REPORT TO THE LEGISLATURE

PROGRESS OF THE *SPARTINA* AND PURPLE LOOSESTRIFE CONTROL PROGRAMS
(as required by RCW 17.26.015)

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EXECUTIVE SUMMARY

Chapter 255, Laws of 1995 designated Washington State Department of Agriculture (WSDA) as the lead state agency for the eradication of *Spartina* and the control of purple loosestrife. The state budget provided WSDA with $806,000 from the Aquatic Lands Enhancement Account (ALEA) to carry out its new responsibilities.

Since assuming its new role, WSDA has provided leadership and coordination to the *Spartina* and purple loosestrife control and eradication efforts of other state agencies, federal agencies, counties, tribes and private landowners.

This report provides updates on WSDA's *Spartina* Control and Eradication Program and Purple Loosestrife Control Program. The report details 1997 and 1998 treatment activities, budgets and preliminary 1999 control season plans.

Spartina **Program**

Spartina alterniflora, Spartina anglica and *Spartina patens* are noxious weeds that are detrimental to the state's valued tideflats. As individual infestations of *Spartina* grow, coalesce, and fill in with sediment, the result is the formation of elevated high marsh meadows. These meadows change the physical characteristics of an estuary, impacting native vegetation and wildlife such as eelgrasses, algae, shellfish, and birds.

There are ten counties in western Washington that have one or more infestations of either *Spartina alterniflora, Spartina anglica* or *Spartina patens*. These include Clallam, Grays Harbor, Island, Jefferson, King, Kitsap, Pacific, San Juan, Skagit and Snohomish counties. *Spartina* infestations range from one *Spartina* colony (or clone) measuring 50 feet in diameter in Clallam County to more than 5,000 acres spread throughout Willapa Bay in Pacific County. *Spartina* infests some percentage of an estimated 18,400 acres in western Washington. This amounts to an estimated 6,800 solid acres of *Spartina* if one could condense all scattered plants into a single contiguous meadow. All but approximately 10 solid acres are located in four counties: Pacific, Snohomish, Island and Skagit.

Spartina spreads quickly and is extremely difficult to eradicate. Eradication involves three levels of activity. First, you must prevent existing infestations from producing seeds and spreading the weed to new areas. You must then contain the existing infestation, a particularly important step given *Spartina's* high rate of vegetative spread. It then may take several years of treatment -- the average is three years -- with a variety of methods (such as mowing, applying herbicides, and hand pulling) before an infestation is eradicated. After eradication is achieved, areas must be monitored and any new seedlings removed to assure no re-establishment occurs.

WSDA Activities

As lead agency, WSDA has coordinated the development of a statewide strategy and management plan for eradicating *Spartina*, streamlined regulatory process requirements by obtaining "umbrella" water quality permits, provided cost-share moneys to state and local government and private landowners, and explored with its partners more efficient and cost-effective ways to eradicate *Spartina*.

In the past three control seasons (1996-1998), WSDA, government agencies and private landowners have worked to refine their treatments efforts, strategies and techniques. Some have been successful, and others have not.

Willapa Bay Status and 1999 Plans

In Willapa Bay, treatment efforts do not appear to have reduced the overall *Spartina* infestation. There are more than 5,000 solid acres of *Spartina* spread over 15,000 acres in the Bay. Combined efforts and resources of WSDA, the Department of Natural Resources (DNR), Washington Department of Fish and Wildlife (WDFW), United States Fish and Wildlife Service (USFWS), Shoalwater Bay Tribe and numerous private landowners resulted in treatment of approximately 450 solid acres of *Spartina* in 1998. More than 90 percent of the total infestation

in the bay received no treatment. Much of this untreated *Spartina* continued to produce viable seed, re-infesting many of the previously treated areas.

As a result, WSDA and partners are considering a new treatment strategy for 1999. WSDA, DNR, WDFW and USFWS plan to pool their resources and focus control efforts on specific areas in an attempt to control the infestation one site at a time. Each agency's role and responsibility will be tailored to the unique resources and expertise it possesses, allowing individual agencies to maximize their productivity while reducing redundancy and inefficiency.
Additionally, the Shoalwater Bay Tribe will continue to mow and dig *Spartina* on the reservation, and WSDA will continue to offer direct cost share assistance to private landowners and to keep them directly involved in planning and treatment activities.

Puget Sound Status and 1999 plans
Spartina control and eradication in the Puget Sound counties and Grays Harbor County has been successful in 1997 and 1998.

- All known infestations in **Clallam, Grays Harbor, Jefferson, King, Kitsap** and **San Juan** counties have been repeatedly treated and, in many cases, totally eradicated.
- In **Island County**, all outlier clones were treated, seed production was successfully suppressed on Whidbey Island, and the majority of the *Spartina* population in Cultis Bay was eradicated.
- In **Snohomish County** all known infestations in the southern part of the county and approximately 80 percent of the infestations in Port Susan were treated and seed production was suppressed along the coast from King County to just south of Skagit Bay.
- In **Skagit County** all known infestations were treated in 1997 and all but one treated in 1998 (due to boat problems). The treatments successfully suppressed seed production at all treated sites.

Besides eradicating a significant amount of *Spartina*, agencies and organizations operated in a more coordinated manner. WSDA and its partners will evaluate treatment efficacy next spring and adjust firelines to target new infestations for 1999.

Table 1, *Spartina Treated in Washington State*, summarizes the control effort to date. This table addresses the actual amount of *Spartina* treated in each county if one were to condense scattered plants into a single discrete meadow. Many of these estimates are based on visual observation only. Most private and public landowners currently do not have the time, budget or equipment required to do a thorough survey. WSDA staff have attempted to standardize the information submitted from each agency.

Table 1, *Spartina* Treated in Washington State

County	*Spartina* present	*Spartina* treated	Treatment Method
Pacific	Approx. 5,000 - 6,000 solid acres spread over more than 15,000 acres	'96 - approx. 414 solid acres '97 - approx. 742 solid acres '98 - approx. 450 solid acres	Mow, mow/herbicide, herbicide, seedling removal
Grays Harbor	Scattered clones < 0.5 acres in size	'96 - all but 10 clones '97 - all but one clone **'98 - all treated**	Mow, mow/herbicide, herbicide, seedling removal
Clallam	1 infestation < 0.5 acres in size	'96 - none **'97 - treated twice** **'98 - treated three times**	Mow
Jefferson	11 infestations - <1 acre in size 1 = 1 acre	**'96 - all treated** **'97 - all treated** **'98 - all treated at least twice**	Mow, dig, herbicide, seedling removal
Kitsap	7 infestations - approx. 6 acres	'96 - 3 treated, 4 discovered '97 - all but 2 tribal sites **'98 - all treated**	Mow, dig, seedling removal
King	A few scattered clones	**'96 - all treated** **'97 - monitored** **'98 - all treated (small clones)**	Dig
Snohomish	Approx. 350 solid acres spread out over 1,100 acres	'96 - approx. 42 solid acres '97 - approx. 89 solid acres '98 - approx. 126 solid acres	mow, mow/herbicide, herbicide, seedling removal, dig
Island	Approx. 350 solid acres spread out over 800 acres	'96 - approx. 51 solid acres '97 - approx. 250 solid acres '98 - approx. 160 solid acres	Mow, mow/herbicide, herbicide, seedling removal
Skagit	Approx. 80 solid acres spread out over 440 acres	'96 - approx. 55 solid acres '97 - approx. 91 solid acres '98 - approx. 57 solid acres	Mow, mow/herbicide, herbicide, seedling removal
San Juan	3 infestations - < 0.5 solid acres in size	**'96 - all treated** **'97 - all treated** **'98 - all treated**	Herbicide, dig

Program Challenges and New Developments

WSDA's *Spartina* program is facing several challenges and monitoring research in biological control.

⇒ **Funding**

A major obstacle in the *Spartina* eradication effort continues to be adequate funding. In 1997, WSDA and its partner state agencies successfully sought additional funding for *Spartina* control from the Washington Coastal Protection Fund. The Natural Resource Damage Assessment (NRDA) committee which manages the fund granted $450,000 for the 1997 and 1998 control seasons which provided for additional control crews and equipment primarily in northern Puget Sound. This funding ends June 30, 1999. WSDA, in cooperation with other state agencies and county noxious weed boards, has applied for federal assistance, however, no additional alternative

funding has been secured at this time. No additional funding for the 1999 control season will hinder control efforts.

⇒ **Herbicide Use**

The use of the herbicide Rodeo® has been limited as a result of rulings by the Pollution Control Hearings Board (PCHB) in response to the 1997 appeal of the Willapa Bay water quality permit by the Ad Hoc Coalition of Willapa Bay. As a result of the appeal, the PCHB ruled that Rodeo® could only be applied when wind speeds were no more than 5 miles per hour (rather than 10 miles per hour) and that there must be at least six hours, not four hours, of drying time before the tide returns. This ruling affected not only the Willapa Bay permit but the five permits WSDA obtained covering the other waterbodies. This ruling effectively reduces the number of days applicators can use herbicide for *Spartina* control because of tidal activities and weather in the region.

The Ad Hoc Coalition of Willapa Bay appealed the permit again in 1998. As of this date, the issue remains unresolved.

Continued use of Rodeo® is also in question. In 1998, the Environmental Protection Agency re-examined its information base in support of the registration of Rodeo® to control *Spartina*, and required that an additional shellfish residue study be produced in order to maintain this use in the future. WSDA is currently assembling funding for this study. Participants are anticipated to include the Washington State Commission on Pesticide Registration, the Willapa Bay/Grays Harbor Oyster Growers Association, the University of Washington, Monsanto Agricultural Co., USFWS, WSDA, and possibly others. WSDA has budgeted $30,000 towards the study in FY99.

⇒ **Biological Control Research**

Biological control is considered one of the more promising tools for *Spartina* control. Several organisms are currently being evaluated. The farthest advanced in testing is the planthopper *Prokelisia marginata*. The results of several separate trials conducted from 1993 to 1997 and follow-up trials conducted in 1998 revealed that the planthopper had an unusually devastating effect on *Spartina alterniflora* and *Spartina anglica* from Washington State.

Federal funding of $335,000 to continue this line of research has been developed by the Olympic Natural Resources Center of the University of Washington. If the results of the *Prokelisia marginata* studies support obtaining the necessary permits for its general release in Willapa Bay, all agencies involved in the *Spartina* eradication effort will coordinate their control efforts to utilize this window of opportunity. At this point it is too early to say if, or when, any widespread release of the insect will occur.

Purple Loosestrife Program

Purple loosestrife is semi-aquatic weed that is found in virtually every county in Washington State. Purple loosestrife infests environmentally sensitive habitats such as meadows, marshes, stream and river banks, and lake shores as well as irrigation ditches, drainage ditches, and stormwater retention basins. Loosestrife harms wetlands by crowding out native wetland plants and by eliminating nutritional food sources and shelter for wetland wildlife that has adapted to

specific plant communities. Loosestrife also chokes out both natural and artificial waterways, slowing natural flows and promoting deposit of silt. This process causes long-term water quality degradation and requires costly maintenance including dredging and cleaning of drainage and irrigation ditches.

Purple loosestrife flourishes in many parts of our state due in part to the relative lack of natural enemies. Loosestrife is also a prolific seed producer as individual plants are capable of producing over a million seeds. The seeds are very small, about the size of ground pepper, and are easily transported by water, wind, wildlife, boats, boat trailers and vehicles. When conditions are right, a small isolated cluster of loosestrife plants can spread and cover a marsh in one growing season, spelling a quiet death for wetlands as a natural ecosystem.

Complete eradication of purple loosestrife from Washington State is not possible at this time due largely to the extent of the infestation and the limited control options currently available. The availability of a selective herbicide approved for use in wetland areas would facilitate control efforts. Currently herbicide control options are limited to Rodeo®, which is relatively non-selective, and 2,4-D which is selective but only approved by the Department of Ecology for use in very limited instances.

WSDA Activities

Purple loosestrife activities during the 1997-99 biennium included obtaining a statewide water quality permit each control season to allow herbicide treatment for purple loosestrife throughout the state. Coverage under this permit was issued to 24 individuals and agencies in 1997 and 32 individuals and agencies in 1998. Approximately 2,100 acres of purple loosestrife were treated with herbicides under provisions of the permit in 1997. In 1998, approximately 2,900 acres of purple loosestrife were treated under the permit.

WSDA staff controlled all known purple loosestrife infestations in Jefferson and Clallam counties in 1997 and 1998, facilitated the control of purple loosestrife on BLM lands in Skagit County, and issued 17 permits for manual control projects to allow movement of plants to disposal sites in 1997 and 1998. The Department also enhanced county noxious weed control board activities by purchasing equipment, such as small boats and canoes, used to survey and control purple loosestrife infestations and to distribute biological control organisms.

WSDA continued to contract with Washington State University to raise, collect and release biological control agents for purple loosestrife in Washington State. Approximately 17,600 adult *Galerucella calmariensis* and *G. pusilla* beetles were released in 1997. Approximately 32,400 were released in 1998. These biological control agents have had a significant impact on the purple loosestrife in many areas including the Winchester Wasteway area in Grant County. The impact in this area is especially visible as hundreds of acres of loosestrife plants show significant feeding damage from the beetles.

Preliminary 1999 Plans

For 1999, WSDA will continue to focus on isolated small infestations for control either manually, with herbicide or with a combination of methods. The large infestations will continue to be targeted for biological control. This is the best tool currently available for the prevention of seed production. In addition, WSDA will continue to map infestation and biological control release sites.

Introduced, exotic species of *Spartina* and Purple Loosestrife are an environmental threat to this state, and, as this report details, a challenge to control and eliminate.

***SPARTINA* PROGRAM**

Basic Program Components

The WSDA *Spartina* program has several basic components including budget, county activities, cost share activities, water quality permits and management plans at the county and statewide level. These components are detailed in this section of the report.

Budget

WSDA has allocated $706,000 of its appropriation from the Aquatic Lands Enhancement Account (ALEA) for *Spartina* activities this biennium. Table 2, *Budget Activity by Area*, illustrates how WSDA is using the funds. The table shows actual expenditures for FY98 and projected expenditures for FY99.

Table 2, Budget Activity by Area - 1997-99 Biennium

($ in thousands)

	Puget Sound/Oly. Peninsula		**Willapa Bay**		**Total**	
Activity	*FY98*	*FY99*	*FY98*	*FY99*	*FY98*	*FY99*
WSDA Coordination and control activities	$40	$50	$40	$50	$80	$100
Survey	$24	$24	0	0	$24	$24
Cost Share Work Crews					$135	$115
- Skagit	$30	$20				
- Island	$40	$25				
- Snohomish	$38	$25				
- Pacific			$27			
-WDFW (in Pacific County)				$45		
Landowner Cost Share	$1	$5	$0	$5	$1	$10
Aerial Spray	$10	$10	$34	$25	$44	$35
Other Contracts (U of W)				$30		$30
Public Notification	$6	$8	$6	$8	$12	$16
Equipment	$8	$25	$8	$39	$16	$64
TOTAL	$201	$188	$115	$202	**$316**	**$390**

Notes for Table 2:

∗ ***Coordination and control activities***

Expenditures were lower than anticipated in FY98 due to a temporary vacancy in the Statewide *Spartina* Control Coordinator position.

∗ ***Survey***

This funding enhances the survey and public education activities of Adopt-A-Beach and the Washington Water Trails Association.

* ***Cost Share Work Crews***

Due to urgent field needs, WSDA allocated more funding in this category for the first half of the biennium in Skagit, Island and Snohomish counties. Also, re-prioritization of activities within Pacific County led direction of funding for treatment in Willapa Bay to WDFW.

* ***Landowner Cost Share***

Expenditures were lower than anticipated in FY98 for direct cost share to land owners. Landowners chose the services of a county work crew over direct cost share assistance (see Cost Share section for matrix). Thus, WSDA allocated the majority of its cost share funding towards the work crew option.

* ***Aerial Spray***

WSDA, in conjunction with other state and federal agencies and private landowners, conducted aerial herbicide applications in Willapa Bay and north Puget Sound during FY98. WSDA anticipates using the remainder of the money budgeted for aerial spray in June of 1999 in Willapa Bay and northern Puget Sound.

* ***Other Contracts***

The Environmental Protection Agency (EPA) has requested that WSDA conduct a shellfish residue study in support of the current use of Rodeo® for *Spartina* control in Willapa Bay. WSDA allocated funding for this study in FY99.

* ***Public Notification***

As a result of increased production costs, WSDA allocated more funding for FY99.

* ***Equipment***

This category reflects the leasing and maintenance costs of the Marsh Master II and maintenance costs for other equipment.

County Activities

WSDA allocated funding for work crews in Snohomish, Skagit, Island and Pacific counties for *Spartina* eradication in 1996, 1997 and 1998, as these counties have the majority of the *Spartina* in the state. This funding was allocated by way of contracts in which WSDA and the contracting agency agreed on designated priority areas. Prior to writing the contracts, WSDA compiled and prioritized all private landowner County Work Crew Cost Share requests based on their locations relative to the established firelines. These requests became the basis for site lists specified in each contract. WSDA conducted field audits throughout each control season. The contracts required that interim and final reports describing treatment efforts and funding expenditures be provided to WSDA.

Cost Share Program

As directed by the 1995 Legislature, WSDA developed a cost share program to provide financial assistance to private landowners for *Spartina* control and eradication. Of the alternatives offered (Table 3, *1998 WSDA Cost Share Options*), landowners have overwhelmingly requested the services of a county crew, rather than direct cost share. For this reason, WSDA allocated most of the cost share money for this option. Some landowners and county coordinators suggested the state pay more than 50 percent of the control costs or allow more flexibility in the cost share program. WSDA will consider these suggestions in revising the list of cost share options for future seasons.

Table 3, 1998 WSDA Cost Share Options

Eradication/Control Method	WSDA Contribution	Landowner Contribution
County work crews mow and/or apply herbicide	WSDA grants county funds to treat priority areas in '98 control season	Must treat once in '98 season
Direct cost share - Landowner applies herbicide	100% of herbicide and adjuvant	100% labor & equipment
Direct cost share - Landowner covers or digs up infestation	100% of pre-approved materials	100% labor
Direct cost share - Landowner uses WSDA pre-approved contractor	50% of contractor cost	50% of contractor cost

Water Quality Permit Coverage

Due to the difficulty of obtaining short-term water quality modification permits for herbicide application in prior years, WSDA worked with Ecology prior to the 1996 control season on a new approach to obtaining the needed permits. The Department applied for and negotiated the terms of six area-wide water quality permits for the 1996, 1997 and 1998 control seasons. These permits have allowed the use of the herbicide Rodeo® and surfactants (R-11, X-77, LI-700) in the waters of Willapa Bay, Grays Harbor, the Straits of Juan de Fuca/Pacific Ocean, Hood Canal, southern Puget Sound and northern Puget Sound. According to these permits, the herbicide and surfactants could be used for *Spartina* control June 1 through October 31.

Once WSDA obtained the water quality permits, coverage was granted under one or more of the permits to qualified applicants. In 1997, 39 applicants requested coverage under one or more of the WSDA permits. In 1998, 44 applicants requested coverage. Table 4, *Permit Coverage by Waterbody*, summarizes the permit coverage WSDA granted in 1997 and 1998.

Many applicants were covered under more than one permit. The applicants included federal, state and county agencies, commercial applicators and private landowners. Applicants who met the permit terms received a packet containing a *Spartina*-specific pesticide application record form, a WSDA flier on herbicide application recommendations, the applicable permit and a general flier on *Spartina*.

Table 4, Permit Coverage by Waterbody

Waterbody	1997 Applicants	1998 Applicants
Willapa Bay	24	35
Grays Harbor	10	20
Northern Puget Sound	22	26
Hood Canal	12	17
Straits of Juan de Fuca	11	16
Southern Puget Sound	9	16

The water quality permits required WSDA to notify all residents with potential to be affected by herbicide applications. WSDA accomplished this notification by conducting a mass mailing to more than 46,000 residents in western Washington in May of each year. WSDA staff also posted all public access points along selected shorelines before June 1 and published legal notices in relevant county newspapers each month during the control seasons.

Management Plans

The 1995 Legislature directed WSDA to develop a Statewide *Spartina* Management Plan. To accomplish this, six area-wide management plans (one for each waterbody covered by a permit) were developed by WSDA in conjunction with county noxious weed control boards. The county management plans detailed historical information on known infestations, past treatment efforts, and plans for upcoming control seasons. WSDA consolidated information from the six area-wide management plans into a single draft document.

The Statewide *Spartina* Management Plan is a dynamic document, updated yearly as new control and survey data/techniques become available. WSDA anticipates a finalized version of the 1999 *Spartina* Management Plan being available before the beginning of the next control season.

Summary of Statewide Program Activities

1996 Activities

As a result of new legislation and funding, WSDA undertook its first significant effort to treat and eradicate *Spartina* during the 1996 control season. WSDA funded three county work crews in northern Puget Sound and two work crews in Pacific County. In addition, DNR hired a full-time crew to treat *Spartina* on their land in Willapa Bay, and WDFW ran a crew that worked on their land in Pacific, Grays Harbor and Snohomish counties. The USFWS also dedicated a crew to treating *Spartina* full-time during the control season on the Willapa National Wildlife Refuge. WSDA staff worked with Adopt-A-Beach and private citizens to survey and treat infestations in counties without an activated noxious weed control board.

The most effective treatment method used during this year was a mow/herbicide combination. Most agency and county workers achieved the best results by first mowing *Spartina* infestations to the mudline, letting the new vegetation grow back to 12 or 18 inches, then applying the herbicide Rodeo®. This method allowed less herbicide to be used, and appeared to cause greater efficacy because the new vegetation was cleaner and had less wax build-up. *Spartina* infestations that were difficult to access or large in size were ideal for this kind of treatment. However, repeated mowing to the mudline was the most frequently used treatment method. The equivalent of approximately 860 solid acres of *Spartina* were treated in 1996.

1997 Activities

For the 1997 control season, similar methods were used as in 1996. However, there were three significant differences:

- Implementation of a "Fireline" control strategy;
- additional funding; and
- new equipment

* ***Fireline Strategy***

  WSDA inaugurated a new *Spartina* eradication strategy, the "fireline" strategy in 1997. To implement the new strategy, WSDA and its partners (e.g., federal, state, and county agencies, Native American tribes, educational institutions, private landowners and volunteers) identified isolated or localized *Spartina* infestations deemed at the periphery of main infestations. Based on the location of these, WSDA drew lines across maps of northern Puget Sound and Willapa Bay defining the fireline and priority treatment areas. The *Spartina* populations outside these lines were targeted for concerted treatment and, wherever possible, one-season eradication. Firelines would then be moved inward in succeeding years as the overall infestation is geographically reduced. Adherence to the fireline strategy allowed participating agencies to build on efforts made in successive control seasons and use resources more effectively.

* ***Additional Funding***

Several funding proposals were awarded in 1997 to *Spartina* control efforts, which provided for additional control crews and equipment. WSDA and DNR, in conjunction with the State Parks and Recreation Commission and WDFW, submitted two successful funding proposals to the Natural Resource Damage Assessment (NRDA) committee. The NRDA committee manages the Washington Coastal Protection Fund which is funded from money obtained from penalties and natural resource damage assessments from oil spills. The committee allocated $450,000 from this fund for the 1997 and 1998 control seasons in northern Puget Sound primarily for more *Spartina* control crews and equipment operated by WDFW. This funding also paid for two six-month temporary positions at WSDA to oversee and coordinate the north Puget Sound treatment effort, which included up to seven crews working in the tri-county area (Snohomish, Island and Skagit counties). In addition, Pacific County acquired federal money. The United States Department of Agriculture, through the Agricultural Conservation Program, awarded $422,800 in cost share money to private landowners in Pacific County. This money was committed in the fall of 1996, and projects are on-going at this time.

* ***New Equipment***

  Finally, the state and federal agencies experimented with new equipment to treat *Spartina* infestations. Two airboats were purchased cooperatively by WSDA, DNR, and WDFW. Also, USFWS in conjunction with DNR and WDFW began using a barge to transport water for herbicide treatments. Crews treating *Spartina* were able to spend more time working on the infestations instead of trudging through the mud trying to get to them.

As a result of the new treatment strategy, new equipment and the additional funding, WSDA and partners treated and eradicated many populations of *Spartina* in Puget Sound during the 1997 control season.

In Willapa Bay, the most successful component of the 1997 program was the focused large-scale coordination and cooperation efforts of the three land management agencies. Large-scale efforts combined the control crews from DNR, WDFW and USFWS on a given area, enabling a larger number of persons to participate on one site. Mowing or herbicide treatment of the lower elevation area of a *Spartina* infestation can often be done only at extreme low tide, during a relatively brief window of time. Combined crews resulted in treatment of approximately seven acres per tide cycle, a seven-fold increase from 1996 efforts.

As was the case in 1996, the most successful treatment method appeared to be mowing the *Spartina* down to the mud, followed by a Rodeo® application. The NRDA crew enhanced all of the counties' efforts in northern Puget Sound by mowing large infestations, a very labor intensive process which the counties could not otherwise afford on many of their sites, prior to herbicide treatment. This was particularly significant on Whidbey Island, as it permitted the control of seed production on all known sites. Overall, the equivalent of 1,181 solid acres of *Spartina* were treated in 1997, with all known infestations treated in five of the 10 counties with *Spartina*.

1998 Activities

Just as treatment efforts during 1997 were built on the efforts of 1996, the treatment efforts for 1998 were based on previous years. Adhering to the fireline strategy, WSDA allocated funding to Snohomish, Skagit and Island counties, aiding the noxious weed boards in conducting meaningful *Spartina* control programs. WSDA also continued to coordinate and partner with DNR, WDFW, USFWS, tribes, landowners and volunteers to treat and monitor infestations.

In addition, WSDA field tested a new piece of equipment in 1998. Building on earlier efforts to find a better means of controlling larger *Spartina* infestations, WSDA leased the Marsh Master II. The Marsh Master II is an amphibious track vehicle originally designed for use in marsh and swamp terrain of the southeastern United States. Pontoons and an outboard motor allowed the machine to access infestations sites by way of deep water channels. The machine had an eight-foot hydraulic sickle-bar cutter installed on it for mowing purposes. WSDA hired a two-person crew to operate and maintain the machine for a four-month control season. Overall, the Marsh Master II program was a success. The machine mowed close to 90 acres of solid *Spartina*, including approximately 30 acres at Potshot Slough in Willapa Bay that was later treated with an aerial herbicide application. WSDA will determine efficacy of this combination of treatment methods next spring, but preliminary results are encouraging. The machine, when running efficiently, mowed approximately one acre per hour. However, the machine was not without complications. The prototype sickle-bar cutter required constant maintenance and, in the end, was a determining factor in WSDA's decision not to purchase the machine.

The field testing of the Marsh Master II by WSDA provided the basis from which state and federal agencies could pursue additional mowing equipment. At the end of the 1998 control season, WDFW purchased a hydraulic sickle-bar cutter known as a Hockney mower. WDFW mounted this cutter on an airboat co-owned with WSDA. They have field tested it a few times, and it appears to be extremely effective. Unlike the Marsh Master II, this machine mows the *Spartina* while it is covered by water, greatly expanding the time control crews can work on a specific infestation during a tidal cycle. In addition, USFWS is in the process of purchasing a large amphibious mowing machine known as a Quality Machine. Instead of a sickle-bar cutter, this machine utilizes a large flail mower. They anticipate having it in the field at the beginning of the 1999 control season.

Although treatment efficacy will not be determined until next year, WSDA staff feel that control efforts were successful in the Puget Sound region during the 1998 control season.

In Willapa Bay, WSDA, DNR, WDFW and USFWS continued to build on previous treatment efforts and refine their techniques. Increased interagency cooperation was the big success in Willapa Bay during the 1998 season. The USFWS provided a base of operations for DNR and the WSDA Marsh Master crew at the Willapa National Wildlife Refuge, and the majority of maintenance support on the increased fleet of boats and equipment in the Bay. Crews from DNR, USFWS and WDFW participated in several cooperative treatment efforts around the Bay treating and successfully suppressing seed production within the treated areas. However, there are more than 5,000 solid acres of *Spartina* spread throughout Willapa Bay. Combined efforts of all state and federal agencies, Shoalwater Bay Tribe, and numerous private landowners resulted in the

treatment of less than 10 percent of the overall infestation. Much of the untreated infestation continued to produce seed, re-infesting many areas previously controlled.

Overall, the equivalent of 802 solid acres of *Spartina* were treated in 1998, with all known infestations treated in six of the 10 counties with *Spartina*.

Specific Treatment Effort by Agencies/Group

WSDA asked each organization to submit data segregated by county to estimate total *Spartina* treated during the past two control seasons. For each treatment method, WSDA requested an estimate of actual (solid) *Spartina* acreage treated and the total acreage infested with some percentage of *Spartina*.

Table 5, *1997 and 1998 Spartina Control Efforts*, shows the estimated solid acres of *Spartina* treated by each agency, organization or group. WSDA attempted to standardize the information submitted by each entity and will continue to refine this effort in the future.

Table 5, 1997 and 1998 Statewide *Spartina* Control Effort

Sponsoring Agency / Group	County Treated	1997 Solid Acres Treated (est.)	1998 Solid Acres Treated (est.)	Treatment Methods Used
DNR	Pacific (state crew)	146	72	Mow, mow/herbicide, herbicide seedling removal
	Pacific	200	40	Aerial herbicide application
	Agency Total:	346	112	
WDFW	Pacific (state crew)	35.3	45	Mow, mow/herbicide, herbicide
	Grays Harbor (state crew)	0.6	1	Mow/ herbicide
	Northern Puget Sound (state crew)	124	133	Mow, mow/ herbicide, herbicide
	Snohomish	46	0	Aerial herbicide application
	Agency Total:	206	179	
WSDA	Pacific (county crew)	25	0	Mow, mow/ herbicide, herbicide
	Pacific (contract with WDFW state crew)	0	15	Mow, mow/ herbicide, herbicide
	Snohomish (county crew)	17	45	Mow, mow/ herbicide, herbicide
	Skagit (county crew)	62	48	Mow, mow/ herbicide, herbicide
	Island (contractor)	106	101	Mow/ herbicide, herbicide, physical removal
	San Juan (state crew)	0.06	0.06	Physical removal
	Jefferson (state crew)	2.5	1.91	Mow, herbicide, physical removal
	Clallam (state crew)	0.05	0.50	Mow, physical removal
	Kitsap (state crew)	1	5.75	Mow, physical removal
	King (state crew)	0.25	0.13	Physical removal
	Agency Total:	214	217	
Ecology	Skagit - Padilla Bay Agency Total:	6.5	9	Mow, mow/ herbicide, physical removal
State Parks	Jefferson Agency Total:	1	1	herbicide, physical removal
USFWS	Pacific Agency Total:	23	42	Mow, mow/ herbicide, herbicide
Private Owners	Pacific, Grays Harbor, Jefferson, Kitsap, King, Island, Snohomish, Skagit, (including Native American Tribes)	135	242	Mow, mow/ herbicide, herbicide physical removal
	Pacific	185	0	Aerial herbicide application
	Island	65	0	Aerial herbicide application
	Private Landowner Total:	385	242	
	TOTAL SOLID ACRES TREATED	***1,181***	***802***	

	(est.):		

In Pacific, Island and Skagit counties, fewer solid acres of *Spartina* were treated in 1998 than in 1997. This decline in treated acreage masks the true effort and progress made in the counties in 1998. The higher acreage treated in 1997 includes large-scale aerial herbicide applications that substantially increased the total solid acres treated. WSDA and partners focused more on ground operations in 1998, conducting only one small (40 acres) aerial herbicide application in Willapa Bay. WSDA primarily focused on the developing the Marsh Master II large scale mowing operation, and the other agencies continued to integrate the use of airboats into their treatment programs.

In Skagit County, problems with their boat prevented them from accessing one site at the end of the 1998 control season. Also, Island and Skagit counties have treated and successfully eradicated populations of *Spartina* at many easy to access sites. The infestations that remain take longer to access and treat, and many sites are now just being monitored for re-infestation rather than being treated.

Table 6, *1997 and 1998 Spartina Treatment Effort by County*, summarizes the statewide treatment effort by county. It also indicates counties where all known *Spartina* infestations were treated.

Table 6, 1997 and 1998 *Spartina* Treatment Effort by County

County	1997 Solid Acres Treated (est.)	1998 Solid Acres Treated (est.)
Clallam	0.50 ♦	0.50 ♦
Grays Harbor	0.60	1.00 ♦
Island	253.50	160.00
Jefferson	3.50 ♦	1.91 ♦
King	0.25 ♦	0.13 ♦
Kitsap	1.00	5.75 ♦
Pacific	741.30	450.00
San Juan	0.06 ♦	0.06 ♦
Skagit	91.20 ♦	57.00
Snohomish	89.00	126.00
TOTAL (est.):	**1,181**	**802**

♦ = All Known *Spartina* Infestations Treated

Program Results by Geographic Area

Northern Puget Sound
For purposes of WSDA's *Spartina* program, the north Puget Sound region consists of Skagit, Island and Snohomish counties. Skagit County currently contains approximately 80 solid acres of *Spartina* spread over 440 acres; Island County has approximately 350 solid acres spread over 800 acres; and Snohomish County has approximately 350 solid acres spread over 1,100 acres.

⇒ **Budget**
WSDA provided a total of $108,000 through contracts with noxious weed control boards of the three northern counties for *Spartina* control and eradication in FY98. WSDA allocated $70,000 for *Spartina* control and eradication for FY99 (Refer back to Table 2 for details).

A Coastal Protection Fund award by the Natural Resource Damage Assessment (NRDA) committee contributed $450,000 in additional funding to *Spartina* control and eradication in northern Puget Sound in FY97 and FY98.

Additionally, private landowners contributed approximately $12,000 worth of herbicide and surfactants for *Spartina* control and eradication at Deer Lagoon in Island County during the 1998 control season.

⇒ **Activities**
Island County and its contractor treated all outlier clones in the north part of the county and all Whidbey Island infestations in 1997 and 1998. Additionally, the US Navy conducted *Spartina* Control and eradication work on its property, contributing to a total suppression of seed production on Whidbey Island in 1998.

Skagit County treated all known infestations in 1997. They treated all but one infestation in 1998. Problems with their boat made access to the one remaining infestation impossible. The treatments successfully suppressed seed production at all treated sites. The Swinomish Tribe, with assistance from Skagit County, physically removed a large portion of the Swinomish Channel infestation and suppressed seed production in areas where physical removal was not possible.

In 1997 and 1998, **Snohomish County** treated all known infestations in the southern part of the county. During the 1998 control season, they were able to suppress seed production along the coast from King County to just south of Skagit Bay. This was done in cooperation with the Tulalip Tribe which conducted *Spartina* control on reservation lands. In addition, Snohomish County treated the majority of the Port Susan area infestation.

WSDA and WDFW conducted a substantial aerial herbicide application on a 65-acre meadow on Camano Island in Island County and a 46-acre meadow on nearby LeQue Island in Snohomish County during the 1997 control season. These meadows were solid *S. anglica*, a different species

from that found in Willapa Bay. Treatment occurred late in the season and appeared to be effective, reducing the amount of re-growth observed in 1998.

For mature infestations that have not coalesced into solid meadows, mowing the infestation down to the mud followed by a herbicide application appeared to be the most effective treatment method in northern Puget Sound. The WDFW crew, funded by the NRDA grant, enhanced county efforts by mowing large infestations prior to the application of herbicide. This is a very labor intensive process that counties could not afford to do otherwise. Also, a WDFW crew normally assigned to Willapa Bay worked as part of a collaborative control effort with other agencies and organizations on both private and public lands in north Puget Sound. This joining of forces allowed more efficient and effective control on large infestations.

⇒ **Preliminary 1999 Plans**

Spartina control and eradication in north Puget Sound has been successful in 1997 and 1998. Besides eradicating a significant amount of *Spartina*, agencies and organizations are operating in a more coordinated manner. As a result, current fireline positions will be adjusted to target new sites in Snohomish, Skagit and Island counties next year once 1998 treatment efficacy is determined (spring 1999). WSDA and partners will continue to utilize an integrated weed management approach (combination of methods based on the specific biological, ecological and environmental conditions of the specific target site), to treat infestations.

On the down side, the NRDA funding that allowed WSDA and WDFW to substantially increase control efforts the past two control seasons will expire June 30, 1999. This has the potential to greatly reduce north Puget Sound control efforts next year.

South Puget Sound and San Juan County

For purposes of the *Spartina* program, the south Puget Sound region consists of King, Kitsap, Clallam, Jefferson and Grays Harbor counties. Infestations are smaller in these areas and much easier to eradicate than those in north Puget Sound and Willapa Bay. They total approximately 24 sites that cover less than 10 solid acres of *Spartina*.

⇒ **Budget**
The NRDA grant provided a total of $64,000 to WSDA for the 1997-98 control seasons in southern Puget Sound.

⇒ **Activities**
WSDA hired a crew in 1997 and 1998 to treat outlier infestations in **south Puget Sound**, and its staff worked closely with this crew. The crew treated 11 infested sites three times during the 1997 season, eradicating *Spartina* on six of the sites. In 1998, the crew treated all remaining infestations in the south Puget Sound region. The WDFW crew treated all known infestations in Grays Harbor in 1998.

The WSDA North Puget Sound *Spartina* Control Coordinator, in cooperation with a WDFW crew, treated two small infestations in **San Juan County** with herbicide in 1997. WSDA staff re-visited the sites in 1998 and found infestations approximately 60 percent eradicated. The crew physically removed the remaining *Spartina* while on site. The Washington Water Trails Association, while conducting a *Spartina* watch workshop, discovered and removed a third infestation in 1998.

Survey work conducted by WSDA, Adopt-A-Beach and private citizens in 1996, resulted in the identification of new infestations in Jefferson County. WSDA, in cooperation with the State Parks and Recreation Commission, treated Washington's lone *Spartina patens* infestation at the Dosewallips State Park in 1997 and 1998. The only other known infestation in Jefferson County was eradicated in 1997 and is now on monitor status.

⇒ **Preliminary 1999 Plans**
Spartina control and eradication in the south Puget Sound region and San Juan County has been extremely successful the past two control seasons. All known infestations have been repeatedly treated and, in many cases, totally eradicated. Physical removal of infestations continues to be the most successful treatment method in this region. WSDA will continue to work closely with Adopt-A-Beach and Washington Water Trails Association next summer to identify and eradicate all south Puget Sound and San Juan County infestations. WDFW will continue to monitor and treat remaining Grays Harbor infestations.

Willapa Bay

This waterbody includes the mouth of Willapa Bay, Willapa Bay, and all the rivers, streams and creeks that feed into the Bay. In 1996, there were an estimated 5,000 solid acres of *Spartina* spread throughout this waterbody. However, many areas infested with scattered clones in 1996 have now coalesced into solid meadows. Also, new infestations have occurred due to seed production in untreated areas. An update of the overall *Spartina* infestation in Willapa Bay is currently being analyzed by DNR using 1997 color infrared aerial photography. Results of this analysis will provide a more current estimate of the *Spartina* infestation.

⇒ **Budget**

WSDA provided approximately $27,000 to Pacific County in FY98 for *Spartina* control and eradication. WSDA allocated $45,000 for a WDFW crew to work in Willapa Bay in FY99.

The US Department of Agriculture (USDA), through its Farm Service Agency's Agricultural Conservation Program, awarded $422,800 in cost share money directly to private landowners in Pacific County to treat the equivalent of 1,123 acres of solid *Spartina*. USDA committed this money in fall 1996. Of the 1,123 acres targeted for control by USDA, 510 are designated in long-term control agreements lasting four to 10 years.

⇒ **Activities**

The Pacific County work crew treated approximately 24 solid acres of solid *Spartina* on privately owned land in 1997. With funding allocated by WSDA, WDFW treated approximately 15 acres of solid *Spartina* on privately owned land during the 1998 control season.

Each of the three state or federal land management agencies in Willapa Bay contributed a full-time control crew in 1997 and 1998.

- **DNR** treated the equivalent of 346 solid acres of *Spartina* in 1997 (200 acres treated by aerial herbicide application) and 112 solid acres of *Spartina* in 1998 (40 acres treated by aerial herbicide application).
- **WDFW** treated the equivalent of 41 solid acres of *Spartina* on WDFW land in Pacific County during the 1997 control season. Exclusive of efforts funded by WSDA, WDFW treated approximately 45 solid acres in 1998.
- **USFWS** treated the equivalent of 23 solid *Spartina* acres on the Willapa National Wildlife Refuge in 1997 and approximately 42 solid acres in 1998. In addition, USFWS provided a base of operations, maintenance staff support, and storage facilities for the other agencies at the Willapa National Wildlife Refuge headquarters.

In 1997, WSDA and several landowners (which included DNR and several private owners), conducted an aerial herbicide application for the second year in a row on the northeast side of Long Island and the adjoining mainland. This site is an established meadow where most of the *Spartina* is inaccessible to mowing or ground herbicide application. This site was first treated with an aerial herbicide application in 1996. WSDA staff evaluated the effectiveness of the 1996 application in May of 1997 by measuring re-growth. The evaluation showed some areas with 100 percent control (zero stem re-growth) and the majority with a significant degree of suppression

(reduced stem density and plant height). The 1997 aerial herbicide application had a similar effect. No additional aerial herbicide application was conducted at this site in 1998.

In 1998, WSDA, in conjunction with DNR and USFWS, conducted an aerial herbicide application on approximately 40 solid acres of *Spartina* at Potshot Slough in 1998. This property is owned by DNR and managed by the Willapa National Wildlife Refuge. WSDA staff mowed approximately half the infestation with the Marsh Master II prior to the herbicide treatment. DNR funded the aerial herbicide application. From observations of top kill observed by WSDA staff in October 1998, it appears most of the infestation has undergone some impact from the treatment. WSDA staff will measure re-growth next spring to more accurately assess treatment efficacy.

Private landowners and the Shoalwater Bay Tribe continued to contribute to the control of *Spartina* in Willapa Bay. Combined efforts resulted in the treatment of approximately 300 solid acres (185 solid acres treated with aerial herbicide application) of *Spartina* in 1997 and approximately 230 solid acres in 1998. With the exception of the aerial herbicide application, all *Spartina* treated by private landowners and the Shoalwater Bay Tribe in 1997 and 1998 was funded by the FSA grant.

⇒ Preliminary 1999 Plans

In Willapa Bay, control efforts have not kept pace with the spreading *Spartina* infestation. Untreated infestations produce a large number of seeds, which are re-infesting adjacent treatment sites. Despite collaborative efforts, DNR, WDFW and USFWS have generally focused a large portion of their control efforts on property under their management. These properties, in many cases, are spread throughout the bay, resulting in an overall dilution of acreage treated.

For the 1999 control season, the state and federal agencies plan to combine their resources and focus control efforts on specific geographic areas in an attempt to control the infestations one site at a time. The sites will be prioritized as follows:

- Maintenance sites (these sites are essentially free of *Spartina* and with minimal efforts and investments can be kept as such);
- primary sites (these sites are designated for 100 percent treatment in 1999, clean up in 2000 and then reduced down to maintenance sites by 2001);
- secondary sites (regions adjacent to primary sites which will be designated for control of seed production to prevent re-infestation of the primary sites and to prepare them to become primary sites in the future);
- and tertiary sites (these sites are additional sites of importance due to ecological significance, financial investment and/or public support and will be completed once other objectives are met).

For example, the agencies have discussed using Potshot Slough (just north of USFWS Refuge office) as a primary site. In a focused effort, the agencies plan to combine resources and attempt to eradicate all of the *Spartina* in the infested area using large mechanical machinery (USFWS's Quality Flail Mower) and/or aerial herbicide application for the meadow and a multiple pronged

ground assault on the fringes. The areas to the north and south of Potshot Slough are designated as secondary sites and will be treated to suppress seed production. By 2001, Potshot Slough should be reduced to a maintenance site and the adjacent areas will become primary sites. In this way, a systematic approach for the control of *Spartina* infestations in Willapa Bay may be achieved. To facilitate this effort, USFWS staff are in the process of drafting a Cooperative Land Management Agreement between the agencies.

Program Challenges and New Developments

Funding *Spartina* Control

A major obstacle in the *Spartina* eradication effort continues to be obtaining adequate funding. Agencies and organizations continue to seek additional alternative funding from sources such as the NRDA Committee award from the Washington Coastal Protection Fund. This ends June 30, 1999. WSDA, in cooperation with other state agencies and county noxious weed boards, has applied for federal assistance. At this time, no additional alternative funding has been secured. No additional funding for the 1999 control season will hinder control efforts.

Water Quality Permit Appeals

In February of 1997, the Ad Hoc Coalition of Willapa Bay appealed the Willapa Bay water quality permit. This group opposes the use of herbicides to control *Spartina* in Willapa Bay. They argued the permit was inconsistent with RCW 90.48.445. The Pollution Control Hearings Board (PCHB) considered three specific issues raised by the appellants. The first two issues concerned the allowable wind speed for herbicide application and the drying time of an infestation before the tide inundates it. The Ad Hoc Coalition of Willapa Bay argued that a four-hour drying time and a 10 mile per hour allowable wind speed, are inconsistent with the Rodeo® label and the *1993 Noxious Emergent Plant Management Environmental Impact Statement* (EIS). In addition, the appellants stated that the EIS requires permits issued to include provisions for additional studies on the use of Rodeo®. In its final order issued on September 25, 1997, the PCHB found in favor of the appellants on the first two issues and ordered that the permit be modified to the following:

> No aerial or ground broadcast application of Rodeo® shall occur if the wind velocity at the treatment site exceeds five miles per hour.
>
> No Rodeo® shall be allowed to be used when the tidal regime leaves the plants dry for less than six hours.

Concerning research requirements in the permit, the PCHB ruled:

> Nothing in the EIS suggests that individual permitees should engage in studies responsive to these recommendations.

As a result of these rulings, all six current and future water quality permits issued by DOE to WSDA for *Spartina* control contain these modifications. This ruling effectively reduces the number of days applicators can use herbicide for *Spartina* control because of tidal activities and weather in the region.

The Ad Hoc Coalition of Willapa Bay appealed the permit again in 1998. As of this date, the issue remains unresolved.

Shellfish Residue Study

Under provisions of federal law, a herbicide such as Rodeo® must be registered with the federal Environmental Protection Agency (EPA) before it can be used in the field. This registration must include directions for use at a specific site (e.g., for *Spartina* control). Registration is only

granted if EPA determines that the data package on file with the agency, which includes toxicology, environmental effects, residue and other types of studies, is adequate to support the use pattern proposed. In 1998, the EPA re-examined its information base in support of the registration of Rodeo® to control *Spartina*, and required that an additional shellfish residue study be produced in order to maintain this use in the future.

WSDA is currently assembling funding for this study which is expected to cost in excess of $100,000. Participants are anticipated to include the Washington State Commission on Pesticide Registration, the Willapa Bay/Grays Harbor Oyster Growers Association, the University of Washington, Monsanto Agricultural Co., USFWS, WSDA, and possibly others. WSDA has budgeted $30,000 towards the study in FY99.

Biological Control Research

Biological control is considered one of the more promising tools for *Spartina* control. Several organisms are currently being evaluated. The farthest advanced in testing is the planthopper *Prokelisia marginata*. Dr. Donald Strong of the University of California at Davis, has spent over a decade studying *Spartina* and its associated insect communities for a biological control option with this sole *Spartina*-related insect that is native to California. The results of several separate trials conducted from 1993 to 1997 revealed that the planthopper had an unusually devastating effect on *Spartina alterniflora* and *Spartina anglica* from Washington State. In the first and second trials, *Spartina* clones taken from Willapa Bay were killed or severely stressed by moderate populations of *Prokelisia marginata*. Native *Spartina* stocks from Maryland and California in contrast were completely unaffected. In later trials, *Spartina anglica* from Puget Sound also displayed an extremely high level of vulnerability to the insects. In follow up trials conducted in 1998, this effect of *Prokelisia* on Willapa Bay *Spartina* was again replicated.

In all the tests done this far, a significant number of the *Spartina* clones from Willapa Bay survived (usually in a stressed state). It is postulated that the introduction of *Prokelisia marginata* would place selective pressure on Willapa Bay's *Spartina* population as the more resistant plants survive and propagate and the less resistant plants are eradicated. To achieve the overall goal of complete eradication, surviving resistant clones would have to be eradicated within a limited number of growing seasons after the introduction of *Prokelisia marginata* populations using other tools in the integrated pest management tool kit. A more complete understanding of the causes of both resistance and lack of resistance will be useful in identifying the most vulnerable clones to target with biological control.

Funding to continue this line of research has been developed by the Olympic Natural Resources Center (ONRC) of the University of Washington. The National Sea Grant Program awarded ONRC $135,000 for work in 1998 and 1999. ONRC will subcontract with Dr. Strong and his research team. The federal budget also authorized an additional $200,000 for the coming biennium to support the involvement of University of Washington researchers in this work. The next research steps fall into four broad categories: (1) further analysis of the causes of the remarkable lack of herbivore resistance in certain *Spartina* clones in Washington state; (2) further exploration of the observed variability in resistance displayed by Washington *Spartina*; (3)

investigation of risks to Washington state's natural resources if plant pathogens are causal factors in the control effect observed in Washington *Spartina* and (4) effective transfer of the results of these studies to agency officials involved in Washington State's Integrated Pest Management Program for *Spartina* control. If the results of the *Prokelisia marginata* studies support obtaining the necessary permits for its general release in Willapa Bay, all agencies involved in the *Spartina* eradication effort will coordinate their control efforts to utilize this window of opportunity.

PURPLE LOOSESTRIFE

Budget

WSDA allocated $100,000 of its $806,000 total biennial appropriation from the Aquatic Lands Enhancement Account for Purple Loosestrife control. Table 7, *Purple Loosestrife Budget Activity - 1997-99 Biennium* shows how WSDA is utilizing this funding.

Table 7, Purple Loosestrife Budget Activity - 1997-99 Biennium

Activity	$ Allocated by WSDA 1997-99 Biennium
WSDA Coordination and control activities	$25,000
Biological Control Contract with WSU	$50,000
Equipment purchases	$25,000
TOTAL	**$100,000**

Water Quality Permit

Activities for the 1997 and 1998 control seasons included preparing the necessary documents for a statewide water quality permit. WSDA is the lead agency for herbicide applications to control purple loosestrife in a manner similar to the *Spartina* program. This statewide permit allows herbicide treatment (Rodeo® or in some instances 2-4,D) for purple loosestrife in wetlands throughout the state. The biggest difference between this water quality permit and the *Spartina* permits is that applicants perform the mandated public notification requirements rather than WSDA. The scattered nature of the purple loosestrife makes public notification from WSDA very difficult. Coverage under the permit was issued to 24 individuals and agencies in 1997 and 32 individuals and agencies in 1998. All geographic areas of the state were represented. Approximately 2,100 acres of purple loosestrife was treated with herbicides under provisions of the permit in 1997. In 1998 approximately 2,900 acres of purple was treated under provisions of the permit.

Cooperative Projects

For the third consecutive year WSDA authored an interagency agreement with the WDFW to control purple loosestrife and *Spartina* on approximately 50 acres of federal Bureau of Land Management (BLM) lands in Skagit County. The agreement provides a maximum of $5,000 per year to WDFW for treating purple loosestrife and *Spartina* plants with the herbicide Rodeo®. The funding for the project is provided by BLM through its five-year, $30,000 per year contract with WSDA. These funds are used only for noxious weed projects on BLM-administered lands. WSDA issued ten permits for manual control projects to allow movement of plants to disposal sites in 1997 and seven permits in 1998. These permits are required for compliance with the *Lythrum* (purple loosestrife) quarantine (WAC 16-752-400). In 1997, WSDA, in cooperation with Ecology, issued a permit to Simpson Timber Company to allow dredging of material from Oakland Bay, its dewatering, and its movement to upland landfill areas where it was buried. WSDA staff also worked with Simpson Timber Company, private landowners and the City of Shelton to control purple loosestrife infestations along Shelton Creek in 1997 and 1998. For two

years, WSDA has participated in a cooperative manual control project with the City of Bainbridge Island, utilizing volunteer labor to remove purple loosestrife from a sensitive area where the use of herbicides would be controversial. WSDA purchased equipment and provided for disposal of the pulled plant material.

WSDA enhanced county noxious weed control board activities by purchasing equipment such as small boats and canoes. These are used to survey and control purple loosestrife infestations as well as to distribute biological control organisms. The purchase of this equipment was suggested by the Washington State Noxious Weed Control Board. Small water-craft including canoes and a 12-foot boat with an outboard motor were purchased in 1997 and are stored and maintained by the Skagit, Pend Oreille and Pierce County Noxious Weed Control Boards. An 18-foot boat capable of navigating on the Columbia River was also purchased in 1997 but was not received until 1998. It is being stored and maintained by the Cowlitz County Noxious Weed Control Board. These are all available to other counties by agreement.

In cooperation with county noxious weed control boards and the Washington State Noxious Weed Control Board, WSDA continued to develop and maintain a database and mapping system to assist in tracking purple loosestrife infestations, control efforts and biological control distribution. Funds for the mapping software, (EasyCAD®, CountyCAD® and RegionCAD®), were obtained through a $8,000 grant from the United States Department of Agriculture - Cooperative Agricultural Pest Survey (CAPS) program. WSDA staff are currently in the process of mapping known purple loosestrife locations. Biological control agent release sites were mapped in 1996 and 1997. 1998 sites are currently being mapped. In 1998 the Department's Noxious Weed Program purchased ArcView® Geographic Information System (GIS) and plans for the purple loosestrife data to be entered into GIS in 1999. This will facilitate the sharing of information between local, state and federal agencies, most of which are already using GIS technology.

WSDA participates in the Chehalis River Task Force, which is attempting to control noxious weeds including purple loosestrife in the Chehalis River drainage. Approximately 118 acres on 51 different sites have been identified to date. These are under varying control programs depending on jurisdiction. WSDA also participates in the Yakima River Purple Loosestrife Task Force and the Mid-Columbia Purple Loosestrife Management Project which address the problem of purple loosestrife in their respective areas. WSDA provided herbicide to the project in 1998, as well as use of WSDA boats.

Regulatory Program

As part of WSDA's responsibility for weed control in counties without activated noxious weed control boards, WSDA staff conducted survey, mapping, education, landowner and land manager identification and contact, and control of purple loosestrife infestations in Mason, Jefferson and Kitsap counties in 1997. Through the Washington State Noxious Weed Control Board, WSDA also funded a survey of Douglas County that detected and mapped purple loosestrife and other noxious weed infestations. In 1998, WSDA staff conducted similar work in Kitsap, Mason and

Douglas counties. Jefferson County activated a county noxious weed board in 1998, and Mason and Kitsap counties are currently in the process of activating boards.

Biological Control Program

In 1997 and 1998, WSDA continued to contract with Dr. Gary Piper of Washington State University to raise, collect and release biological control agents for purple loosestrife in Washington State. In 1997 a total of 17,575 adult *Galerucella calmariensis* and *G. pusilla* beetles were released in both eastern and western Washington. Seventeen sites in four counties were inoculated with these defoliating beetles. In addition, 3,401 eggs and 851 adult *Hylobius transversovittatus* weevils were released at 16 sites in six counties. In 1996, *Nanophyes marmoratus* weevils were obtained from the Oregon Department of Agriculture as part of a biological agent exchange program. Population levels of these insects were not large enough in 1997 to redistribute to other areas. The first field releases of *Nanophyes marmoratus* weevils were made in 1998 when 610 adults were released on five sites in Grant County. Also in 1998 a total of 32,371 adult *Galerucella* beetles were released in both eastern and western Washington. Releases occurred at 23 sites in eleven counties. In addition, 4,917 eggs and 183 adult *Hylobius* weevils were released at 13 sites in seven counties. These releases are summarized in Table 8, *Purple Loosestrife Biological Control Agent Releases – 1997-99 Biennium*.

Table 8, Purple Loosestrife Biological Control Agent Releases – 1997-99 Biennium

Insect Released	Number Released	Number of Release Sites
Galerucella calmariensis and G. pusilla	1997 - 17,575 adults 1998 - 32,371 adults	17 sites in 4 counties 23 sites in 11 counties
Hylobius transversovittatus	1997 - 851 adults, 3,401 eggs 1998 - 183 adults 4,917 eggs	16 sites in 6 counties 23 sites in 11 counties
Nanophyes marmoratus	1998 – 610 adults	5 sites in 1 county

Since 1996, the following agencies have been the recipients of purple loosestrife biological control agents propagated at Washington State University. USFWS - Columbia National Wildlife Refuge, Swinomish Tribal Community, Oregon Department of Agriculture (biological agent exchange program), Washington Department of Transportation, WDFW, Grant County Weed District No. 3, Intercounty Weed District No. 52, the Benton, Douglas, Grays Harbor, Island, King, Lewis, Pierce, Skagit, Snohomish, Spokane, Stevens and Whatcom County Noxious Weed Control Boards, Douglas County Public Utility District No. 1, King County Public Works, City of Seattle Parks and Recreation Department, and Washington State University.

In 1998, WSDA participated in a project initiated by the Washington State Noxious Weed Control Board to collect and redistribute *Galerucella* from the Winchester Wasteway area in Grant County to other areas of the state. *Galerucella* was released into the area in 1992 and the populations have now become large enough to allow large scale collection and redistribution. The *Galerucella* have had a significant impact on the purple loosestrife in the Winchester

Wasteway area. Hundreds of acres of loosestrife plants show significant feeding damage from the *Galerucella*. (It is still too early in the biological control program to see significant impacts from *Hylobius* or *Nanophyes*.) The Department purchased equipment for the project and performed releases of these insects in Douglas and Spokane counties. Thirteen county weed control boards, three weed districts and eight state and federal agencies participated. This project will be continued and expanded in 1999.

Preliminary 1999 Plans

Complete eradication of purple loosestrife from Washington State is not possible at this time due largely to the extent of the infestation and the limited control options currently available. The availability of a selective herbicide approved for use in wetland areas would facilitate control efforts. Currently herbicide control options are limited to Rodeo®, which is relatively non-selective, and 2,4-D which is selective but only approved by the Department of Ecology for use in very limited instances.

In the 1999 control season, WSDA will target small isolated infestations for control either manually, or with herbicides or a combination of these methods. This will serve to attempt to contain the spread of the infestation while protecting mostly non-infested areas of the state. The large infestations will continue to be addressed with biological control agents. This limits the amount of spread in these heavily infested areas as well as reducing spread off site by reducing seed production. In addition, an inventory of purple loosestrife populations will be undertaken to attempt to better delineate the level of infestation in Washington State. Mapping of infestations as well as biological control areas will continue.