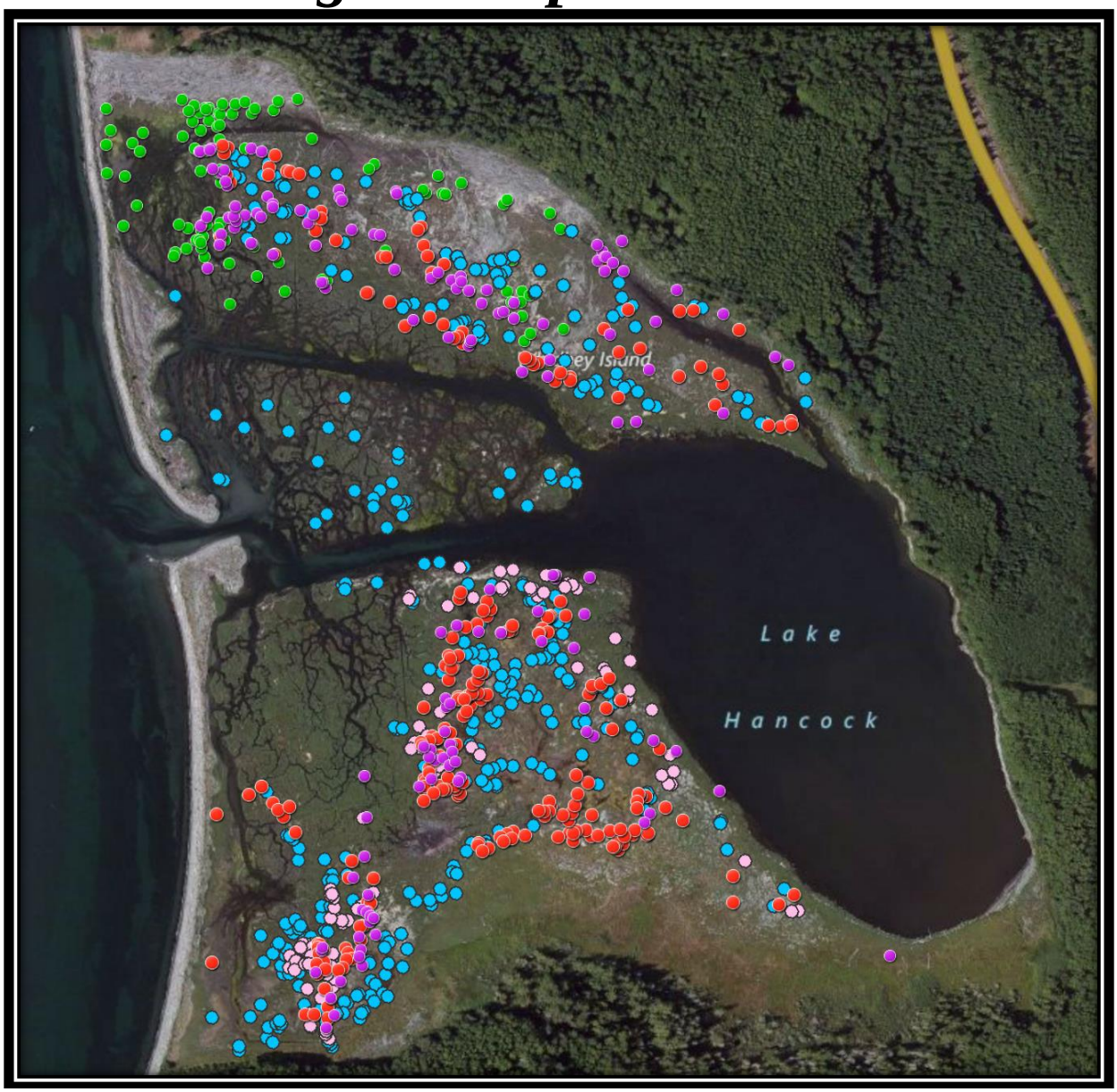
Spartina Eradication Program
2015 Progress Report



Washington State Department of Agriculture

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Cover photo (WSDA)
Other photos provided by Dave Heimer, Les Holcomb (WDFW)

Cover: A story of interagency cooperation, the points depict *Spartina anglica* occurrences, the color represents the affiliation of the crew who found the plant, Whidbey Island, Island County, Washington.

AGR PUB 809-505 (N/2/16)

PROGRESS OF THE 2015 *SPARTINA* ERADICATION PROGRAM

Washington State Department of Agriculture

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Concepts or definitions used in this report:

Solid Acres	A measure of how many acres a dispersed population would occupy if all *Spartina* plants were grouped together.
Affected Acres Treated	A measure of how many acres had one or more *Spartina* occurrence points.
Spartina Occurrence Point	Any *Spartina* identified within approximately one square meter.
Survey/Treatment Lap	Refers to a single detailed survey of all susceptible habitat in the referenced area.
Surveyed Acres	A measure of how many acres were surveyed for *Spartina,* a minimum of once, during a given year.
Site Eradication Criteria	Requires that six consecutive negative survey events occur over the course of three or more years. Also specifies that a maximum of two qualifying negative survey events can occur in any year.

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Executive Summary

The Washington State Department of Agriculture (WSDA) has served as the lead state agency for the eradication of invasive *Spartina* since 1995. WSDA facilitates the cooperation of local, state, federal, and tribal governments; universities; interested groups; and private landowners responsible for the tremendous success of the program. From a statewide high of over 9,000 solid acres infested in 2003, the program has reduced *Spartina* to a projected nine solid acres in 2016. These final, nine solid acres are a collection of individual plants and small clones spread along thousands of miles of shoreline in the Puget Sound, around the Olympic Peninsula, and estuaries along Washington State's Pacific Coast.

Spartina, commonly known as cordgrass, is an aggressive noxious weed that has severely disrupted the ecosystems of native saltwater estuaries in Washington State. Left unchecked, *Spartina* out competes native vegetation and converts mudflats and estuaries into monotypic *Spartina* meadows. As a result, important migratory shorebird and waterfowl habitats are lost, the threat of flooding is increased, and the state's shellfish industry is severely impacted.

The coming years will be pivotal as the cooperators continue to survey the intertidal waters of Washington State to find and eradicate the remaining infestations. WSDA remains confident that with continued funding eradication can be achieved. Figure 1 is a projection of *Spartina* reduction within Washington State over the next three years assuming continued funding. The recent increases depicted are the result of transitioning funding and resources to the Puget Sound as the coastal infestation levels have declined. This increasing focus on the Puget Sound infestation, and recent long and warm growing seasons, has contributed to increased *Spartina* finds.

In 2015, as part of an increasingly detailed survey effort, project partners inspected over 80,000 acres of saltwater estuaries and more than 750 miles of shoreline in 12 counties for evidence of *Spartina*. As part of this effort the cooperators found and recorded over 35,000 *Spartina* occurrence points or discrete finds. This eradication program is an unprecedented success story; however, the last few acres of *Spartina* will by far be the most difficult to find and eradicate.

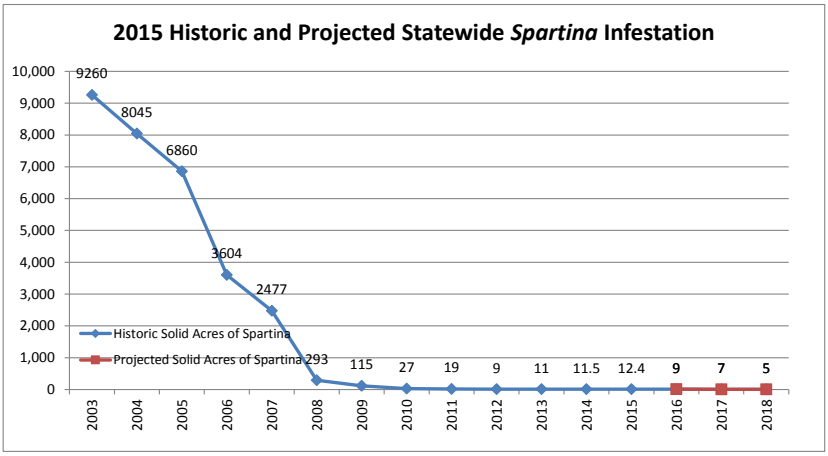

Figure 1: Solid acres of *Spartina* by year statewide based on WSDA estimates. The blue line represents historic *Spartina* infestation since 2003. The red line indicates the projected *Spartina* infestation level through 2018. Projection assumes continued funding.

Pacific County

During the 2015 treatment season, Pacific County cooperators located and treated 1.13 solid acre of *Spartina* (1,825 occurrence points). The treatment program experienced a 26 percent increase from the 0.90 solid acres treated in Pacific County during the 2014 season. This increase may be explained by a longer than usual treatment season, June through November, and amplified surveys within the most heavily infested areas of Willapa Bay. WSDA estimates that 0.8 solid acre of *Spartina* or less than ten percent of the Washington State infestation will remain in Pacific County during the 2016 treatment season.

Grays Harbor County

In 2015, the Grays Harbor cooperators found and treated 0.0041 solid acre of *Spartina.* Of the 0.0041 solid acre treated, 0.0032 solid acre were *S. alterniflora* (5 points) and 0.00085 solid acre were *S. densiflora* (37 points). This is a decrease from the approximate 0.013 solid acre of *Spartina* treated during the 2014 season. Due to several *S. alterniflora* plants found post 2015 season, WSDA expects a slight increase to approximately 0.006 solid acre of *Spartina* in Grays Harbor during the 2016 treatment season.

Puget Sound Counties

In 2015, approximately 11.3 solid acres of *Spartina*, including over 30,000 occurrence points, was treated in the Puget Sound. This represents a seven percent increase from the 10.5 solid acres treated in 2014. A number of factors contributed to this increase, including: the most detailed survey to date, a very long and warm growing season, increased funding for staff and the use of Puget SoundCorps (PSC) crews (see appendix A). WSDA estimates that eight solid acres of *Spartina* will remain in Puget Sound in 2016.

2015 Trends

The coastal infestation continues to come under control. This has allowed staff, funding and resources to transition to the Puget Sound effort. The improved Puget Sound effort, along with exceptionally warm growing seasons, has contributed to recent annual increases in *Spartina* found.

In 2015, WSDA increased staff field time, cooperator support and equipment resources to the Puget Sound effort. WSDA continued to provide funding to WDFW to survey and treat the most heavily infested areas of Snohomish and Island counties. For the third year DNR funded PSC crews were made available in Skagit, Snohomish and Island counties. With the additional staff and funding, the North Puget Sound cooperators expanded their survey and eradication efforts. This resulted in an increase in both the number of detections and acreage treated. Also encouraging was the success of numerous cooperative control efforts in 2015. See appendix C for more information about these efforts.

An encouraging development is depicted in Figure 2 where 8 new black triangles represent previous *Spartina* infestations declared eradicated in 2015. This brings the total number of previously infested sites declared eradicated to 43. The next three years will be pivotal as the cooperators continue to survey the vast intertidal waters of Washington State to find and eradicate the remaining infestations.

Continued funding is imperative during the coming years to meet the program's goal of eradicating *Spartina*.

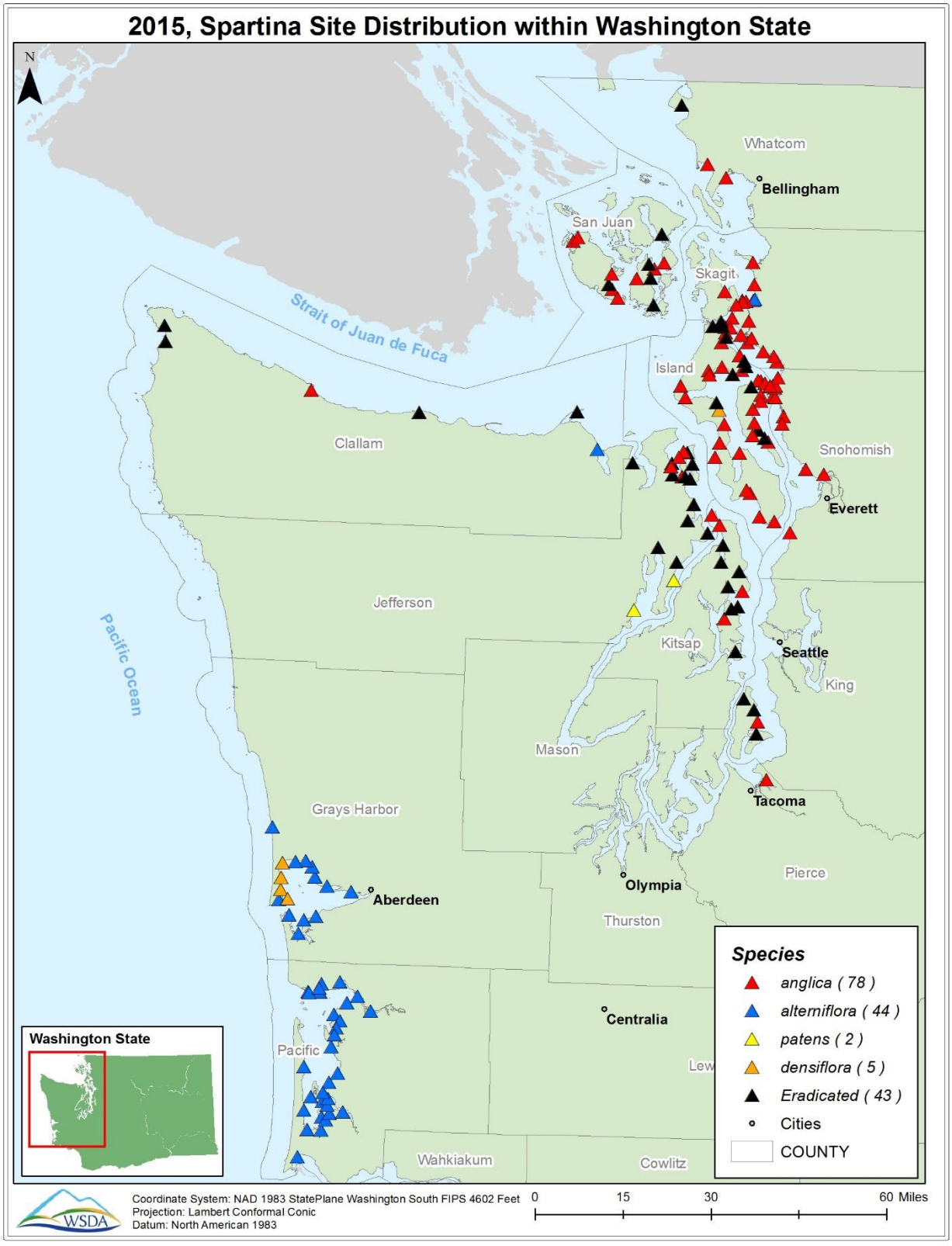

Figure 2: Distribution of invasive *Spartina* sites in Washington State, 2015.

Spartina Eradication Program

WSDA *Spartina* Program

In 2015, the WSDA *Spartina* Eradication Program worked collaboratively with partner agencies to continue *Spartina* eradication.

WSDA hired, equipped, and managed personnel to survey and treat infestations in Whatcom, San Juan, Clallam, Jefferson, King, Pierce and Kitsap counties; assisted the Swinomish, Suquamish, Makah, Puyallup, and Tulalip tribal communities and the noxious weed control boards in Skagit, Snohomish, and Island counties with eradication work; worked cooperatively with WDFW, Washington State Department of Ecology (DOE), and the USFWS in Puget Sound and Grays Harbor County; worked cooperatively with the DNR, WDFW, USFWS, The Nature Conservancy (TNC), the Shoalwater Tribe, Pacific County, the aquaculture industry, and Washington State University (WSU) on infestations in Pacific County.

WSDA continued to administer the Department of Ecology National Pollutant Discharge Elimination System (NPDES) general permit required for *Spartina* eradication activities.

WSDA provided resources through interagency agreements, cost-share agreements, and contracts with state and local government agencies. WSDA organized and facilitated the exchange of *Spartina* eradication information through regional planning and informational meetings. The department also continued to explore more efficient and cost-effective ways to eradicate *Spartina* with partner agencies.

In 2015, WSDA continued to allocate funding for resources and *Spartina* work crews in counties with the majority of the infestations. In Willapa Bay, $140,000 was designated for Pacific County to continue their survey, treatment and weed board involvement. In the Puget Sound, WSDA provided resources totaling $207,500 by entering into agreements with the noxious weed control boards in Skagit, Island, Whatcom, and Snohomish counties, the Swinomish Tribe, and WDFW. WSDA staff participated in field activities throughout the control season and facilitated coordination meetings to ensure contract priorities were addressed. WSDA continued working with WDFW, DNR, WSU, and USFWS to explore the potential for restoration of once-infested tidelands to functioning shorebird and waterfowl habitat.

During 2015, WSDA participated in ongoing efforts related to the West Coast Governors' Agreement on Ocean Health. In this agreement the governors of Washington, California, and Oregon committed to eradicate all non-native *Spartina* on the western U.S. coast by 2018. As part of this agreement, knowledge and developments are actively shared with representatives from the three states, federal government, tribal governments, non-governmental organizations, and the Province of British Columbia. The continued high level of intergovernmental cooperation will aid ongoing eradication programs and enhance future control efforts.

Additionally, an opportunity was provided to the Puget Sound partners during the 2015 summer *Spartina* survey season for the return of Puget SoundCorps (PSC) crews. The Washington State Department of Natural Resources was able to fund PSC crews who were available to assist with a variety of projects including riparian weed control and *Spartina* survey and eradication. Whether they worked directly in the field with *Spartina* crews or along rivers on the Knotweed project, their contribution to the 2015 Puget Sound effort took pressure off the county and state crews which allowed for extremely detailed surveys in 2015. The addition of PSC crews resulted in an expansion of the *Spartina* eradication effort into new areas. The increase in the amount of *Spartina* found and treated in 2015 was a direct result of the increased survey effort and expansion of the areas surveyed. All of the project partners who had the opportunity to work with the PSC crews appreciated the opportunity and hope that the crews will return during future summer surveys. See appendix A for more information on PSC crew involvement and funding background.

In 2015 WSDA expanded the use of cloud based data collection to the Puget Sound, this technology was originally implemented in the coastal counties in 2014. The use of this system is a significant process improvement aiding communication between the cooperators. The use of cloud-based data collection is one factor contributing to the increase in occurrence points reported for 2015. WSDA is planning expanded training before the 2016 season to improve the uniformity of data collection between the partner agencies. In recent years the cooperators have recorded GPS location data for each occurrence point. A change to the 2016 effort will be to ask the cooperators to enter an estimate of the size of the above ground area occupied, in square feet, for every occurrence point. This estimate is similar to an estimate of canopy coverage in forestry. This will give the cooperators an additional tool to track not only *Spartina* occurrences but plant density across the landscape. See appendix B for more information about this cloud-based data collection system.

Also encouraging was the success of numerous cooperative control efforts in 2015. WSDA staffed an additional Puget Sound based field position for the 2015 *Spartina* control season. The main focus of the position was facilitation of cooperative efforts between Skagit, Snohomish and Island Counties, WDFW, WSDA, DNR, and non-governmental entities such as The Nature Conservancy (TNC) performing *Spartina* control work. See appendix C for more information about this effort.

In early 2015 WSDA compiled the concepts and program priorities explained throughout the annual reporting process into a one page 2015 Eradication Plan/Overview document. This plan distills the program into sixteen key components/goals. This document, while not exhaustive, proved to be a useful communication tool. See appendix D for a copy of the document.

Budget

WSDA allotted $1.87 million of the appropriation from the Aquatic Lands Enhancement Account (ALEA) for statewide *Spartina* activities during the 2015-2017 biennium. Table 1 describes how WSDA allocated funds to conduct *Spartina* survey and eradication activities throughout western Washington.

Table 1: WSDA *Spartina* Budget Activity – FY16 and FY17

Activity	Fiscal Year 2016 (July 1, 2015 thru June 30, 2016)	Fiscal Year 2017 (July 1, 2016 thru June 30, 2017)	Biennial Totals (July 1, 2015 thru June 30, 2017)
WSDA Eradication & Coordination Activities	$525,000.00	$543,000.00	$1,068,000.00
Purchased Services			
Pacific County	$140,000.00	$140,000.00	$280,000.00
Skagit County	$25,000.00	$25,000.00	$50,000.00
Island County	$55,000.00	$60,000.00	$115,000.00
Snohomish County	$55,000.00	$60,000.00	$115,000.00
Whatcom County	$2,500.00	$2,500.00	$5,000.00
Swinomish Tribe	$5,000.00	$5,000.00	$10,000.00
WDFW Puget Sound	$65,000.00	$75,000.00	$140,000.00
DNR State Wide	$20,000.00	$20,000.00	$40,000.00
Unobligated	$0.00	$45,000.00	$45,000.00
Totals	**$892,500.00**	**$975,500.00**	**$1,868,000.00**

Notes for Table 1:

1. WSDA Eradication and Coordination Activities: Expenses include WSDA eradication, survey, restoration activities, salaries and benefits, herbicide, equipment, travel, legal fees, public notification expenses and other goods and services.
2. Purchased Services: WSDA interagency agreements and intergovernmental agreements to accomplish *Spartina* eradication goals.

Other agencies received additional funding for *Spartina* activities during the 2015-2017 biennium. This funding is provided from ALEA, federal agreements, grants and other sources. Table 2 documents additional funds, as reported to WSDA, available to conduct *Spartina* survey and eradication activities in western Washington.

Table 2: Other Agencies *Spartina* Budget Activity – FY16 and FY17

Agency	Fiscal Year 2016 (July 1, 2015 thru June 30, 2016) (USFWS Refuge funding follows Federal fiscal period)	Fiscal Year 2017 (July 1, 2016 thru June 30, 2017) (USFWS Refuge funding follows Federal fiscal period)	Biennial Totals (July 1, 2015 thru June 30, 2017)
WDFW Spartina Activities	$245,000.00	$245,000.00	$490,000.00
DNR Spartina Activities	$290,000.00	$290,000.00	$580,000.00
USFWS Nisqually Refuge	$128,000.00	$0.00	$128,000.00
USFWS Willapa Refuge	$65,000.00	$65,000.00	$130,000.00
Totals	**$728,000.00**	**$600,000.00**	**$1,328,000.00**

Statewide Overview

For programmatic purposes, this geographic region encompasses all tidally influenced shoreline waters of Whatcom, San Juan, Skagit, Island, Snohomish, Kitsap, King, Pierce, Thurston, Mason, Jefferson, Clallam, Pacific, and Grays Harbor counties. There are approximately 3,000 miles of tidal shoreline in these waters. Along the shores of these counties four species of *Spartina* are found: *Spartina anglica, Spartina alterniflora, Spartina densiflora* and *Spartina patens* (Figure 3). Figure 2, page 3 depicts the current distribution and species occurrence of *Spartina* within Washington State.

S. alterniflora (Smooth Cordgrass or Saltmarsh Cordgrass) is found in Pacific, Grays Harbor, Skagit, and Clallam counties. This species was unintentionally introduced to Pacific County (Willapa Bay) during the late 1800's where it spread to more than 8,500 solid acres by 2003. The extent of the infestation in Willapa Bay spurred one of the largest and most successful estuarine eradication programs in the nation's history. Subsequent aerial surveys were conducted in Grays Harbor and the Olympic Peninsula in 2005 which revealed another 10-15 solid acres. Through dedicated funding and aggressive eradication efforts by local, state, and federal agencies, only 1.1 solid acre of *S. alterniflora* remained in all affected counties during 2015, representing a 99.9 percent reduction from the 2003 peak. There was no *S. alterniflora* found in Skagit County during the 2015 treatment season.

S. anglica (Common Cordgrass) was introduced to Snohomish County in 1961 and the infestation increased to a peak of more than 1,000 acres by 1997. This introduction quickly spread to Skagit and Island counties and to a lesser extent the counties of Whatcom, San Juan, Clallam, Jefferson, King, Pierce and Kitsap. This intentional introduction is also implicated in the Boundary Bay and Tsawwassen Delta *S. anglica* infestations in BC. Of these four species of *Spartina, S. anglica* is currently the most abundant and accounts for 90 percent of Washington State's infestation. As of 2015, the largest infestations of *S. anglica* are found within Snohomish (6.7 solid acres), Island (4 solid acres) and Skagit (0.5 solid acre) counties. In 2015, approximately 11.3 solid acres of *S. anglica* remain in the infested counties of Washington State representing a 99 percent reduction from the 1997 peak.

S. densiflora (Dense-Flowered Cordgrass) is an aggressive South American species discovered at Bills Spit in Grays Harbor and at Race Lagoon in Island County in the fall of 2001. This species exhibits bunchgrass type growth and blends in well with the native saltmarsh flora making survey and treatment difficult. Consequently, despite aggressive eradication efforts the infestation in Bills Spit showed an increase in solid acreage from 2008 (0.17 solid acre) to 2009 (0.28 solid acre). Cooperators also documented the continued spread of *S. densiflora* from Bills Spit to North Bay near the mouth of the Humptulips River. In 2009, a transect or grid system methodology was implemented in the heavily infested area of Bills Spit (refer to the 2010 and 2011 WSDA *Spartina* reports). From 2009 to 2012 a 99 percent decrease in *S. densiflora* solid acreage was achieved using the transect methods. Since *S. densiflora* remains green year round, additional winter and spring surveys conducted north of Bills Spit to the mouth of the Humptulips River have also contributed to the decline of *S. densiflora* solid acreages in Grays Harbor. During extensive surveys conducted in 2015, approximately 0.00085 solid acre (37 ft^2) of *S. densiflora* was manually removed by crews from WDFW, DNR, and WSDA in Grays Harbor. There was no *S. densiflora* found in Race Lagoon during the 2015 treatment season.

S. patens (Saltmeadow Cordgrass) also known as salt marsh hay, is a species of cordgrass native to the Atlantic Coast and was discovered in the 1990's at Dosewallips State Park (Jefferson County) on Hood Canal. Historically, Dosewallips has contained the only known infestation of *S. patens* in Washington State. During the 2013 season, the WSDA survey crew discovered a new infestation of *S. patens* on Hood Canal across from Naval Base Kitsap-Bangor in Jefferson County on the Toandos Peninsula. Due to this find occurring late in the season and the need to notify and collaborate with the Navy to gain access, this site was not treated during 2013. Access to the Bangor infestation was granted in September of 2014 and WSDA chemically treated approximately 1,307 ft² of *patens* on the Toandos Peninsula (Figure 19).

S. patens, like *S. densiflora*, also exhibits physical characteristics that blend in well with the native saltmarsh flora making survey and treatment difficult. In 2015, 0.00078 solid acre of *S. patens* was treated representing a 98 percent decrease from the 0.047 solid acre treated in 2014. The decrease can be explained by effective treatments of the Dosewallips and Bangor West sites during the previous treatment season. In the future these sites will require detailed survey and treatment efforts in order to achieve eradication.

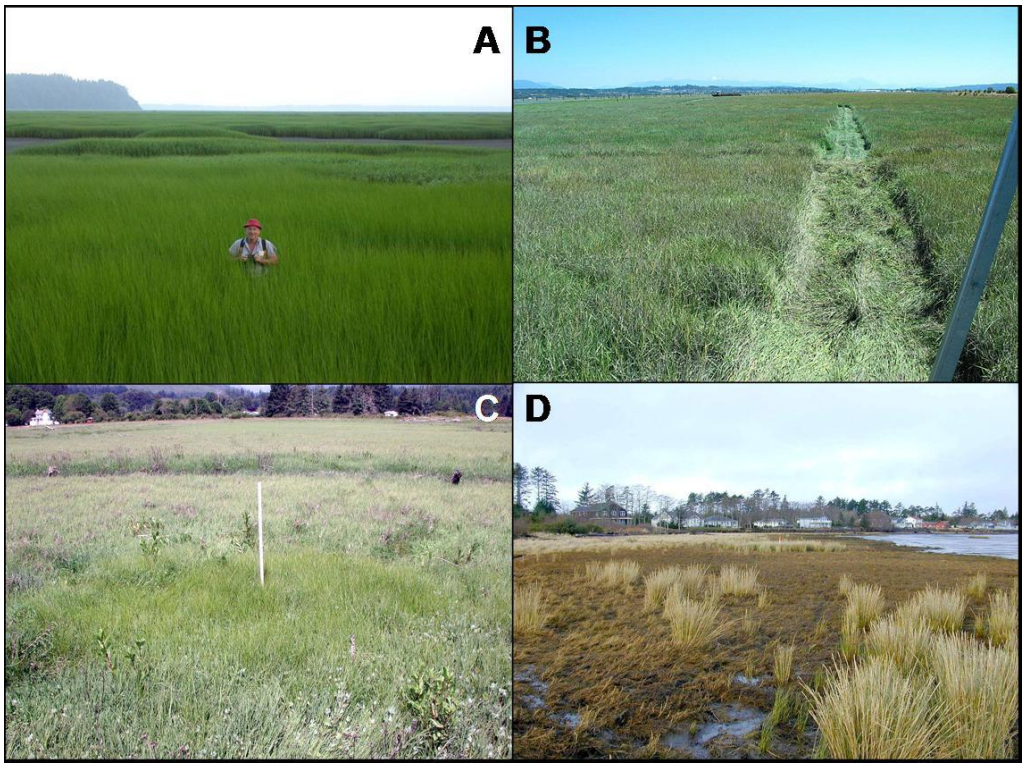

Figure 3: The four species of *Spartina* present in Washington. A) a meadow of *S. alterniflora* in Willapa Bay (2003), B) a meadow of *S. anglica* in Skagit Bay (2003), C) *S. patens* at Dosewallips (2001), and D) clones of *S. densiflora* in Grays Harbor County (2001).

With continued reductions in *Spartina* occurring statewide, an encouraging development for 2015 can be seen in Figure 2 page 3, where the 43 black triangles represent *Spartina* sites that have met the criteria for eradication. Eradication criteria have been developed in collaboration with the members of the West Coast Governors' Agreement on Ocean Health. The criterion requires that six consecutive negative survey events occur over the course of three or more seasons and that a maximum of two survey events can occur in any season. As the program approaches eradication, the need to evaluate if sites meet this criterion requires detailed tracking of the distribution and extent of the known infestation.

The 2015 control season was successful; below are some highlights of the 2015 treatment season. Following these brief highlights are detailed county by county reports.

- In 2015, eight additional *Spartina* sites were declared eradicated.
- South East Skagit Bay received the most detailed survey and treatment effort to date. See Appendix C for more information about how this was accomplished.
- DNR provided PSC crews; increasing both the area covered and the staff available to conduct detailed surveys in Snohomish and Island counties. See Appendix A.
- Approximately 12.4 solid acres of *Spartina* were located and treated in Washington State during 2015. This represents a seven percent increase from the 11.5 solid acres treated in 2014. The increasing focus on the Puget Sound infestation, and recent long and warm growing seasons, has contributed to increased *Spartina* finds.
- Grays Harbor received the most widespread winter time survey to date where *S. densiflora* was the primary target. All of the *S. densiflora* found in 2015 were located on those surveys, along with a few *S. alterniflora* clones. No *S. densifora* was discovered outside of the known infested locations.
- All site visits and shoreline surveys within Clallam County were negative for *Spartina*, the first negative survey in county history since the plant was discovered.
- Cloud based data collection was expanded greatly increasing the efficiency of data transfer between the partner agencies. This is one factor contributing to the increase in occurrence points reported for 2015. See Appendix B for more information about this cloud based data collection.
- The WSDA *Spartina* program has achieved over a 99 percent reduction in *Spartina* from the peak statewide infestation of more than 9,000 solid acres in 2003.

Spartina Eradication Effort by County

Pacific County

In 2015, the Pacific County cooperators collectively located 1,825 *Spartina alterniflora* occurrence points and treated 1.13 solid acre. This is a slight increase from the 1,788 occurrence points and 0.90 solid acre treated during the 2014 season. This increase may be explained by a longer than usual treatment season, June through November, and amplified surveys within the most heavily infested areas of Willapa Bay. Figures 5 and 6 identify where eradication efforts occurred.

The Willapa Bay Treatment Program requires the cooperation of many different organizations. WSDA provides resources, equipment, and herbicide to Pacific County. DNR, WDFW, USFWS, Pacific County, TNC and the Shoalwater Bay Tribe all provide crews that are responsible for treatment of their areas of responsibility. The cooperators meet throughout the treatment season in order to maintain communication regarding the progress of eradication efforts.

As of 2015, affected acres in Pacific County has declined to 1,075 representing a 96 percent reduction from the peak of 25,430 affected acres recorded in 2009. This is a positive indication that the program is not only proving to be effective at reducing overall solid acres of *Spartina* but trending toward eradication in some areas of the county. The decline in affected acres does not reduce the need to have a detailed monitoring program in place throughout the county. The cooperators surveyed over 30,000 acres of potential *Spartina* habitat, most of it two or more times during the course of the season.

With the successes of the past 13 years and the massive reductions of *Spartina* in Pacific County, continued support and funding remain crucial. The transition from the large-scale treatments of meadows has required significant numbers of personnel on the ground to give individual attention to areas that helicopters or large machines were previously able to cover in a relatively short amount of time. As the large meadows have broken up into small, scattered plants under the pressure of eradication, manual removal of *Spartina* has become cost effective, in some areas, and provides for a longer survey and treatment season.

WSDA anticipates the cost of conducting *Spartina* eradication in Pacific County in 2016 and beyond will decrease. As the Pacific County infestation approaches eradication, survey effort at individual sites can be reduced. Once a site has been declared eradicated, survey effort will drop to a single detailed, annual survey/monitoring lap. WSDA further proposes to reduce to biennial survey/monitoring after 4 additional years of negative survey. With this plan in effect, funding and resources can gradually transition to the most heavily infested Puget Sound counties while maintaining adequate resources in Pacific County to complete *Spartina* eradication.

With the successful eradication of over 8,000 solid acres of *Spartina* in Pacific County, it is critical that program continuity is maintained.

Figure 4 is a projection of *Spartina* reduction within Pacific County over the next three years with continued funding.

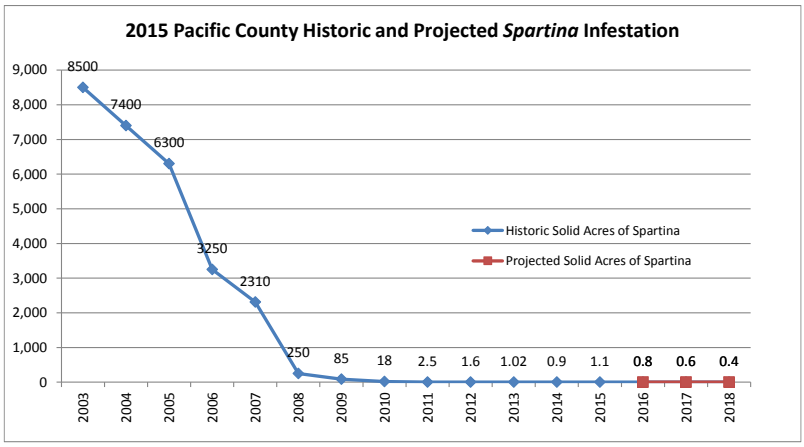

Figure 4: Solid acres of *Spartina* in Pacific County by year, based on WSDA estimates. The blue line represents the historic area of *Spartina* since 2003. The red line represents the projected *Spartina* area through 2018. Projection assumes continued funding.

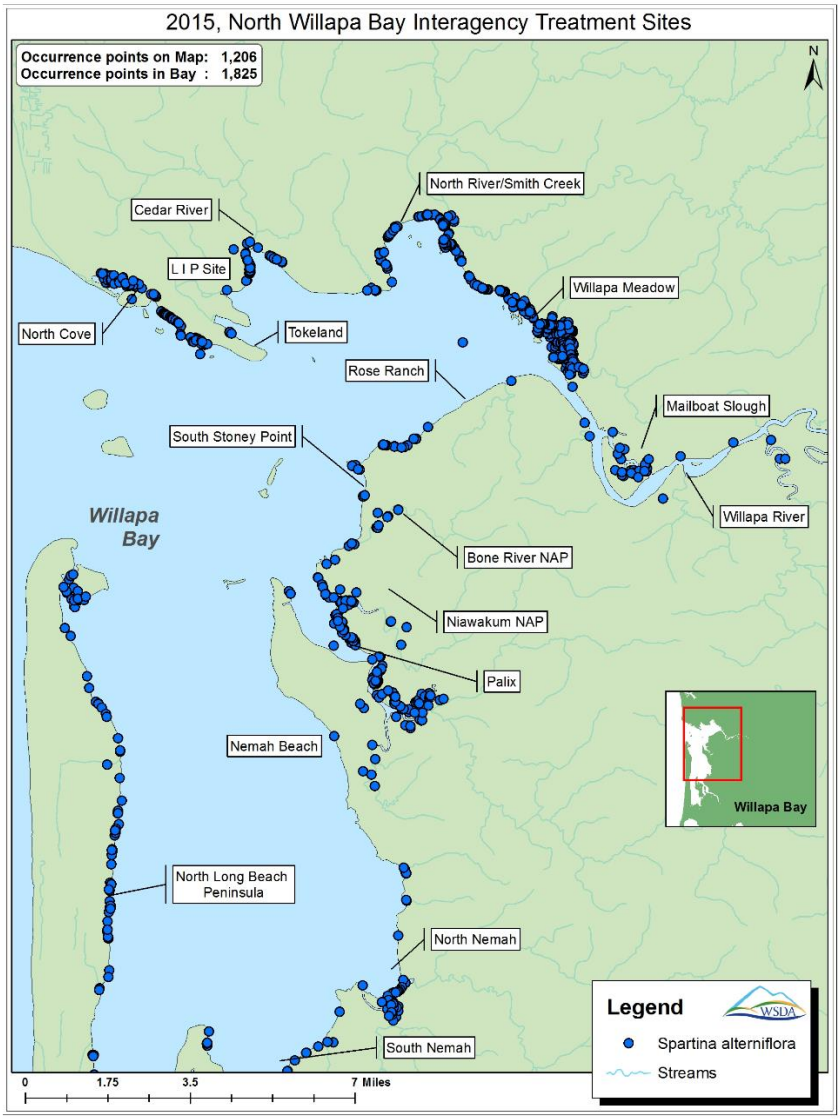

Figure 5: 2015 North Willapa Bay *Spartina* treatment sites.

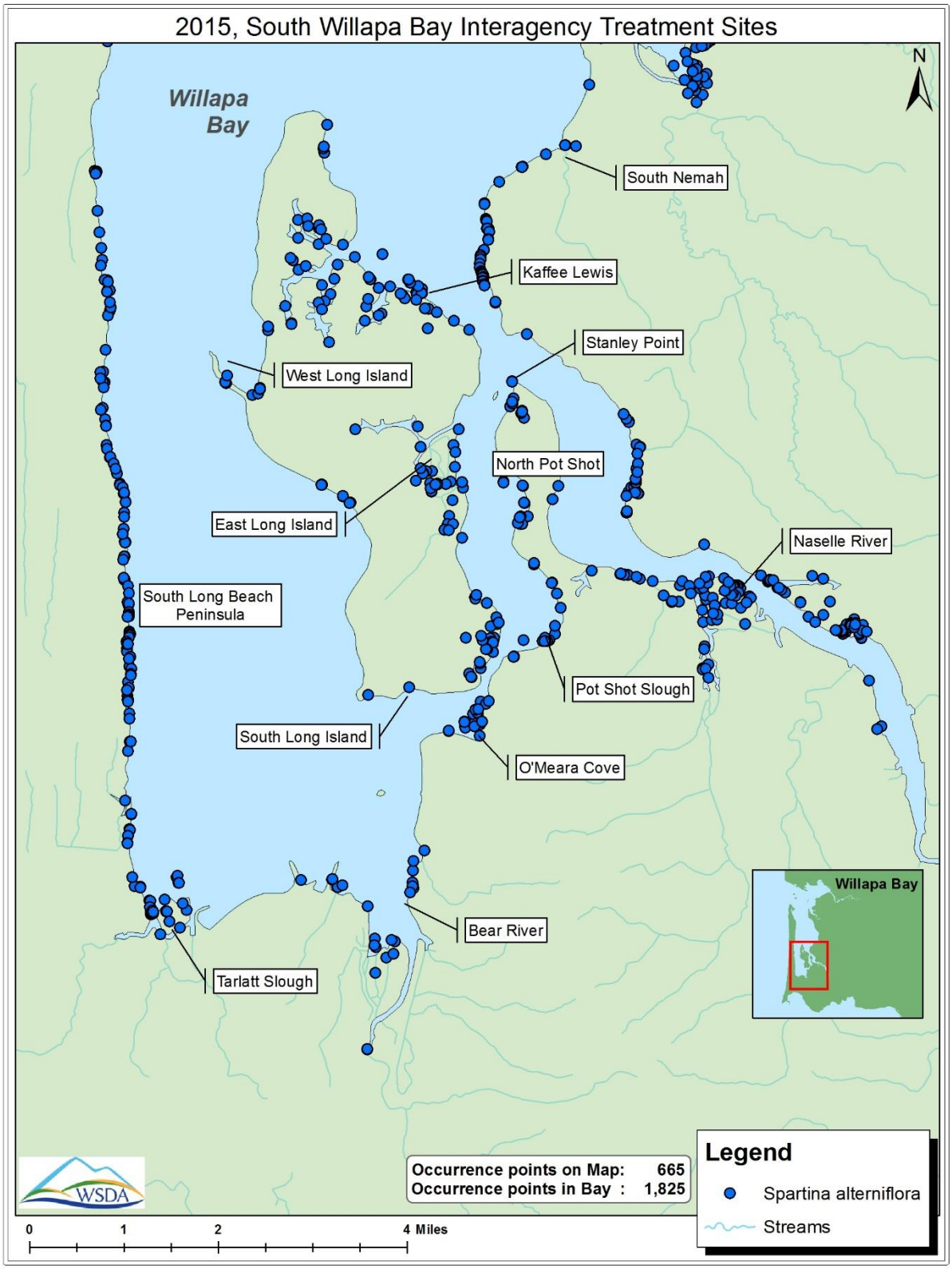

Figure 6: 2015 South Willapa Bay *Spartina* treatment sites.

Grays Harbor County

In 2015, with the opportunity furnished by continued federal funding from the USFWS Nisqually National Wildlife Complex and additional state funds, crews from DNR, WDFW, and WSDA completed two survey laps of Grays Harbor. The crews found and treated approximately 177 ft^2 (0.0041 solid acre) of *Spartina* within Grays Harbor County (Figure 7). Of this total, 140 ft^2 (0.0032 solid acre) were *S. alterniflora* and 37 ft^2 (0.00085 solid acre) were *S. densiflora.* This is a decrease from the 566 ft^2 (0.013 solid acre) of *Spartina* treated in 2014. Figure 8 shows the survey sites within Grays Harbor.

The overall infestation of *S. alterniflora* has been reduced to 0.0032 solid acre from a high of over ten solid acres in 2005 and reduced the overall infestation of *S. densiflora* to 0.00085 solid acre from a high of 0.28 solid acre in 2009. This is a reduction of over 99 percent for each species. Because of the significant reductions of *Spartina* infesting Grays Harbor County, digging has become cost effective and has been the primary means of control since 2011. Winter surveys and manual removal have proven effective by providing for a longer treatment season. During the 2015 and early 2016 winter survey a detailed harbor wide survey targeting *S. densiflora* resulted in no new sites detected. A full survey through the winter has been deemed unnecessary for 2016 due to that fact that no plants were found outside of known infested areas in 2015.

Since 2007, the Grays Harbor treatment program has been primarily funded by three federal contracts awarded by USFWS Nisqually National Wildlife Complex, these contracts totaled $891,928. WSDA allocated funds from these contracts to WDFW and to a lesser extent DNR to support eradication activities in Grays Harbor and the surrounding coast. During the 2015 summer survey season $128,000, from the third federal contract, was utilized to support the eradication effort. In December 2015 the last of these contracts ended.

These federal funds have allowed WSDA to allocate state origin funds and resources to the most heavily infested areas of the state. Moving into 2016 and beyond it is anticipated that state origin funding must protect the programmatic gains made while supported by federal funds. The annual cost of finding and controlling the scattered infestations has decreased over the last few years, however with the loss of federal funding the program will need to look for additional efficiencies. WSDA anticipates that some changes to the survey structure will be necessary, but with support from the cooperators the program will maintain its effectiveness.

WSDA projects that less than 0.006 solid acre of *Spartina* will be present in Grays Harbor County during the 2016 treatment season (Figure 7). A slight increase is predicted due in part to post season discoveries of several *S. alterniflora* clones. In order to be most efficient, two surveys of Grays Harbor shoreline will be completed at strategic times throughout the year. One survey will be completed during the winter into early spring within the areas traditionally infested by *S. densiflora* while native vegetation lies dormant. The second survey will be conducted during late summer and early fall. The focus of this survey will be locating *S. alterniflora* in the upper salt marsh as the surrounding plant life begins to recede. This tactical approach will maximize survey efforts in Grays Harbor during the 2016 treatment season.

With the successes of the past eleven years and the large reductions of *Spartina* in Grays Harbor County, continued support and funding are more important than ever.

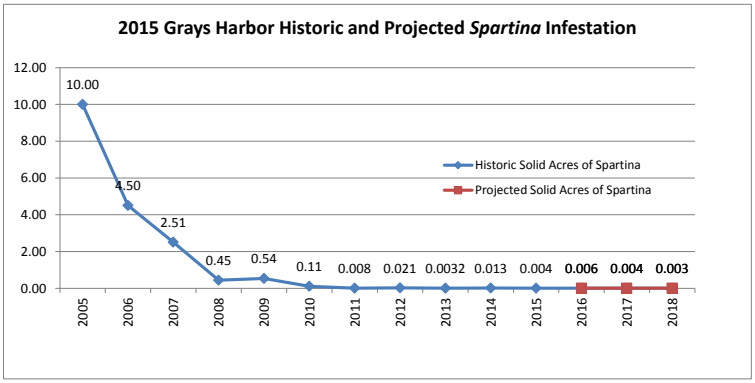

Figure 7: Solid acres of *Spartina* in Grays Harbor County by year, based on WSDA estimates. The blue line represents the historic area of *Spartina* since 2005. The red line represents the projected *Spartina* area through 2018. Projection assumes continued funding.

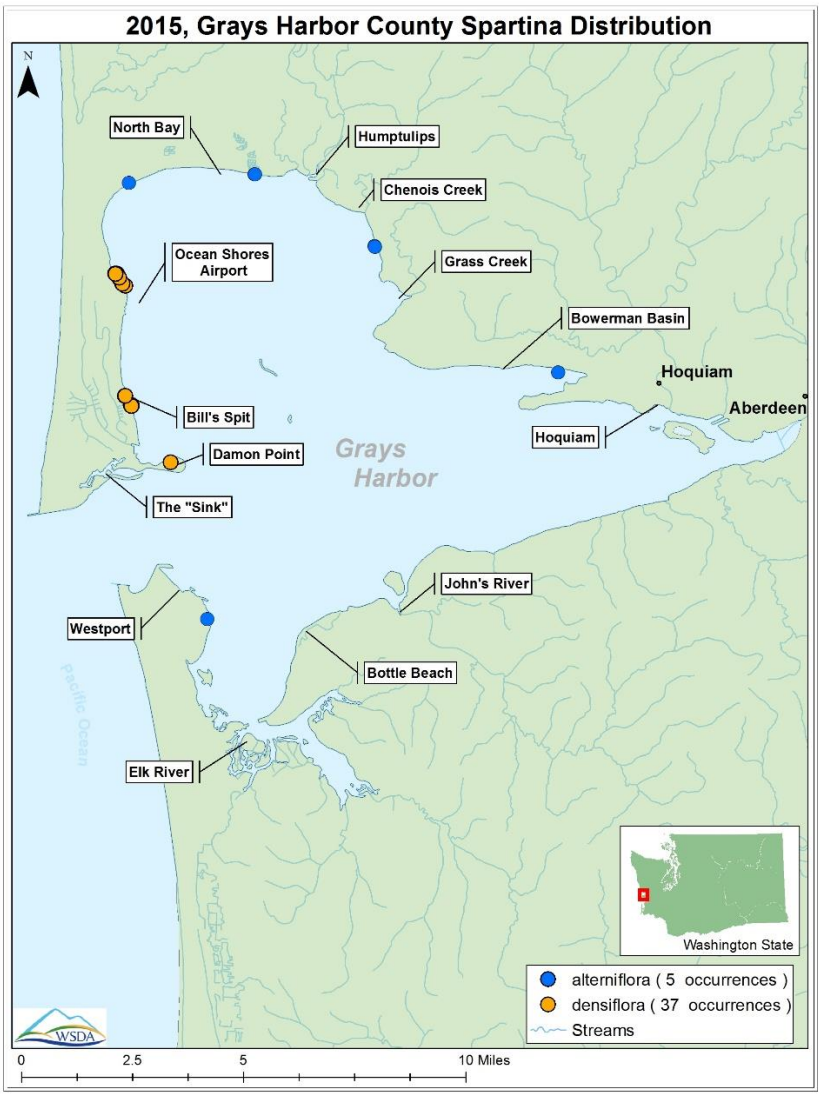

Figure 8. *Spartina* distribution *S. alterniflora* (blue) and *S. densiflora* (yellow), Grays Harbor County, 2015.

Snohomish County

In 2015, the largest *Spartina* infestation in Washington State was located in Snohomish County. The Snohomish County Noxious Weed Control Board (SCNWCB), WDFW, WSDA, DNR, TNC, Skagit County and the Tulalip Tribal Nation found and treated 6.7 solid acres (19,793 occurrence points) of *Spartina anglica* in 2015 (Figure 10). This is a thirteen percent increase from the 5.8 solid acres treated in 2014. WSDA provided Snohomish County $55,000 for *Spartina* eradication activities in 2015.

The higher levels of solid acreage found in 2013, 2014 and 2015 are linked to additional staff and funding provided to the Puget Sound effort. WSDA provided additional funding to the WDFW Puget Sound crew and DNR provided Puget SoundCorps (PSC) crews, equipment, and DNR staff. WSDA coordinated and participated in 31 cooperative treatment days in Snohomish County while DNR staff participated in eight cooperative treatment days and PSC crews participated throughout the summer. For more information on 2015 cooperative treatment efforts see Appendix C of this report. These additions resulted in an expansion of the *Spartina* eradication effort into new areas. The increase in the amount of *Spartina* found and treated in 2015 is a direct result of this increased survey effort. All of the project partners who had the opportunity to work with the PSC crews appreciated the opportunity and hope that the crews will return during future summer surveys. For more information on PSC crew involvement please see Appendix A of this report.

The majority of the *Spartina* infestation in Snohomish County was treated by the WDFW (3.7 solid acres) and SCNWCB (2.8 solid acres). The majority of this *Spartina* was contained within the South Skagit Bay area. SCNWCB and WSDA also worked closely with the Tulalip Tribal Nation to treat *Spartina* infesting Tulalip Bay, Big Flats and other culturally significant areas in 2015. Continued cooperation from the Tulalip Tribe is essential for efforts aimed at eradicating *Spartina* from Snohomish County.

In addition, TNC treated 0.24 solid acre of *S. anglica* within their 4,100 acre saltmarsh located in the Port Susan Bay Preserve (PSBP) just south of Stanwood. TNC contracts with an EarthCorps crew of five to six individuals to survey and treat the vulnerable habitat within the PSBP. For the 2016 treatment season, TNC will continue to contract with EarthCorps to survey and treat the PSBP and will also coordinate with the SCNWCB and WSDA to survey areas that are accessible only by boat.

For the 2016 treatment season, WSDA will assist the Snohomish partners in the survey of problematic areas and areas accessible only by watercraft. WSDA will continue to facilitate and participate in cooperative efforts with the partnering agencies in the most heavily infested areas. Continuing participation from DNR staff will be a great assistance to the Snohomish County effort. This multi-agency cooperative effort will provide the necessary coverage and detail needed to eradicate *Spartina* from Snohomish County.

Figure 9 is a projection of *Spartina* reduction within Snohomish County over the next three years with continued funding.

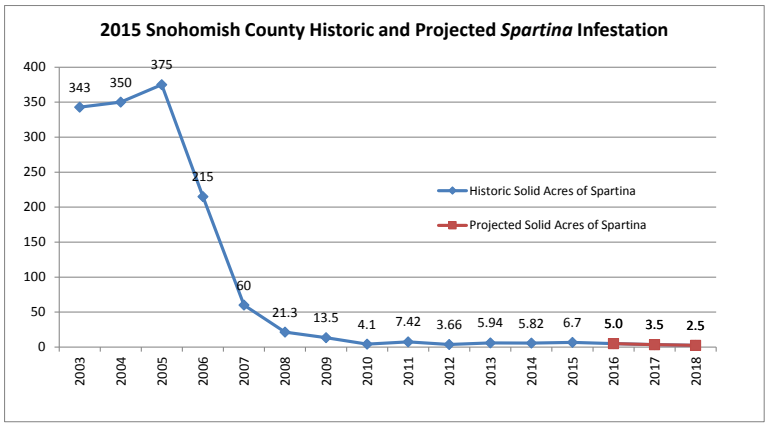

Figure 9: Solid acres of *Spartina* in Snohomish County by year, based on WSDA estimates. The blue line represents the historic area of *Spartina* since 2003. The red line represents the projected *Spartina* area through 2018. Projection assumes continued funding.

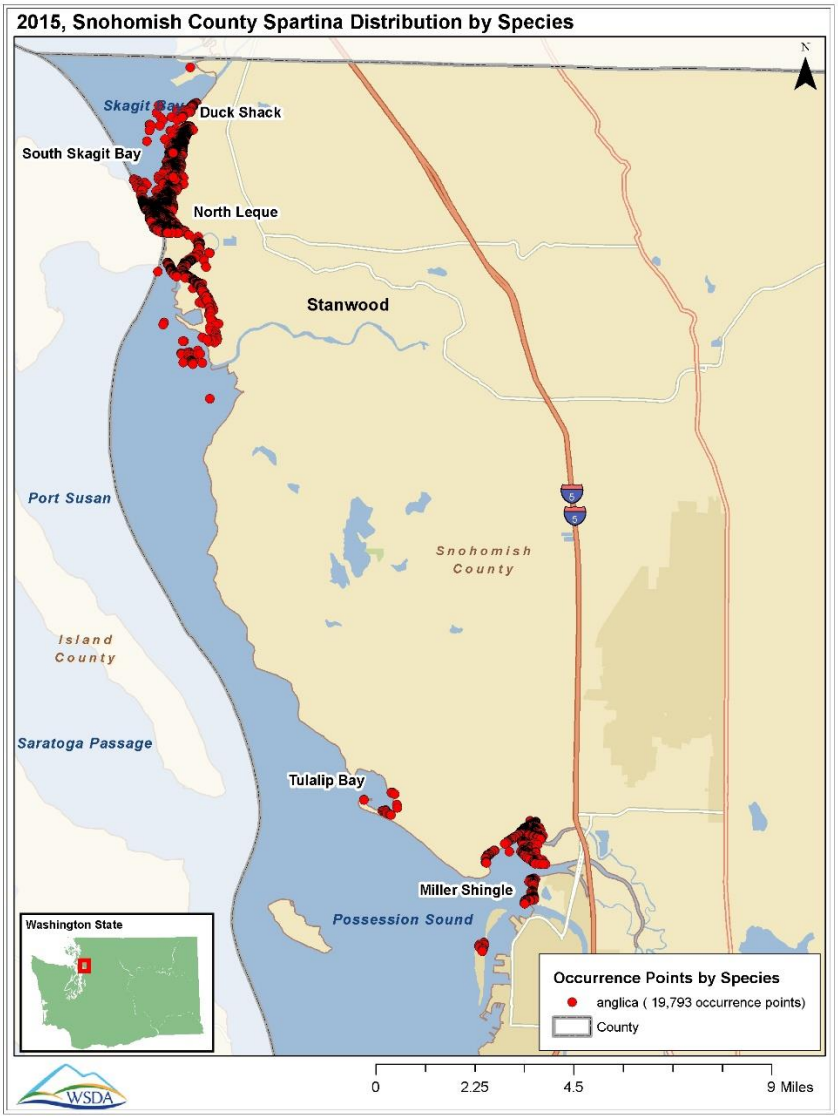

Figure 10: 2015 Snohomish County *Spartina* distribution by species.

Island County

In 2015, Island County contained Washington State's second largest *Spartina* infestation. Skagit County, Snohomish County, Island County, WDFW, and WSDA participated in the Island County effort. Island County Noxious Weed Control Board (ICNWCB) and WDFW treated the majority of the *Spartina* controlled in Island County. A total of 4 solid acres of *Spartina anglica* representing 13,338 occurrence points were found and treated in 2015 (Figure 12). This represents a 12 percent decrease from the 4.56 solid acres treated in 2014. WSDA provided Island County $55,000 for *Spartina* eradication activities in 2015. An encouraging development is depicted in Figure 12 where three new black triangles represent previous *Spartina* infestations declared eradicated in 2015. This brings the total number of previously infested sites declared eradicated in Island County to eleven.

Throughout 2015, the Puget Sound cooperators planned and executed effective multiagency treatments, including the Lake Hancock effort depicted on the front cover of this report. See Appendix C for more information about 2015 cooperative control efforts.

For the third consecutive year DNR funded PSC crews were made available in Island County. WSDA provided additional funding to WDFW to survey and treat the most heavily infested areas of the County. With the additional staff and funding, the cooperators expanded their survey and eradication efforts. These additions resulted in an expansion of the *Spartina* eradication effort into new areas. The increase in the amount of *Spartina* found and treated in 2012, 2013 and 2014 is a direct result of these increased efforts. All of the project partners who had the opportunity to work with the PSC crews appreciate the opportunity and hope that the crews will return during future summer surveys. For more information on PSC crew involvement please see Appendix A of this report.

ICNWCB and its contractor Wildlands Management controlled the major *Spartina* infestations and seed sources on Whidbey Island in 2015. 0.4 solid acre of *Spartina* were treated by Wildlands Management throughout Island County in 2015. This represents a 34 percent decrease from the 0.61 solid acre treated in 2014. This decrease in the amount of *Spartina* controlled by ICNWCB may reflect a shortened field season, due to contract renewal challenges, rather than an actual decrees in the amount of *Spartina* present. The 2016 field season results should be more comparable to the 2014 data.

WDFW treated a total of 3.6 solid acres in Island County in 2015. This represents an 8 percent decrease from the 3.95 solid acres treated in 2014. The majority of the 2015 Island County *Spartina* infestation occurred in and around Emericks and Prices Islands. For 2016, these infested areas will require significant support and resources in order to meet eradication objectives.

In addition, Island County contains Puget Sound's only known infestation of *Spartina densiflora* in Race Lagoon located on Whidbey Island. Approximately 6 ft^2 were located and manually removed at this site in 2014. For the first time in several years no *Spartina densiflora* was found in Race Lagoon in 2015. Continued survey and treatment efforts aimed at eradication of this infestation will remain a high priority. Due to *S. densiflora's* cryptic nature within the native salt marsh, survey and any needed treatment (mechanical) efforts will be conducted during the early spring and winter months of 2016.

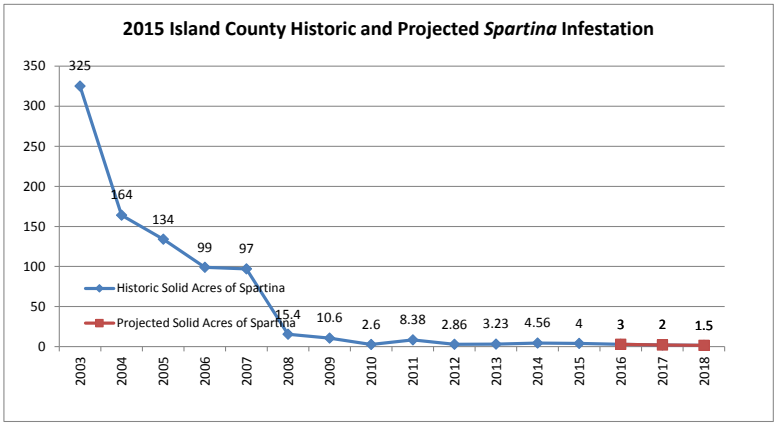

Figure 11: Solid acres of *Spartina* in Island County by year, based on WSDA estimates. The blue line represents the historic area of *Spartina* since 2003. The red line represents the projected *Spartina* area through 2018. Projection assumes continued funding.

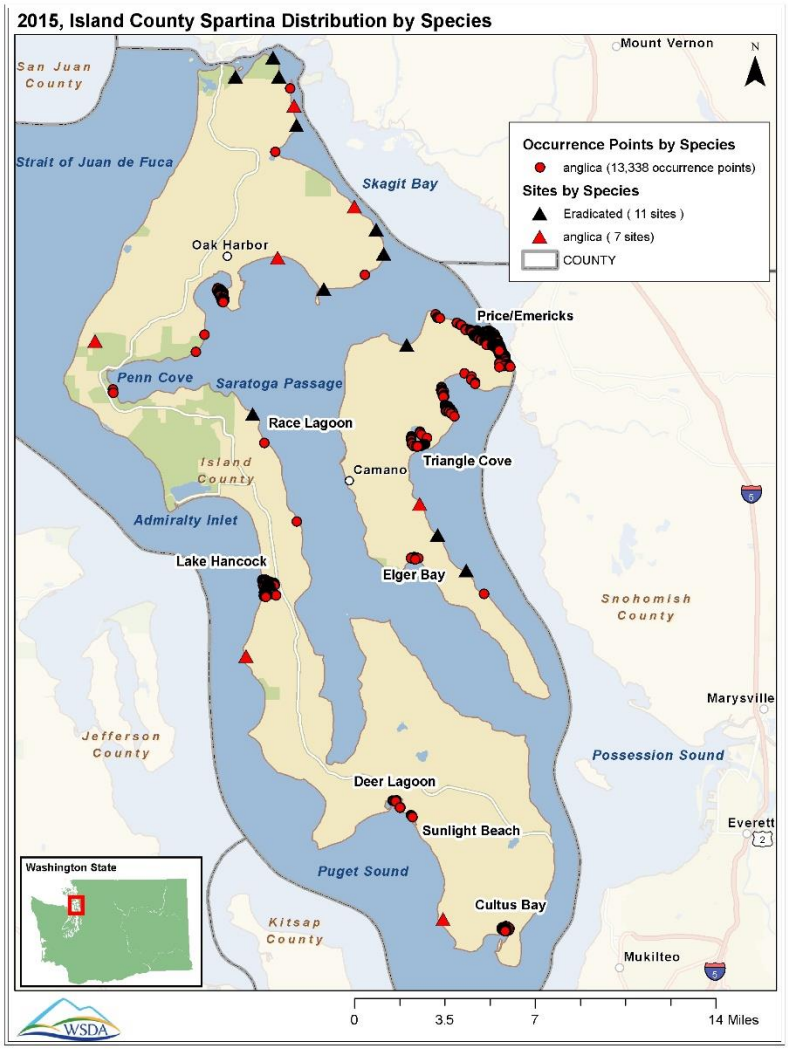

Figure 12: 2015 Island County *Spartina* distribution by species.

Skagit County

In 2015, Skagit County contained the third largest infestation of *Spartina* in Puget Sound. Approximately 0.5 solid acre (21,780 ft²) of *Spartina anglica* representing 890 occurrence points were found and treated in 2015 by the Skagit County Noxious Weed Control Board (SCNWCB), DOE, WDFW, WSDA, and the Swinomish Tribal Nation (Figure 14). This represents a 34 percent decrease from the 0.76 solid acre treated in 2013, the last year for which reliable data exists. Snohomish County crews assisted in the 2015 Skagit effort. WSDA provided $25,000 to SCNWCB and $5,000 to the Swinomish Tribal Nation for *Spartina* eradication activities in 2015.

Most of the survey and treatment efforts by SCNWCB occurred in the areas near Fir Island and Fidalgo Bay. WSDA provided airboat assistance to SCNWCB in 2015 to survey and treat the areas between Ika Island and Craft Island. For 2016, in addition to the Fir Island and Fidalgo Bay infestations, WSDA will continue to provide airboat assistance to the SCNWCB in the survey and treatment of all outlying islands including Alice Bay near Samish Island, Ika Island, and the tide flats between Craft Island and Ika Island.

The Swinomish Tribal Nation engaged in *Spartina* control on their lands in 2015. A total of 0.0189 solid acre (823 ft²) of *Spartina anglica* (244 occurrence points) was treated as part of a thorough two lap survey of potential *Spartina* Habitat on and around the Swinomish Reservation. Due to staff turnover and logistical issues a thorough survey was not completed in 2014. The 2015 results are a 65 percent decrease from the 0.054 solid acre (2,352 ft²) treated in 2013 during two survey laps. Since 2008, the Swinomish Tribe has reduced the *Spartina* infestation by 99 percent. The Swinomish Tribal Nation's continued cooperation and treatment efforts are essential to eliminate *Spartina* from Skagit County.

DOE has controlled *Spartina* on their Padilla Bay Estuarine Research Reserve since 1996. Two species of *Spartina* exist in Padilla Bay, *Spartina anglica* and *Spartina alterniflora*. In the 2015 treatment season, DOE found and dug one *S. anglica* plant while no *S. alterniflora* was found.

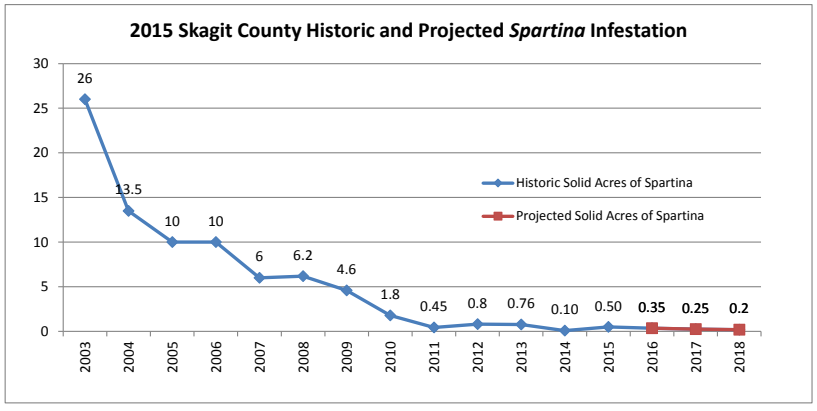

Figure 13: Solid acres of *Spartina* in Skagit County by year, based on WSDA estimates. The blue line represents the historic area of *Spartina* since 2003. The red line represents the projected *Spartina* area through 2018. Projection assumes continued funding.

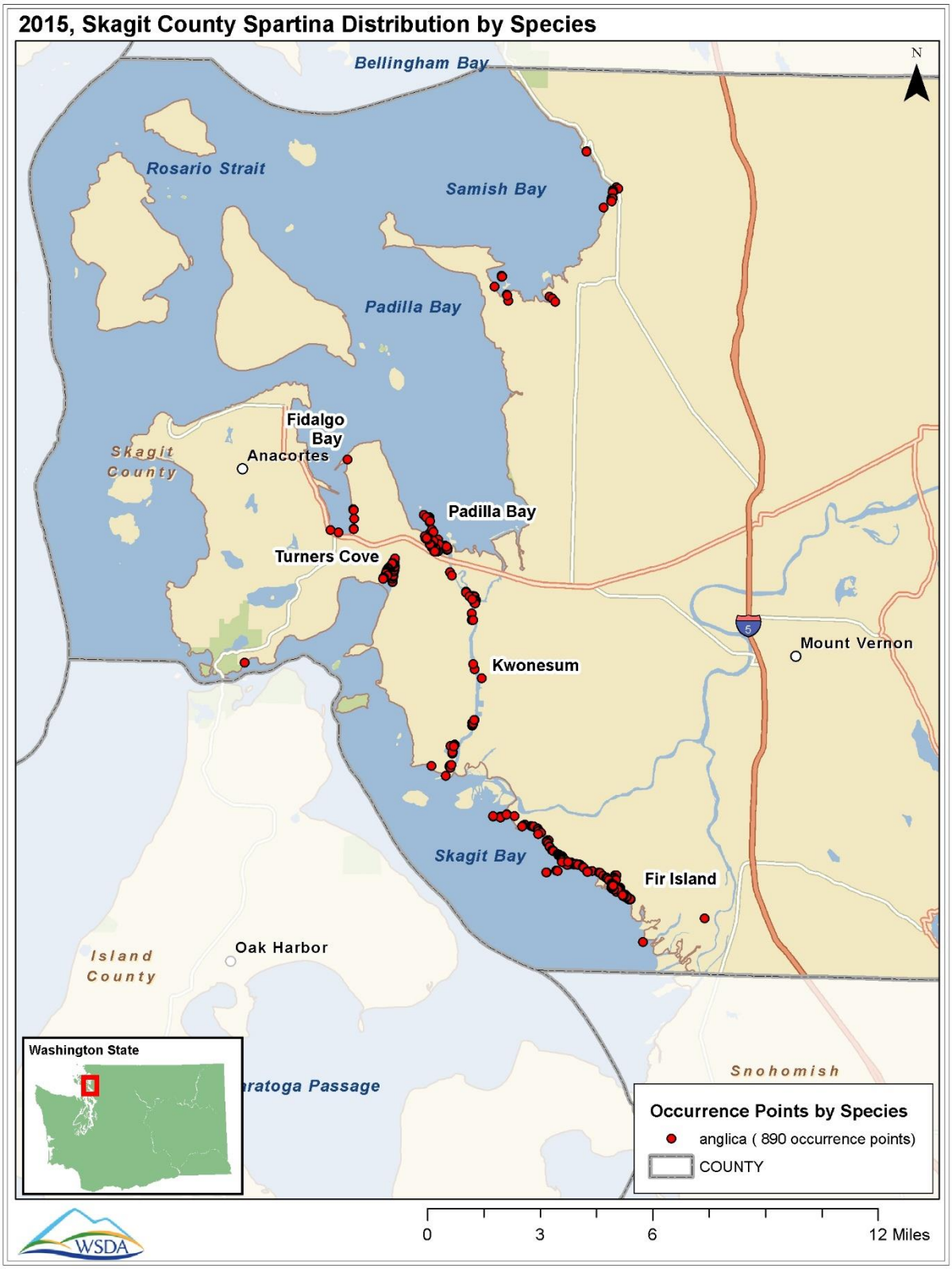

Figure 14: 2015 Skagit County *Spartina* distribution by species.

Whatcom County

In Whatcom County, *Spartina anglica* clones were discovered on the Nooksack Delta within the Lummi Reservation in 2010. In 2011, a collaborative effort with the Lummi Nation, the Whatcom County Noxious Weed Control Board (WCNWCB), People for Puget Sound, and WSDA located and dug approximately 100 ft^2or 0.0023 solid acre of *S. anglica* in this area. With the continued cooperation of the Lummi Nation, surveys were again conducted in 2012 and 2013 by staff from the WCNWCB and WSDA where a combined total of 144 ft^2 (0.0033 solid acre) of *S. anglica* were dug and removed in the Lummi Flats/Nooksack Delta area. Due to access issues and inclement weather a thorough removal of known *Spartina* plants was not executed in 2014, however, crews from the WCNWCB and the Lummi Nation dug 20 ft^2 from 4 sites in one treatment day and WCNWCB staff surveyed Lummi Flats and recorded 105 ft^2 and removed 232 seed heads from additional sites. Walking shoreline surveys in 2014 totaled 26 miles, including Point Roberts, Semiahmoo, Drayton Harbor and an area of the Nooksack Delta where *Spartina* had been found in years previous.

A successful 2015 effort was able to find and remove 48 plants or 278 ft^2 from Lummi Flats. Walking surveys in 2015 totaled 13 miles and included Sandy Point to Neptune Beach and all of Point Roberts. No additional *Spartina* was found outside of the Lummi Flats area during the walking surveys. WSDA and the WCNWCB will continue to assist the Lummi Nation in the survey and treatment of *Spartina* located within their estuaries. In 2015 WSDA provided $2,500 to the WCNWCB to survey potential *Spartina* habitat located within the County. Figure 15 depicts the 2015 distribution of *Spartina* in Whatcom County including site names.

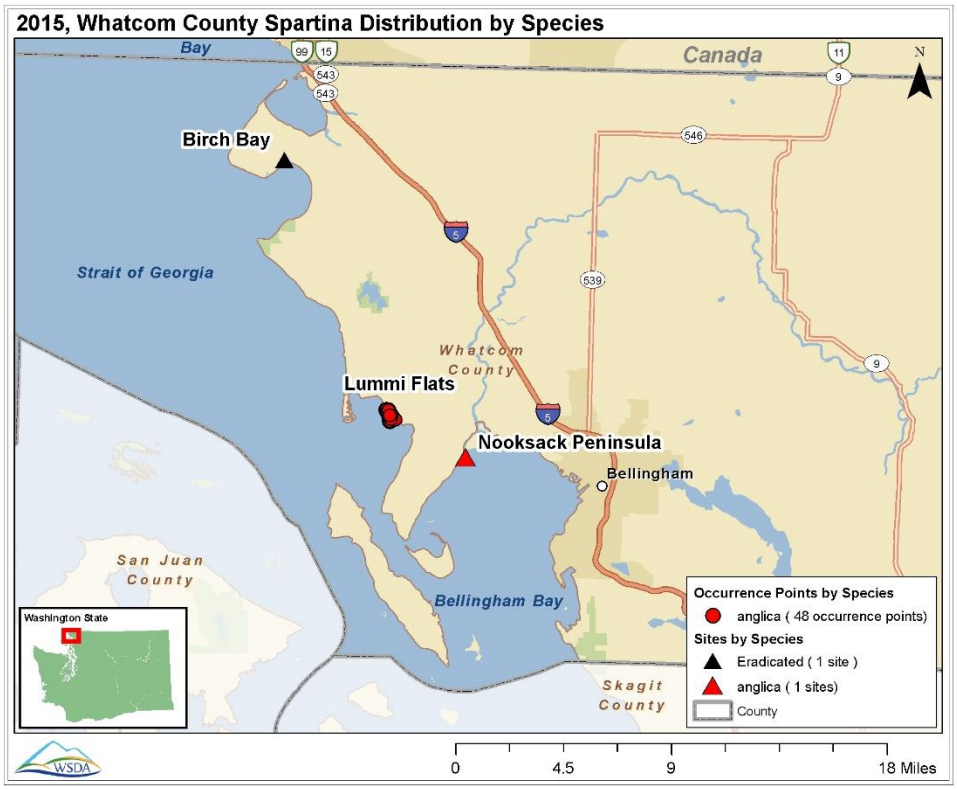

Figure 15: 2015 Whatcom County *Spartina* distribution by species.

San Juan County

Approximately 0.025 solid acre or 1093 ft^2 of *Spartina anglica* were treated in San Juan County in 2015. This represents a significant increase from the 23 ft^2 treated in 2014. This increase is due to a large infestation which was located in Argyle Lagoon during a late September survey in 2014 and was not treated due to landowner coordination issues and inclement weather. This infestation was treated in 2015 and accounted for 1089 ft^2 of the *Spartina anglica* treated in San Juan County. The only other site producing finds in 2015 was Low Point where 4 ft^2 was manually dug. No Spartina was found at the other historically infested areas such as Fisherman's Bay, Spencer's Spit, Sculpture Park and White Point. WSDA will continue to assist the San Juan County Weed Board in the survey and treatment of all vulnerable habitat located within the county. Figure 16 depicts the 2015 distribution of *Spartina* in San Juan County including site names.

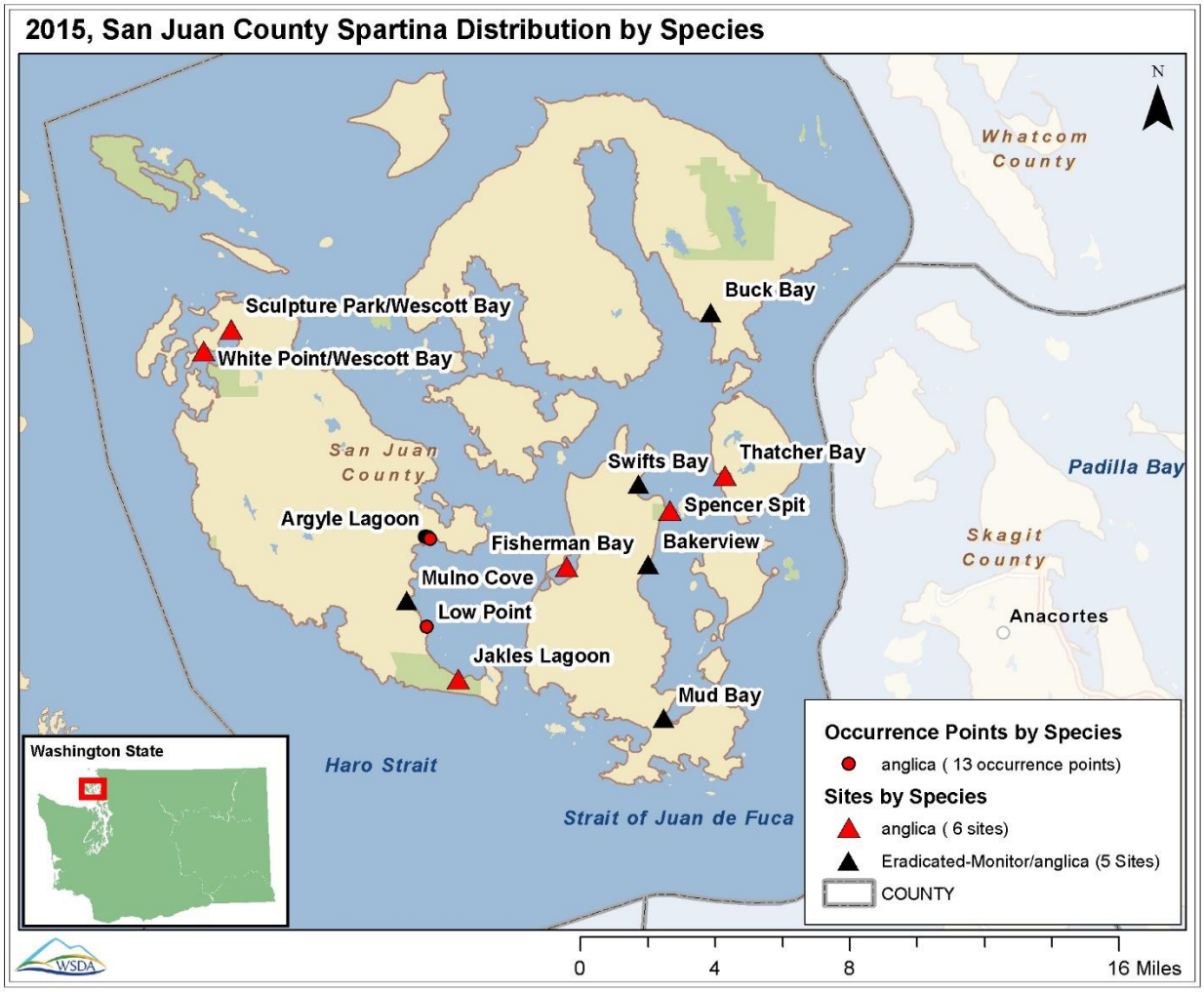

Figure 16: 2015 San Juan County *Spartina* distribution by species.

Clallam County

In 2015, WSDA continued to work with the Clallam County Noxious Weed Control Board, USFWS, and the Makah Tribal Nation to conduct surveys and control *Spartina* in Clallam County. These cooperators played an important role in all aspects of integrated weed management from consent to control work in the 2015 season.

In 2007, aerial and shoreline surveys discovered two species of *Spartina* totaling approximately one acre. *Spartina alterniflora* was found on the Sooes and Waatch rivers while *Spartina anglica* was located at Salt Creek, Dungeness Spit and the Pysht River. Multiple surveys and treatments of each site since 2007 have greatly reduced the *Spartina* infestation in Clallam County.

During the 2015 survey season, the WSDA crew was unable to locate *Spartina* in Clallam County after two visits to each site. This is a reduction from the 1 sq. ft. of *Spartina* that was found in the county during the 2014 season. In addition to the county wide reduction, Dungeness Spit and Waatch River met the criteria for eradication. The crew also completed survey in likely habitats throughout the county, including the mouth of the Elwha River, no new infestations were discovered. Figure 18 depicts the distribution of *Spartina* in Clallam County including site names.

Along with a minimum of two visits to all known sites in 2016, thorough ground and kayak surveys of all vulnerable *Spartina* habitat in Clallam County is recommended. With continued control efforts during the upcoming years, WSDA looks forward to a county wide *Spartina* eradication.

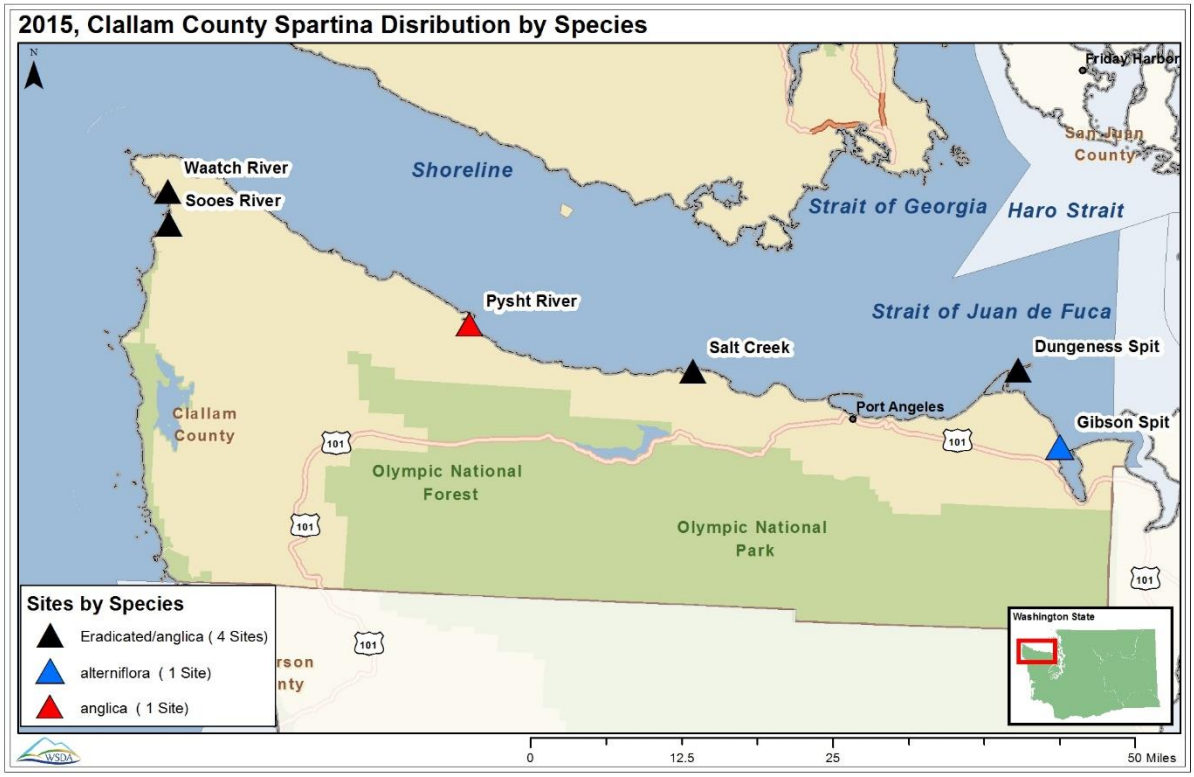

Figure 17: 2015 Clallam County *Spartina* distribution by species.

Kitsap County

In Kitsap County, approximately 0.001 of a solid acre (53 ft^2) of *Spartina anglica* (42 occurrence points) was manually removed in 2015. This represents a 38 percent decrease from the 85 ft^2 removed in 2014. WSDA and the Suquamish Tribe worked together to treat the largest known infestation in the central Puget Sound located at Doe-Kag-Wats. This site has significant challenges with continually shifting driftwood that litters the cove and makes survey difficult. In 2015, 51 ft^2 of *Spartina* was treated at Doe-Kag-Wats representing a 16 percent decrease from the 61 ft^2 treated in 2014. With the continued cooperation of the Suquamish Tribe, eradication at this site will require repeated visits in the coming years. Additionally, two detailed surveys of Foulweather Bluff revealed 2 ft^2 of *S. anglica*.

For 2016, WSDA crews will continue to survey the estuarine habitat of Kitsap County to ensure that no new outlying infestations exist. Figure 18 depicts the 2015 distribution of *Spartina* in Kitsap County including site names.

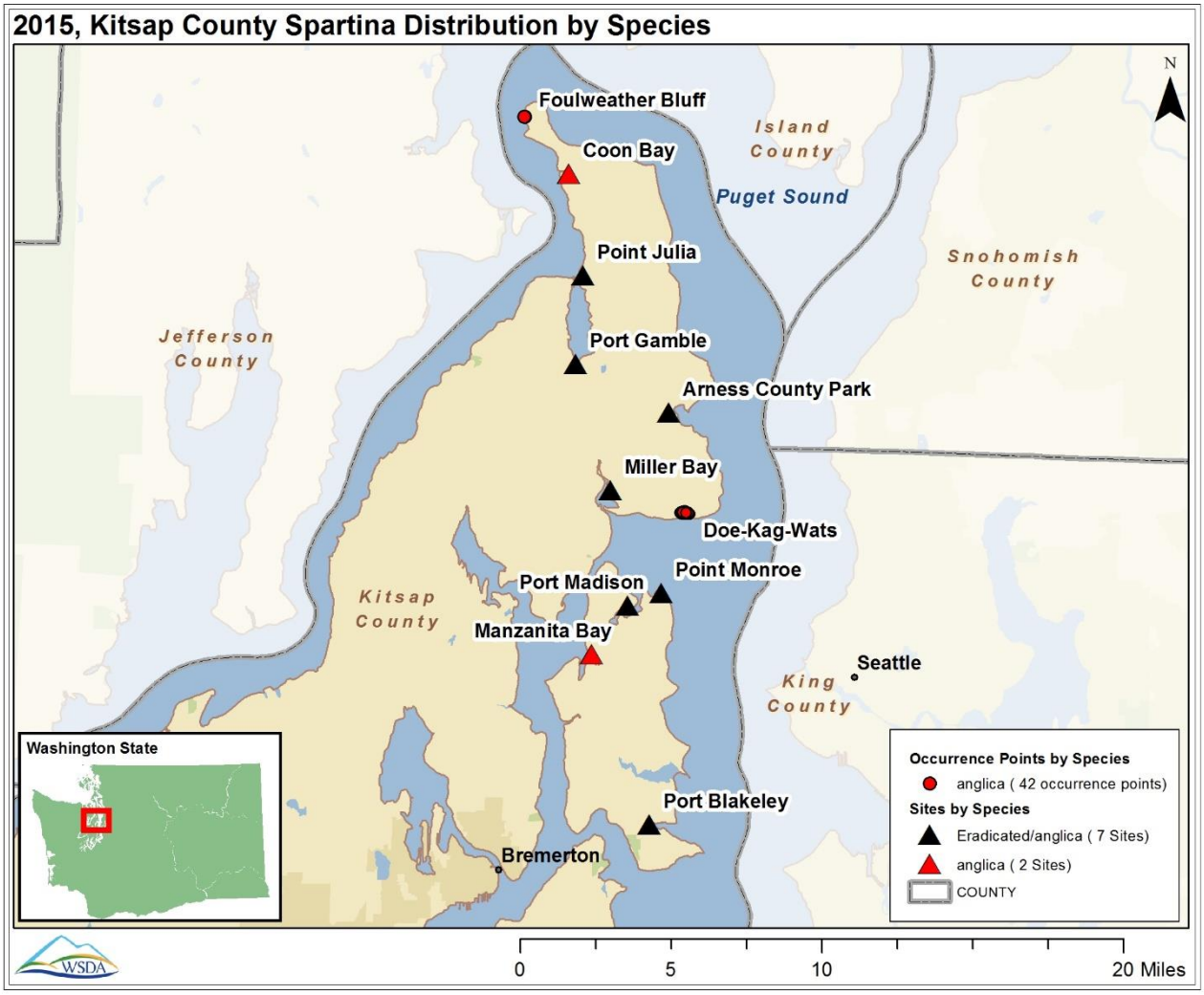

Figure 18: 2015 Kitsap County *Spartina* distribution by species.

Jefferson County

WSDA continues to work with the Jefferson County Noxious Weed Board, U.S. Navy, Washington State Parks, and private landowners to conduct surveys and control *Spartina* in Jefferson County. These cooperators played an important role in all aspects of integrated weed management practices during the 2015 season.

Two species of *Spartina* infest Jefferson County. Volunteer surveys in the 1990s revealed scattered infestations of *Spartina anglica* at several locations within the county. *Spartina patens* was discovered in the 1990s at Dosewallips State Park on Hood Canal by Evergreen State College professor Dave Milne while on a field trip with his class. Multiple visits to all known sites over the last several years have led to a vast reduction of *Spartina* within the county.

In 2015, extensive ground and kayak surveys yielded 3 *Spartina* occurrence points totaling approximately 40 ft^2 (0.00092 acre) treated within Jefferson County. Of this total, WSDA crews treated approximately 34 ft^2 of *S. patens* on private land located just north of Dosewallips State Park. An additional 6 ft^2 of *S. anglica* was dug by WSDA crews in Walan Point and North Indian Island. Figure 19 depicts the 2015 distribution of *Spartina* in Jefferson County including site names.

Working in cooperation with Washington State Parks and local landowners, WSDA crews made four separate visits to Dosewallips conducting extensive surveys of *S. patens*. As a result, approximately 34 ft^2 (0.00078 acre) of *S. patens* was treated at the site representing a 95 percent decrease from the 740 ft^2 (0.017 acre) treated in 2014. With permission granted by the U.S. Navy in 2014, WSDA crews chemically treated approximately 1,307 ft^2 (0.030 solid acre) of *S. patens* within the Bangor West Site on the Toandos Peninsula. Subsequently in 2015, WSDA observed that all plants previously treated at Bangor West were ceased and no new plants were discovered.

Indian Island remains the center of the *S. anglica* infestation in Jefferson County. In 2015, both sites located on the island were found to contain plants. Surveys of the North Indian Island and Walan Point sites each revealed one plant estimated to be 3 ft^2. It appears that as the Indian Island infestation is reduced, the amount of *S. anglica* found within adjacent sites diminishes. Kala Point and Fort Flagler, located near Indian Island were traditionally infested sites that met the requirements for eradication this year.

In 2016, continued shoreline surveys in Jefferson County are recommended to locate and eradicate *Spartina*. Additionally, continued landowner support to the north and south of Dosewallips State Park and the Bangor Naval Base will be crucial in the effort to eradicate *S. patens* from Washington State.

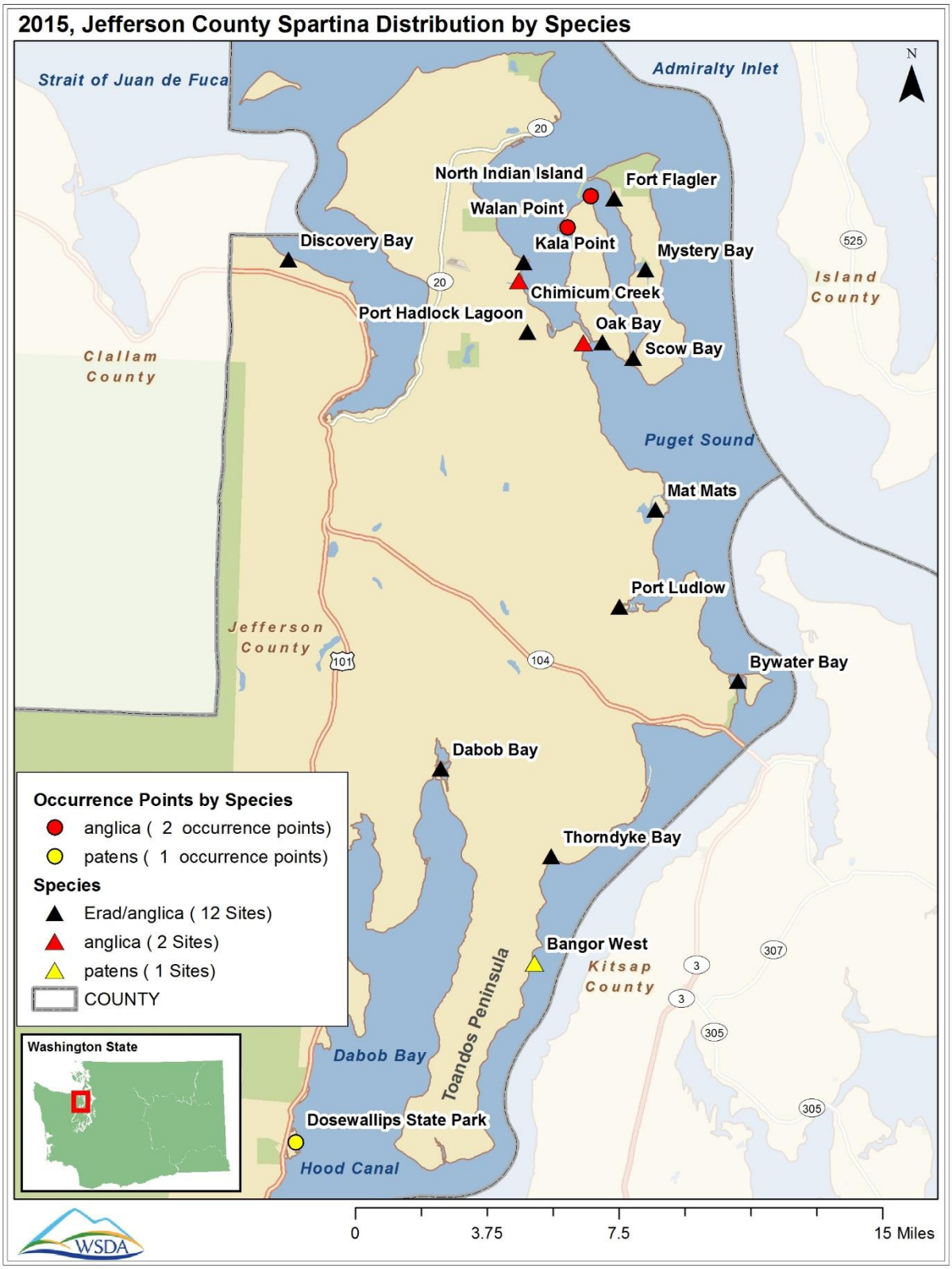

Figure 19: 2015 Jefferson County *Spartina* distribution by species.

Pierce County

Spartina anglica was discovered for the first time in Pierce County in 2010 at Squally Beach/Commencement Bay along the Hylebos Waterway in the Port of Tacoma. At this site, approximately 60 ft^2 (0.0014 solid acre) of *Spartina* was manually removed by crews from WSDA and WDFW. In 2011, WSDA crews conducted three rounds of survey at the site, finding and removing 18 ft^2 (0.0004 solid acre) of *Spartina*. Two survey/treatment laps were conducted in 2012 where 6 ft^2 (0.00014 solid acre) were manually removed. In 2013 and 2014, two rounds of survey were conducted where 2 ft^2 of *anglica* was removed. After multiple trips to the site in 2015, no *Spartina* was found. WSDA will continue to cooperate with the Pierce County Noxious Weed Control Board and the Puyallup Tribe to survey the vulnerable habitat in Pierce County. Figure 20 depicts the location of the Squally Beach, Pierce County site.

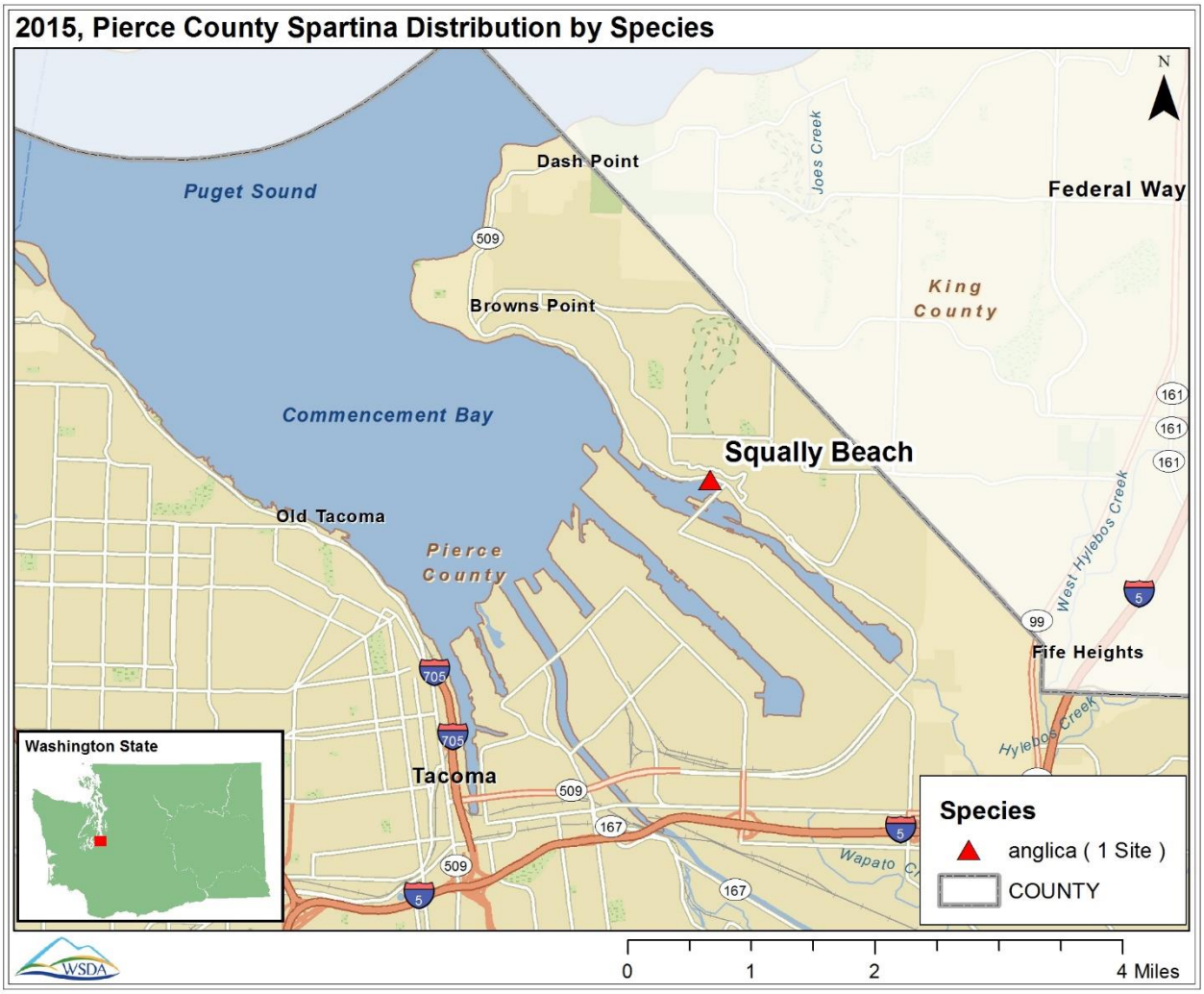

Figure 20: 2015 Pierce County *Spartina* distribution by species.

King County

Historically, small infestations of *S. anglica* were found on Vashon Island near Rabs Lagoon, Point Heyer, Gorsuch Road and Fern Cove and following the 2013 treatment season the county was declared "eradicated." However, in 2014, surveys conducted by WSDA crews in Point Heyer revealed 3 ft² of *Spartina*. The 2015 surveys did not find any *Spartina* in King County. WSDA and King County Noxious Weed Control Board will continue to monitor the estuarine habitat of King County to ensure that no new infestations occur. Figure 21 depicts the 2015 distribution of *Spartina* in King County including site names.

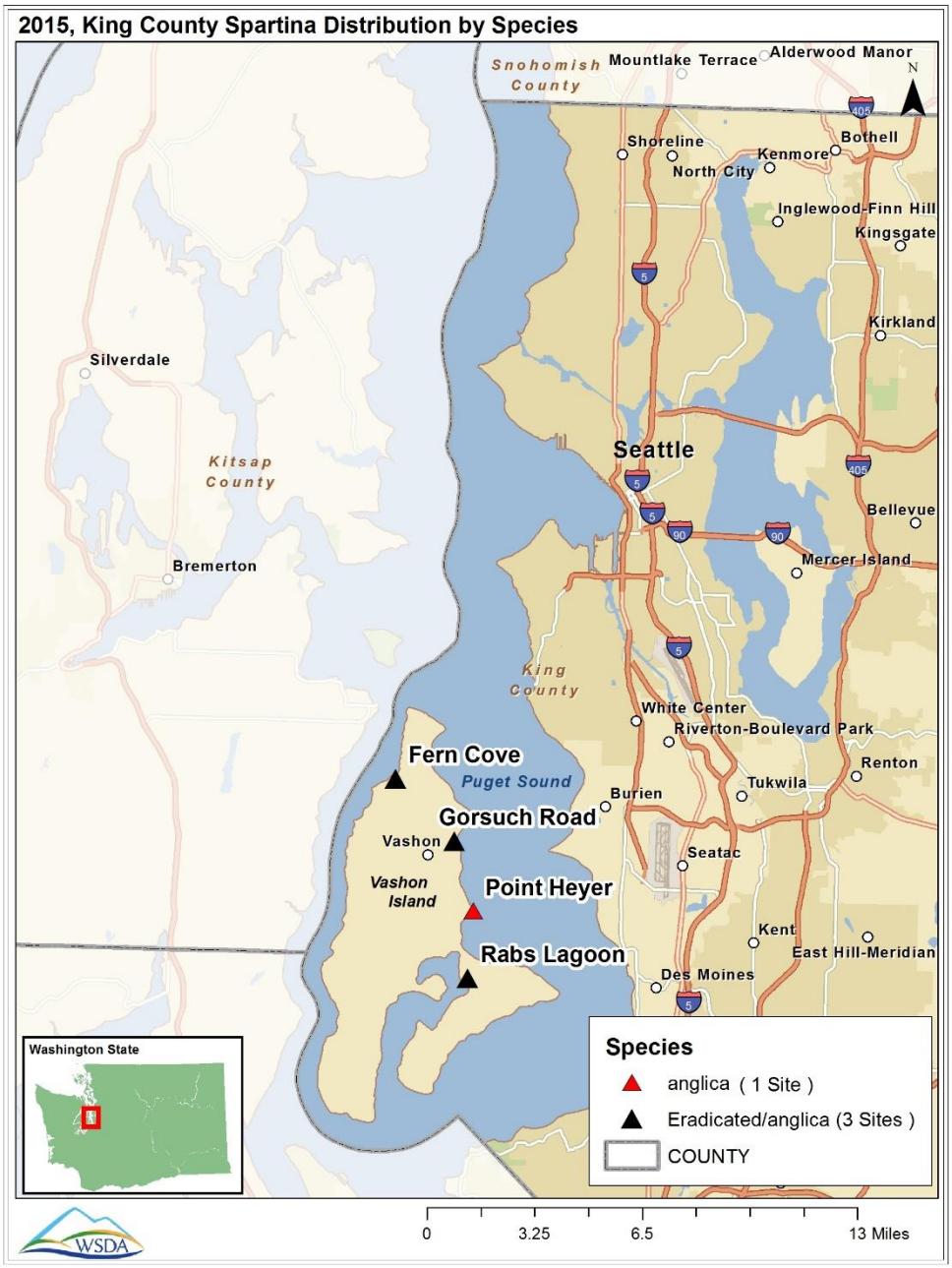

Figure 21: 2015 King County *Spartina* distribution by species.

Appendix A

DNR Aquatic Invasive Species Program Control Work Using Puget SoundCorps Crews
Submitted by Todd Palzer & Todd Brownlee, DNR Aquatic Resources Division

The 2012 Washington State Legislature passed the Jobs Now Act, which included a $940,000 appropriation for the Washington State Department of Natural Resources' (DNR) Aquatic Resources Division for the 2011-13 biennium. These funds were used to control aquatic noxious weeds as part of a larger jobs fund package. This funding was continued in 2013-15.

In 2013, 2014 and 2015 DNR, along with the Washington State Department of Ecology (Ecology), established Puget SoundCorps crews to perform noxious weed and invasive plant control for select watersheds flowing into the greater Puget Sound and its marine shorelines. DNR's Aquatic Invasive Species Program partnered with county noxious weed control boards and conservation districts with established partnerships with state and federal agencies, tribal governments, conservancy organizations, and private landowners. The combination of these partnerships, a pre-existing infrastructure, and local experience maximized overall productivity and on-the-ground accomplishments.

The capital budget request for Puget SoundCorps partnership funding was approved by the legislature for the 2015-17 biennium. DNR's Aquatic Resources Invasive Species Program was allotted $50,000 of re-appropriated ALEA funding and $156,000 of Puget SoundCorps bill funding; and $40,000 of DNR's operating RMCA-A funds were also prioritized to sustain these effective crews for on the ground invasive species survey and treatments. For the 2015 field season, limited crews were available to perform these activities for a total of 35 crew days (2,520 man hours) at a cost of $54,000. Crews were deployed as follows for the 2015 survey and treatment season:

Thurston County – 6 crew days and supplies – yellow flag iris treatment = $9,800.
Clallam Co./Jefferson Co. – 10 crew days and supplies – Knotweed / other species = $15,200
Snohomish Co./Skagit Co./Island Co. – 19 crew days and supplies – Spartina = $29,000

This reduction in effort from previous years was primarily due to three factors -- reduced funding levels, a severe fire season, and the logistic issues of planning and securing crew time for the three summer months following a capital and operating budget being finalized for invasive species treatments. The remaining 2015-17 funding ($192,000) is planned to be spent during the 2016 field season allowing crew time to be adequately planned for within DNR, Ecology, EarthCorps and our local, tribal and federal partners. This funding and field work pattern is likely to continue into the future due to logistic issues of putting crews in the field immediately following the biennial budget sessions with the budget cycle year reduced focused effort on critical treatments and a more robust effort the second year of the biennium.

A crew is composed of one crew lead and five crew members provided by Ecology's Washington Conservation Corp (WCC) or EarthCorps. A total of 35 crew days, at a cost of $1,185 per crew per day plus PPE and supplies, equaled a total of $54,000 spent on invasive species control by Puget SoundCorps crews in FY 2015. Puget SoundCorps crews were once again instrumental

during the 2015 *Spartina* eradication season. Puget SoundCorps crews working in Skagit, Island, and Snohomish counties covered the expanded treatment areas of Spartina in 2013 and 2014.

DNR oversight was provided by Kirk Thomas, Field Operation Coordinator for the agency's Asset and Property Management Division; Todd Brownlee, Invasive Species Operations Coordinator, Aquatic Resources Division; and Todd Palzer Shellfish and Invasive Species Programs Manager. DNR used existing invasive species funds to cover its employees' costs and did not charge any of its staff time against the Jobs Act Now funding for these projects.

For more information about the 2015 Puget SoundCorps crews, please contact Todd Palzer at (360) 280-9153.

Appendix B

WSDA Pest Program Cloud Based Data Collection Process Improvement
Submitted by Landon Udo, Plant Protection Division

During the 2015 *Spartina* field survey season, WSDA continued the use of its cutting edge mobile data collection system comprised of two key pieces of software, iForm and ArcGIS Online, which are run on iPhones and iPads. The software is designed to work complimentary to one another to aid in both real-time and offline data collection as well as adding real-time mapping capabilities.

In recent years the majority of cooperators operated with simple recreational grade GPS equipment only capable of collecting location and date information leading to miscommunication in reporting back to WSDA which led to unreliable data. Under the WSDA system, we are able to collect not only location and date but species, size of the infestation, data collector, unique identification per plant, along with a high resolution images. Another limitation of the old system was the wait time involved in receiving data from cooperators which ranged from weeks to months making it difficult for field crews to recall answers about specific data verification inquiries. With the new system the process of collecting the data can be done in as little as 30 seconds from starting the record to uploading the record. Once the data has been uploaded, the information is immediately available to all WSDA *Spartina* staff, GIS department, and management from a central website and mapped in real-time. This automated flow of data and ease of accessibility has led to increased communication between cooperators in the field and WSDA staff as well as cut down on reporting lag time from months to minutes. The incorporation of real-time mapping and ArcGIS Online allowed WSDA to monitor and respond to *Spartina* occurrences in less time and included other benefits such as the ability to reference historical data, aerial imagery analysis, access to parcel ownership information, in addition to plant occurrences' relation to other plant occurrences from different cooperators in the area. This season WSDA also implemented the use of real-time creation and sharing of trackline data which shows the path of the surveyor throughout the day to represent exact areas that have been surveyed. The initial results were very promising in order to show not only positive data but also aided in assuring there are no gaps in coverage and surveyed areas. In 2016 this capability will be released and implemented by cooperators as well.

With the vast amount of data collectors and cooperators involved, the ability to find a single solution that could satisfy the needs of all users has always been deemed impossible. Yet over the past two years, WSDA has successfully implemented a system that featured standardized field data collection forms, universal hardware to aid in training and support as well as data collected and mapped wirelessly in real-time. The result was less time wasted on data management for cooperators, less data lost by cooperators when saving and transmitting data to WSDA, and at the end of the season a more accurate and reliable data collecting and reporting process. WSDA hopes to build on the success of 2015 and will be rolling out the real-time mapping elements of ArcGIS Online to a limited number of cooperators allowing them access to real-time information on plant occurrences and surveyed areas done by all cooperators in their area. This will help reduce program inefficiencies and improve the cooperative eradication effort.

For more information about the cloud based data collection process, please contact the Pest Program at (360) 902-2070.

Appendix C

WSDA Puget Sound Program to Support Cooperative *Spartina* Control Efforts
Submitted by Sonny Gohrman, Washington State Department of Agriculture

The Washington State Department of Agriculture staffed an additional field position for the 2015 *Spartina* control season. The main focus of the position is facilitation of cooperative efforts between Skagit, Snohomish and Island Counties, WDFW, WSDA, DNR, and non-governmental entities such as TNC performing *Spartina* control work. WSDA also supported cooperative efforts by increasing the availability of both Marsh Masters and airboats with trained operators.

Multiple co-op efforts occurred during the 2015 season. Airboats were used extensively in Skagit, Snohomish and Island counties. These three counties are a priority as they contain the majority of the Puget Sound *Spartina* infestation. WSDA also worked with Whatcom County on a cooperative project on Lummi Flats where two WSDA airboats were used on a manual removal project. Control and survey of areas hard to reach was the emphasis for airboat use. Puget Sound has vast areas of mudflat and estuarine vegetation in both Port Susan and Skagit Bay where airboats are best suited for fast survey. Time is of the essence due to tides and the size of areas that need to be surveyed. Fast access to control sites allows for the necessary dry times after applications.

Historically the Puget Sound partners have planned annual cooperative control efforts. Frequently the realities of weather, tide, staffing and unplanned events have derailed these cooperatives before they occurred. The addition of a WSDA employee based in the North Puget Sound with a daily focus on facilitating cooperative control efforts was successful. If a planned cooperative was canceled an immediate effort was made to facilitate alternative efforts.

Below is a recap of significant 2015 cooperative efforts in Skagit, Snohomish, Island and Whatcom Counties:

Skagit County
NW Skagit Bay Coast from Dry Slough to the North Fork of the Skagit River was surveyed and control work was accomplished on scattered plants and clones on the outer mud flats and along accessible channels in July. Both WSDA airboats were used and staff from WSDA, Snohomish and Skagit Counties participated. Additional time was spent on the ground between Rawlins Road and Browns Slough. Control and Survey in **Samish Bay** was accomplished using staff from Skagit and Snohomish Counties and WSDA. Ground surveys were accomplished from the north Skagit border to Edison. Clones and scattered plants were found south of Blanchard and were controlled as was a clone and scattered plants at the Samish Bay Sports Club. Dike access is the key to most of the areas in Skagit County.

Island County
Skagit, Snohomish and Island Counties, WSDA, and WDFW were all involved in co-op efforts in Island County. Airboats from WDFW and WSDA were used to access the **Price, Emerick, North Leque, and Mystery Island** sites in October. The WSDA Marsh Master was made available early in the season to backup WDFW. **Hancock Lagoon** was the site of 4 co-op efforts

during the season with all entities participating. Hancock Lagoon is a walk in site and no equipment was involved, just lots of crew members on the ground working cooperatively.

Snohomish County

During the July airboat co-ops in Skagit County **Big Ditch, Thomas Moore Slough / SF Skagit River** and down to Duck Shack North were surveyed for later control work. These areas were subsequently controlled by WDFW. Multiple co-op efforts involving the Marsh Masters from WSDA, WDFW, and DNR were accomplished in Skagit Bay. DNR brought a third Marsh Master and driver from coastal Willapa Bay to assist with the Skagit Bay sites. This is the first time in a number of years that DNR has worked in Puget Sound. The Marsh Masters were used at sites near West Pass in **South Skagit Bay, Duck Shack North, and** the **Duck Shack.** The **Duck Shack** sites are hard to reach and for the first time in years was thoroughly sprayed.

Port Susan/TNC was also the site of multiple co-op efforts. In July 3 days were spent doing survey and control on the mud flats and along the channels. TNC is the owner of most of the infested areas in Port Susan. For the last few years TNC has hired an EarthCorp Crew and this year, WSDA and Snohomish County worked with their crew north of the Groeneveldt dike to South Pass and south with the airboat around Goose Island. Associated areas including **Davis Slough, South Pass East, South Pass West and Warm Beach** were all part of co-op efforts. Areas to the South include **Tulalip Bay, Quilceda, Big Flats, and Miller Shingle**. **Tulalip Bay** was quickly controlled using staff from WSDA, Snohomish and Skagit Counties. Big Flats was completely covered in a two day effort involving airboats from WSDA and WDFW. **Quilceda** is a new site split in half by Quilceda Creek. The west side was surveyed in the winter by Snohomish County and the east side was surveyed in August by the County and WSDA. Surveys are necessary in order to inform the Tulalip Tribe as to amounts and treatment necessary. Both sides were thoroughly sprayed using staff from WSDA, Skagit County, and Snohomish County. A final site in this area is from **Priest Point to Quilceda**. This site was surveyed by WSDA and Snohomish County. Weather and the end of the season prevented treatment. Only one co-op effort involving WSDA, Snohomish and Skagit Counties was done at Miller Shingle.

Whatcom County

A one day co-op with the Whatcom County Weed Board, WSDA, and an EarthCorp crew from the Lummi Tribe dug and hauled 3700 pounds of *Spartina* and mud from Lummi Flats. Two airboats were used. WSDA will continue to assist Whatcom County and the Lummi Tribe with their eradication efforts.

Appendix D

2015 Washington State *Spartina* Eradication Plan/Overview

Objective: Explain the primary components/goals of the cooperative plan to eradicate invasive *Spartina* from Washington State's shoreline.

1. Survey all of Washington State's 3,026 miles of intertidal shoreline focusing on high risk saltmarsh environments; on a five year rotation.
2. Meet with project partners and identify areas of responsibility based on ownership, jurisdiction, cooperation and capabilities.
3. Map areas of responsibility for field operations and communication purposes.
4. Conduct two laps of detailed survey and treatment of all infested sites within Washington State each season.
5. Continue the transition to cloud-based GPS point collection, documenting every positive *Spartina* find.
6. Utilize GIS to evaluate and map finds at both the statewide and the site level.
7. Share program data with project partners throughout the season utilizing mobile, web based, and GIS mapping technologies.
8. Determine if individual sites are seeing fewer numbers and moving toward eradication. If not: devote more resources, conduct cooperative treatments, adjust survey timing, change tactics, and treatment techniques, or develop new technologies.
9. Site Eradication Criteria: Requires that six consecutive negative survey events occur over the course of three or more years. Also specifies that a maximum of two qualifying negative survey events can occur in any year.
10. Reduce program effort at eradicated sites and allocate remaining program resources to sites that have not yet satisfied the eradication criteria.
11. Continue to monitor eradicated sites annually for at least four years.
12. Transition to biannual monitoring of eradicated sites after four years.
13. Reset the Site Eradication Criteria at any site found to contain a remnant *Spartina* population.
14. Base both requests for funding and allocation of resources on meeting the plan.
15. Transition funding and resources to the Puget Sound as the coastal infestation level is reduced.
16. For the 2015 season, individual site plans and allocation of resources will be developed regionally with the cooperators in an ongoing effort.