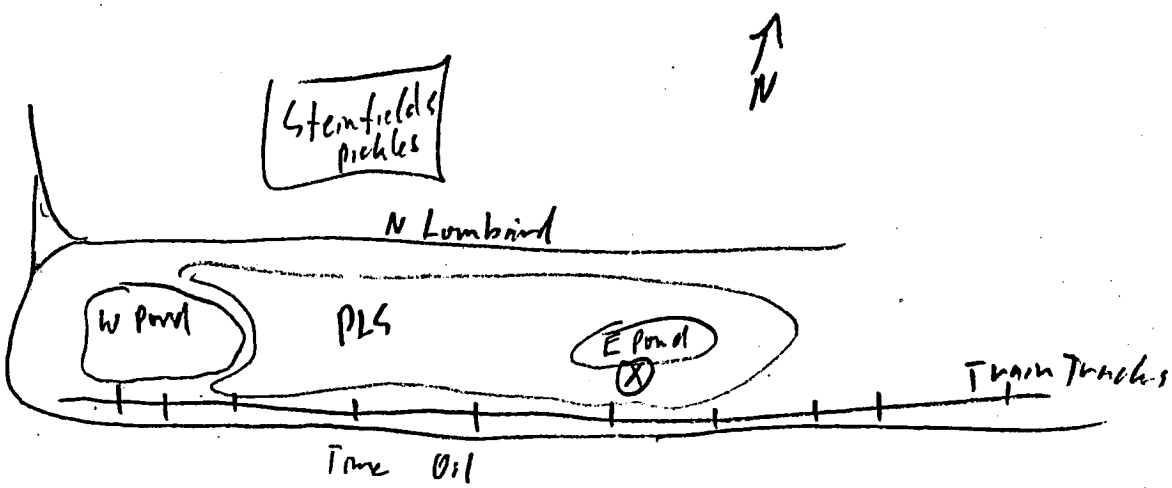
Stage Released Egg ☐ Larva ☐ Pupa ☐ Adult ☒ In plant material ☐ Galls ☐

Cooperators: USDA - APHIS / ODA / OSU / CSWC / BES / Port / Metro

Reported by: Shon Schooler / Gary Brown **Database record no.** _____

Directions to release site: Lombard & Time Oil
(From Nearest Town) across from Steinfelds pickle plant
under BPA lines

Please draw or atttach a map to the release site: Indicate the release site with an 'X' in a circle. Indicate North with an arrow. Label roads and features.



Non Target Info: Are there native plants in the same tribe or genus present at the release site?
☒ Yes ☐ No List: _____

Remarks: (Condition of insects, breeding or egg laying observed, predators, other species present, etc.)

USDA - APHIS / ARS Release Rec. No. (if applicable): _____

RETURN ORIGINAL FORM TO: WEED CONTROL, 635 CAPITOL STREET NE SALEM, OR 97301-2532

Retain copy for your records. If you have any questions, call 503-986-4621

ODA BIOLOGICAL CONTROL AGENT RELEASE FORM

Target Weed: Purple loosestrife Date: 7 / 12 / 2001 (MM DD YYYY)

Common Name) Agent: HYTR Number Released: 105

(Scientific Name)

County: Multnomah T ____ (Township) R ____ (Range) Sec ____ (Section) 1/4 ____

Lat: 45.62333 Long: -122.73795 (Decimal degrees) GPS Derived? Yes ☐ No ☐

Land Owner: BLM ☐ USFS ☐ Private ☐ USFWS ☐ State ☐ Other ☐ Metro

Land Manager: Metro

(BLM Districts & Resource Area / National Forest & Ranger District / Refuge / ODOT / BPA / City / County / Rancher / Etc.)

Site Name: Bybee Lake NW

(Use geographical reference, mountain, river, valley, road, campground, powerline, etc.)

Site Data: Check all items that apply and fill in the blanks. (Draw map on back.)

Nearest Town St Johns Road N Marine Dr Mile Post ____

Weather Clear ☒ Partly Cloudy ☐ Cloudy ☐ Rain ☐ Temp 75F Wind Slight

Slope None ☐ Slight ☒ Moderate ☐ Steep ☐ Aspect N ☐ S ☐ E ☐ W ☐

Soil Sandy ☐ Loam ☒ Silt ☐ Gravel ☐ Clay ☐ Elevation 10 ft

Terrain Valley ☐ Foothill ☐ Mountain ☐ Plain ☐ River ☐ Lake/Pond ☒

Vegetation Grassland ☐ Shrubland ☐ Cropland ☐ Riparian/Wetland ☒ Conifer forest ☐
Deciduous Forest ☐ Mixed Forest ☐ Other ☐ ____

Plant Cover (Estimate %) Target Weed 10 Forbs(excluding target) 70 Grasses 5
Shrubs 10 Trees 10 Litter 40 Bare Ground —

Dominant Plant Species (list) Epilobium / Solanum / willow

Land Use Range ☐ Timber ☐ Wildlife ☐ Right of Way ☐ Pasture ☐ Crop ☐ Vacant ☐
Wetland ☒ Recreation ☒ Mining ☐ Other ☐ ____

Disturbance Factor Grazing ☐ Logging ☐ Road ☐ Fire ☐ Flood ☒ Cultivation ☐
Construction ☐ Other ☐ ____

Infestation Type Isolated ☐ Patchy ☒ Linear ☐ Continuous ☐

Size of Infestation (acres) ≤1 ☐ 2-10 ☒ 11-50 ☐ 51-99 ☐ ≥100 ☐

Target Weed Height (ft.) <1 ☐ 1-2 ☐ 3-6 ☒ ≥7 ☐

Weed Density (Sq. yd.) ≤1 ☐ 2-5 ☒ 6-10 ☐ 11-25 ☐ 26-99 ☐ ≥100 ☐

Stage of Development Seedling ☐ Rosette ☐ Bolting ☐ Budding ☐ Flowering ☒ % 100
Seeding ☐ Dormant ☐

Is this BC Agent already present? Yes ☐ No ☒ Abundance per minute ____

Other BC Agents Present (list): none

Source of Agents: Bernd Blossey - NY Date: 7/5/2001

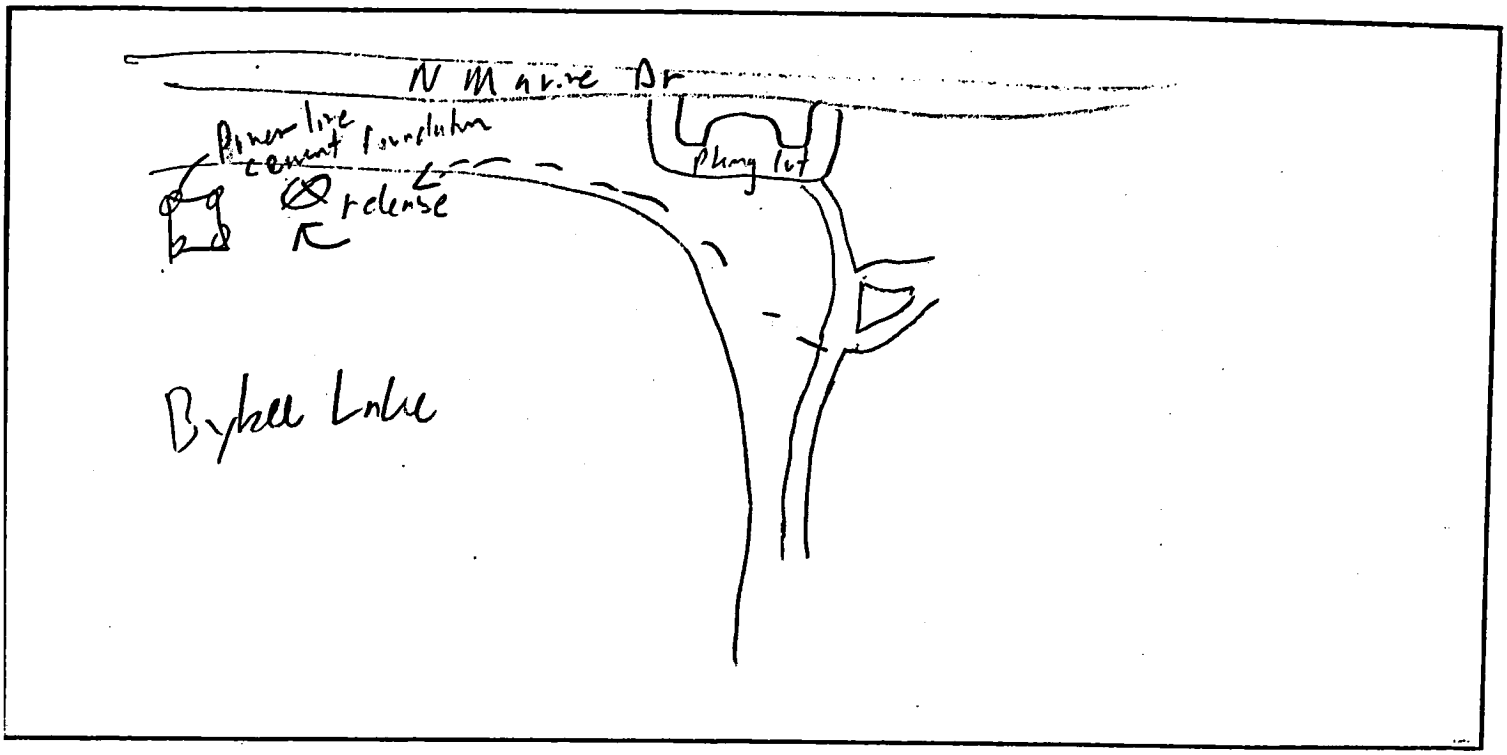
Stage Released Egg ☐ Larva ☐ Pupa ☐ Adult ☒ In plant material ☐ Galls ☐

Cooperators: API/IS / CWSC / Port / BES / OSU / OSWB / LCWC

Reported by: Shon Schooler & Gary Brown Database record no. ____

Directions to release site: N Maine Dr to Smith's Bybee Lakes Entrance NW Bybee Lake
(From Nearest Town)

Please draw or atttach a map to the release site: Indicate the release site with an 'X' in a circle. Indicate North with an arrow. Label roads and features.



Non Target Info: Are there native plants in the same tribe or genus present at the release site?
☐Yes ☒No List:_____

Remarks: (Condition of insects, breeding or egg laying observed, predators, other species present, etc.)

USDA - APHIS / ARS Release Rec. No. (if applicable): _____

RETURN ORIGINAL FORM TO: WEED CONTROL, 635 CAPITOL STREET NE SALEM, OR 97301-2532

Retain copy for your records. If you have any questions, call 503-986-4621

ODA BIOLOGICAL CONTROL AGENT RELEASE FORM

Target Weed: Purple loosestrife Date: 7 / 12 / 2001 (MM DD YYYY)

Common Name) Agent: NAMA Number Released: 100+

(Scientific Name) County: Multnomah T ____ (Township) R ____ (Range) Sec ____ (Section) 1/4 ____

Lat: 45.62737 Long: -122.73795 GPS Derived? Yes ☒ No ☐ (Decimal degrees)

Land Owner: BLM ☐ USFS ☐ Private ☐ USFWS ☐ State ☐ Other ☐ Metro

Land Manager: Metro (BLM Districts & Resource Area / National Forest & Ranger District / Refuge / ODOT / BPA / City / County / Rancher / Etc.)

Site Name: Sybee Lake NW (Use geographical reference, mountain, river, valley, road, campground, powerline, etc.)

Site Data: Check all items that apply and fill in the blanks. (Draw map on back.)

Nearest Town St. Johns Road N Marine Dr Mile Post ____

Weather Clear ☒ Partly Cloudy ☐ Cloudy ☐ Rain ☐ Temp 75F Wind slight

Slope None ☐ Slight ☒ Moderate ☐ Steep ☐ Aspect N ☐ S ☐ E ☐ W ☐

Soil Sandy ☐ Loam ☒ Silt ☐ Gravel ☐ Clay ☐ Elevation 10 ft

Terrain Valley ☐ Foothill ☐ Mountain ☐ Plain ☐ River ☐ Lake/Pond ☒

Vegetation Grassland ☐ Shrubland ☐ Cropland ☐ Riparian/Wetland ☒ Conifer forest ☐
Deciduous Forest ☐ Mixed Forest ☐ Other ☐ ____

Plant Cover (Estimate %) Target Weed 10 Forbs(excluding target) 70 Grasses 5
Shrubs 10 Trees 10 Litter 40 Bare Ground —

Dominant Plant Species (list) Epilobium / Alnus rubra / willow

Land Use Range ☐ Timber ☐ Wildlife ☐ Right of Way ☐ Pasture ☐ Crop ☐ Vacant ☐
Wetland ☒ Recreation ☒ Mining ☐ Other ☐ ____

Disturbance Factor Grazing ☐ Logging ☐ Road ☐ Fire ☐ Flood ☒ Cultivation ☐
Construction ☐ Other ☐ ____

Infestation Type Isolated ☐ Patchy ☒ Linear ☐ Continuous ☐

Size of Infestation (acres) ≤1 ☐ 2-10 ☒ 11-50 ☐ 51-99 ☐ ≥100 ☐

Target Weed Height (ft.) <1 ☐ 1-2 ☐ 3-6 ☒ ≥7 ☐

Weed Density (Sq. yd.) ≤1 ☐ 2-5 ☒ 6-10 ☐ 11-25 ☐ 26-99 ☐ ≥100 ☐

Stage of Development Seedling ☐ Rosette ☐ Bolting ☐ Budding ☐ Flowering ☒ % 100
Seeding ☐ Dormant ☐

Is this BC Agent already present? Yes ☐ No ☒ Abundance per minute ____

Other BC Agents Present (list): none

Source of Agents: Ontario GP Date: 7/10/2001

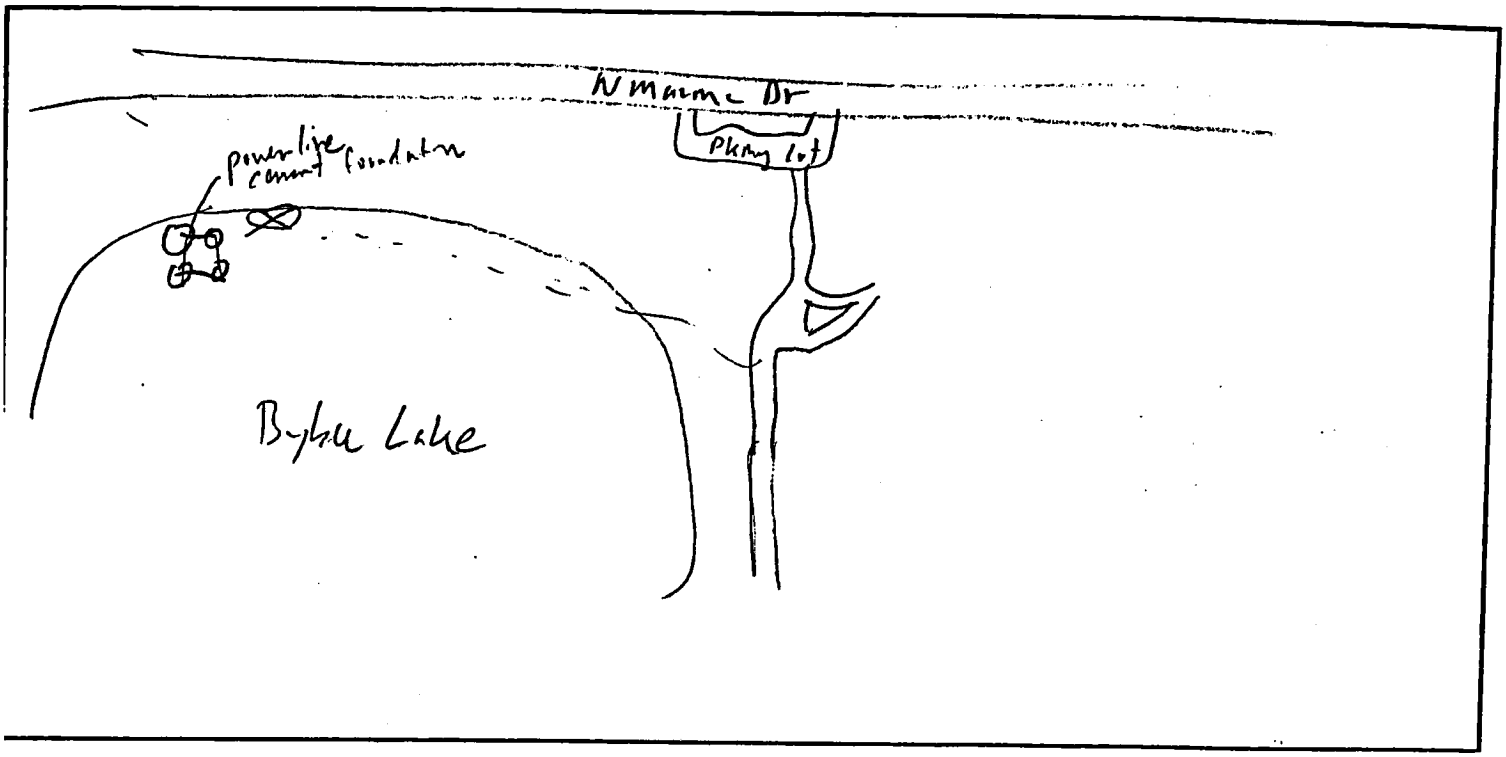
Stage Released Egg ☐ Larva ☐ Pupa ☐ Adult ☒ In plant material ☐ Galls ☐

Cooperators: APHIS / CSVC / Port / BES / OSU / OSWB / LCNC

Reported by: Shon Schooler & Gary Brown Database record no. ____

Directions to release site: N Marine Dr. to Smith & Byhe Lakes Entrance
(From Nearest Town) NW Byhe Lake

Please draw or atttach a map to the release site: Indicate the release site with an 'X' in a circle. Indicate North with an arrow. Label roads and features.



Non Target Info: Are there native plants in the same tribe or genus present at the release site?
☐Yes ☒No List:

Remarks: (Condition of insects, breeding or egg laying observed, predators, other species present, etc.)

USDA - APHIS / ARS Release Rec. No. (if applicable):

RETURN ORIGINAL FORM TO: WEED CONTROL, 635 CAPITOL STREET NE SALEM, OR 97301-2532

Retain copy for your records. If you have any questions, call 503-986-4621

ODA BIOLOGICAL CONTROL AGENT RELEASE FORM

Target Weed: Purple Loosestrife (Common Name) Date: 7 / 12 / 2001 (MM DD YYYY)

Agent: NAMA (Scientific Name) Number Released: 100

County: Multnomah T _____ (Township) R _____ (Range) Sec _____ (Section) 1/4 _____

Lat: 45.60806 (Decimal degrees) Long: -122.72395 GPS Derived? Yes ☒ No ☐

Land Owner: BLM ☐ USFS ☐ Private ☐ USFWS ☐ State ☐ Other ☒ Metro

Land Manager: Metro
(BLM Districts & Resource Area / National Forest & Ranger District / Refuge / ODOT / BPA / City / County / Rancher / Etc.)

Site Name: East Smith Lake
(Use geographical reference, mountain, river, valley, road, campground, powerline, etc.)

Site Data: Check all items that apply and fill in the blanks. (Draw map on back.)

Nearest Town St Johns Road Columbia Way Mile Post _____

Weather Clear ☒ Partly Cloudy ☐ Cloudy ☐ Rain ☐ Temp 80 Wind Slight

Slope None ☐ Slight ☒ Moderate ☐ Steep ☐ Aspect N ☐ S ☐ E ☐ W ☐

Soil Sandy ☐ Loam ☒ Silt ☐ Gravel ☐ Clay ☐ Elevation 15 ft

Terrain Valley ☐ Foothill ☐ Mountain ☐ Plain ☐ River ☐ Lake/Pond ☒

Vegetation Grassland ☐ Shrubland ☐ Cropland ☐ Riparian/Wetland ☒ Conifer forest ☐
Deciduous Forest ☐ Mixed Forest ☐ Other ☐ _____

Plant Cover (Estimate %) Target Weed 10 Forbs (excluding target) 30 Grasses 20
Shrubs 20 Trees 10 Litter 5 Bare Ground 5

Dominant Plant Species (list) willow / Epilobium / Cirsium arvense / Ash

Land Use Range ☐ Timber ☐ Wildlife ☐ Right of Way ☐ Pasture ☐ Crop ☐ Vacant ☐
Wetland ☒ Recreation ☒ Mining ☐ Other ☐ _____

Disturbance Factor Grazing ☐ Logging ☐ Road ☐ Fire ☐ Flood ☒ Cultivation ☐
Construction ☐ Other ☐ _____

Infestation Type Isolated ☐ Patchy ☒ Linear ☐ Continuous ☐

Size of Infestation (acres) ≤1 ☐ 2-10 ☒ 11-50 ☐ 51-99 ☐ ≥100 ☐

Target Weed Height (ft.) <1 ☐ 1-2 ☐ 3-6 ☒ ≥7 ☐

Weed Density (Sq. yd.) ≤1 ☐ 2-5 ☒ 6-10 ☐ 11-25 ☐ 26-99 ☐ ≥100 ☐

Stage of Development Seedling ☐ Rosette ☐ Bolting ☐ Budding ☐ Flowering ☒ % 100
Seeding ☐ Dormant ☐

Is this BC Agent already present? Yes ☐ No ☒ Abundance per minute _____

Other BC Agents Present (list): none

Source of Agents: Ontario SP East Oregon Date: _____

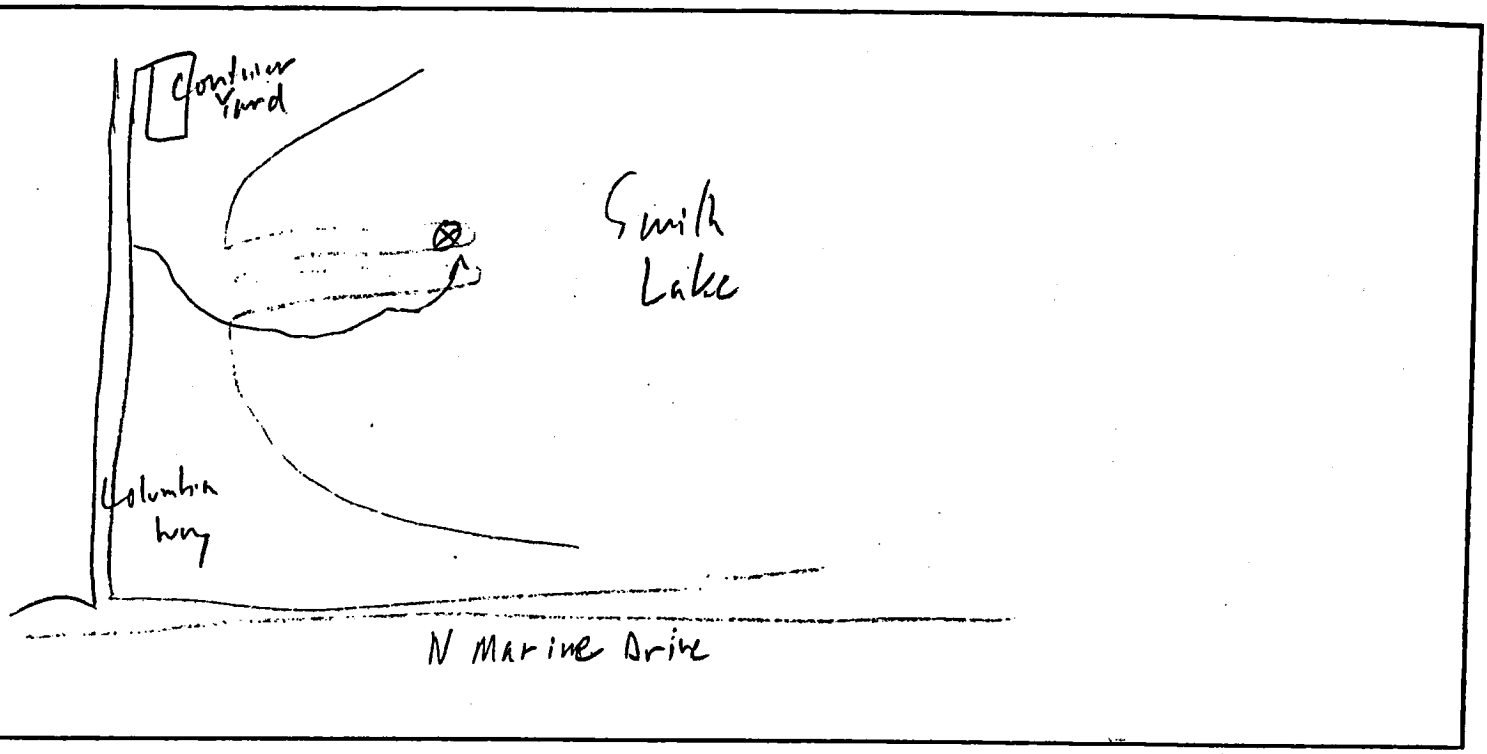
Stage Released Egg ☐ Larva ☐ Pupa ☐ Adult ☒ In plant material ☐ Galls ☐

Cooperators: APHIS / ODA / OSU / CSWC / LCWC / Port / BES

Reported by: Shon Schooler & Gary Brown Database record no. _____

Directions to release site: Columbia Way 1m S Marine Drive
(From Nearest Town)

Please draw or atttach a map to the release site: Indicate the release site with an 'X' in a circle. Indicate North with an arrow. Label roads and features.



Non Target Info: Are there native plants in the same tribe or genus present at the release site?
☐ Yes ☒ No List: _____

Remarks: (Condition of insects, breeding or egg laying observed, predators, other species present, etc.)

USDA - APHIS / ARS Release Rec. No. (if applicable): _____

RETURN ORIGINAL FORM TO: WEED CONTROL, 635 CAPITOL STREET NE SALEM, OR 97301-532

Retain copy for your records. If you have any questions, call 503-986-4621

ODA BIOLOGICAL CONTROL AGENT RELEASE FORM

Target Weed: Purple loosestrife Date: 7 / 12 / 2001 (MM DD YYYY)

Co. Agent (Common Name): HYTR Number Released: 100

(Scientific Name)

County: Multnomah T ____ (Township) R ____ (Range) Sec ____ (Section) 1/4 ____

Lat: 45.60806 Long: -122.72345 GPS Derived? Yes ☒ No ☐

(Decimal degrees)

Land Owner: BLM ☐ USFS ☐ Private ☐ USFWS ☐ State ☐ Other ☐ Metro

Land Manager: Metro

(BLM Districts & Resource Area / National Forest & Ranger District / Refuge / ODOT / BPA / City / County / Rancher / Etc.)

Site Name: East Smith Lake

(Use geographical reference, mountain, river, valley, road, campground, powerline, etc.)

Site Data: Check all items that apply and fill in the blanks. (Draw map on back.)

Nearest Town St Johns Road Columbia Hwy Mile Post ____

Weather Clear ☒ Partly Cloudy ☐ Cloudy ☐ Rain ☐ Temp 80 Wind slight

Slope None ☐ Slight ☒ Moderate ☐ Steep ☐ Aspect N ☐ S ☐ E ☐ W ☐

Soil Sandy ☐ Loam ☐ Silt ☐ Gravel ☐ Clay ☒ Elevation 15 ft

Terrain Valley ☐ Foothill ☐ Mountain ☐ Plain ☐ River ☐ Lake/Pond ☒

Vegetation Grassland ☐ Shrubland ☐ Cropland ☐ Riparian/Wetland ☒ Conifer forest ☐

Deciduous Forest ☐ Mixed Forest ☐ Other ☐ ____

Plant Cover (Estimate %) Target Weed 10 Forbs (excluding target) 30 Grasses 20

Shrubs 20 Trees 10 Litter 5 Bare Ground 5

Dominant Plant Species (list) willow / Epilobium / Ash / Cirsium arvense

Land Use Range ☐ Timber ☐ Wildlife ☐ Right of Way ☐ Pasture ☐ Crop ☐ Vacant ☐

Wetland ☒ Recreation ☒ Mining ☐ Other ☐ ____

Disturbance Factor Grazing ☐ Logging ☐ Road ☐ Fire ☐ Flood ☒ Cultivation ☐

Construction ☐ Other ☐ ____

Infestation Type Isolated ☐ Patchy ☒ Linear ☐ Continuous ☐

Size of Infestation (acres) ≤1 ☐ 2-10 ☒ 11-50 ☐ 51-99 ☐ ≥100 ☐

Target Weed Height (ft.) <1 ☐ 1-2 ☐ 3-6 ☒ ≥7 ☐

Weed Density (Sq. yd.) ≤1 ☐ 2-5 ☒ 6-10 ☐ 11-25 ☐ 26-99 ☐ ≥100 ☐

Stage of Development Seedling ☐ Rosette ☐ Bolting ☐ Budding ☐ Flowering ☒ % 100

Seeding ☐ Dormant ☐

Is this BC Agent already present? Yes ☐ No ☒ Abundance per minute ____

Other BC Agents Present (list): none

Source of Agents: Bend Bloody NY - Cornell Date: 7/5/2001

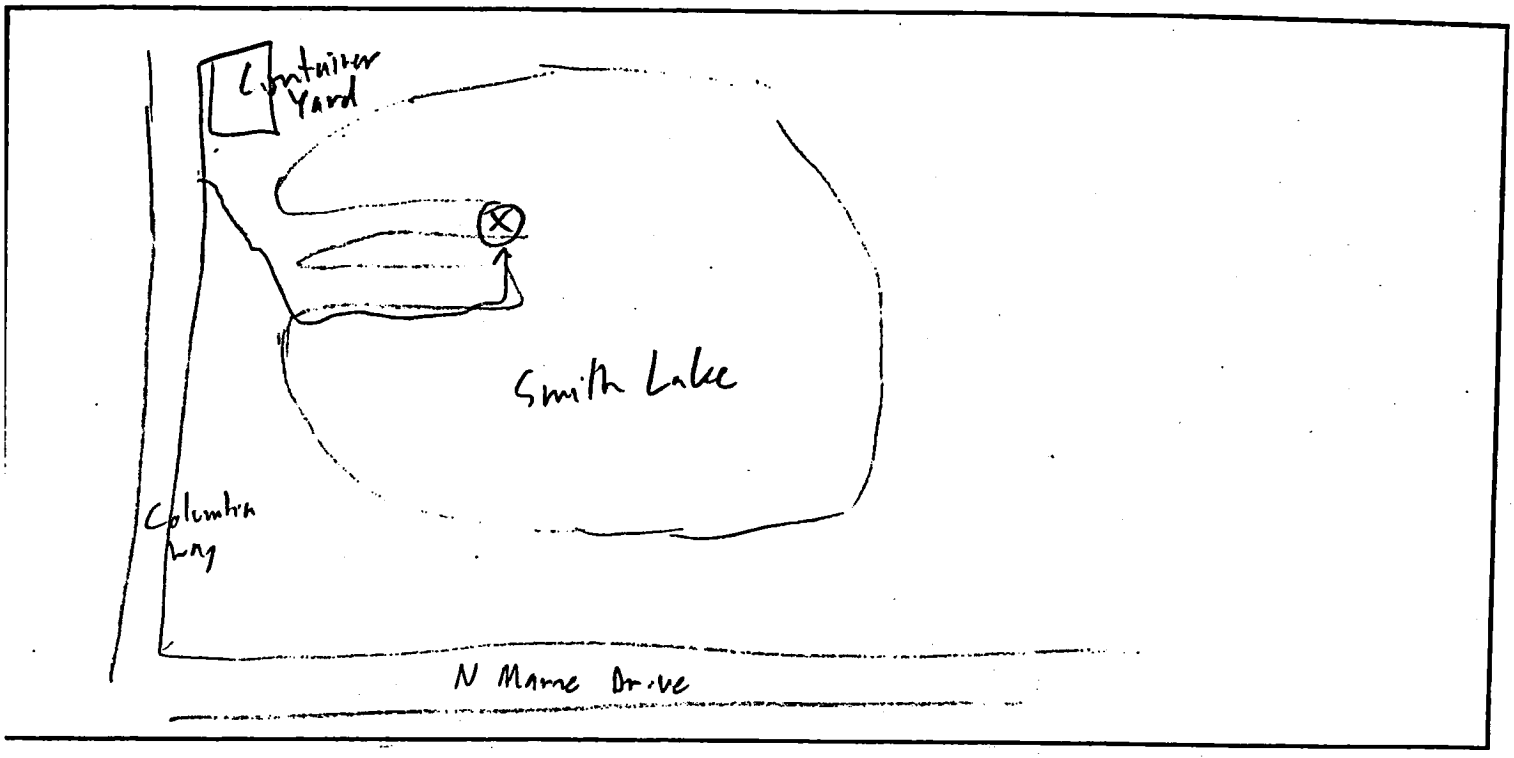
Stage Released Egg ☐ Larva ☐ Pupa ☐ Adult ☒ In plant material ☐ Galls ☐

Cooperators: APHIS / ODA / OSU / CSWC / Port / BES / LCWC / OSWB

Reported by: Shon Schooler & Gary Brown Database record no. ____

Directions to release site: Columbia Way 1m S Maple Drive
(From Nearest Town)

Please draw or atttach a map to the release site: Indicate the release site with an 'X' in a circle. Indicate North with an arrow. Label roads and features.



Non Target Info: Are there native plants in the same tribe or genus present at the release site?
☐Yes ☒No List:

Remarks: (Condition of insects, breeding or egg laying observed, predators, other species present, etc.)

USDA - APHIS / ARS Release Rec. No. (if applicable):

RETURN ORIGINAL FORM TO: WEED CONTROL, 635 CAPITOL STREET NE SALEM, OR 97301-2532

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