Sea Duck Joint Venture
Annual Project Summary for Endorsed Projects
FY 2006 – (October 1, 2005 to Sept 30, 2006)

Project Title (SDJV Project #28, Year 4 of a 4-year ongoing project):

Determination of breeding area, migration routes, and local movements associated with Surf and White-winged Scoters wintering in the inner marine waters of Washington State.

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Project Description:

The Washington Department of Fish and Wildlife (WDFW) continued its ongoing four-year focus study that is presently using implanted satellite (PTT's) and VHF radio transmitters to better understand the demography and movements associated with Surf and White-winged Scoters that frequent Washington State waters during the year. This work started in 2003 looking at White-winged Scoters and expanded to include Surf Scoters in the remaining three years to look at the two most common scoter species historically present in Washington marine waters during the winter. This focused work was impelled by the recognition of the significant declines that have occurred in wintering scoter populations distributed throughout Washington State marine waters over the last 25 years. This WDFW project has now implanted during the four years a total of 73 satellite PTT transmitters in scoters (Surf, 47 and White-winged, 26) captured on the wintering grounds in the inner marine waters of Washington. This work has also implanted 90 VHF transmitters primarily into Surf Scoters, facilitating examination of other facets of their demography. Most of the batteries for the PTT transmitters lasted from 1-1.5 years, but we do have a few that were programmed to last 2 years. In addition, some of our VHF transmitters have lasted longer than one year also, giving us some additional insight into inter-year site fidelity. The greater focus on Surf Scoters is considered critical since the decrease in this species is increasingly considered to be the largest component of the declines observed overall for scoter species in Washington.

Other research efforts in Baja California Mexico, San Francisco Bay, and the Strait of Georgia in British Columbia, have also deployed satellite PTT and VHF transmitters during some portion of the last four years in Surf Scoters; a certain percentage of these scoters also spend some extended time in the marine waters of

Washington State. Our VHF tracking efforts in Washington and nearby British Columbia for the second consecutive year have recorded location data on scoters from all of these other winter capture efforts. These data have helped begin to characterize some of the important migration, staging, and molting options utilized here. Both our VHF and PTT data have also been used again in Southeast Alaska and the Northwest Territories in Canada to complement ongoing scoter work in those areas.

Objectives:

The objectives of this project are to document the pattern of use and fidelity to winter and spring foraging areas, night resting areas, migration routes, breeding sites and range, and molting areas of White-winged and Surf Scoters that winter in the inner marine waters of Washington State. These objectives address several of the high priority needs identified in the SDJV 2001-2006 Strategic Plan concerning population definition and delineation of White-winged Scoters and Surf Scoters: migration corridors used between various breeding and wintering areas, wintering areas used by scoters from various breeding areas, and determination of important spring staging areas and late summer molting areas associated with scoters from various breeding and wintering areas along the western coast of North America.

This project also continues and expands ongoing collaboration with other simultaneous scoter research efforts in nearby regions, increasing the probability of reaching conclusions and results more widely applicable to the population and flyway for these particular species. This included some planning, collaboration, and sharing of lead authorship of publications on varied topics related to these studies with all of the partners listed at the beginning of this report.

Preliminary Results:

Wintering scoters were captured with floating mist nets on 5 days between 21 November and 5 December, 2005, and on 4 days between 22 and 28 February, 2006 in three areas of Puget Sound: 1) Henderson Inlet in southern Puget Sound (SPS); 2) Point Bolin and Rich Passage areas in central Puget Sound (CPS); and 3) Kilisut Harbor near Port Townsend in the Admiralty Inlet/E. Strait of Juan de Fuca area (ESJF). The nets were set in areas determined by our aerial surveys to be primarily frequented by Surf Scoters. The 9 days when capture efforts were implemented resulted in the live-capture this year of 193 sea ducks, banding 40 White-winged Scoters, 133 Surf Scoters, 12 Black Scoters, 3 Harlequin Ducks, 2 Greater Scaup, 1 Common Goldeneye, and 2 Bufflehead. PTT's (PTT-100 satellite transmitters [39 g] manufactured by Microwave Telemetry Inc., Columbia, Maryland) were surgically implanted in 11 ATY Surf Scoters (2 males and 9 females), and 2 ATY White-wing Scoters (2 females). In addition, 30 Surf Scoters (13 males and 17 females) were surgically implanted with ATS A2300 VHF transmitters (Table 1).

Table 1. Summary of Washington Surf and White-winged scoters implanted with PTT and VHF transmitters during winter 2005-2006, by sex and capture area.

Surf Scoters	**VHF**			**PTT**		
Capture Area	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
Southern Puget Sound (SPS)	3	3	6	0	0	0
Central Puget Sound (CPS)	4	1	5	1	5	6
Admiralty Inlet/E. Strait of Juan de Fuca (NPS)	6	13	19	1	4	5
Total	13	17	30	2	9	11

White-winged Scoters	**VHF**			**PTT**		
Capture Area	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
Admiralty Inlet/E. Strait of Juan de Fuca (NPS)	0	0	0	0	2	2
Total	0	0	0	0	2	2

All captures occurred during pre-dawn and early post-dawn periods of each day, as scoters were flying into the feeding areas from their resting areas used at night. VHF movements were followed throughout the winter and spring until mid-May 2006, then again during the molt (early September 2006).

Pre-northern migration: Most of the scoters tracked displayed considerable fidelity to the general region or subregion of Washington's inner marine waters where they were captured. There were individual variations over time during winter, where movements appeared to be related to other factors like timing of herring spawning. This will be analyzed in more detail this next year.

Northern migration including staging areas used enroute: The spring migration and staging areas are similar to those reported last year, 65-75% of wintering Washington scoters staging in the spring in the area depicted in Figure 1, with the other 25-35% eventually staging mostly in southeast Alaska after some brief stops in British Columbia. A majority of those Surf Scoters that utilize the early spring area (Figure 1) continue on to southeast Alaska spring staging areas while most remaining scoters stay in the Salish Sea until departing for nesting grounds. The percentage of wintering Surf Scoters that we followed (VHF and PTT) that staged in spring in Washington and nearby British Columbia marine waters exhibited the following usage patterns (Figure 1).

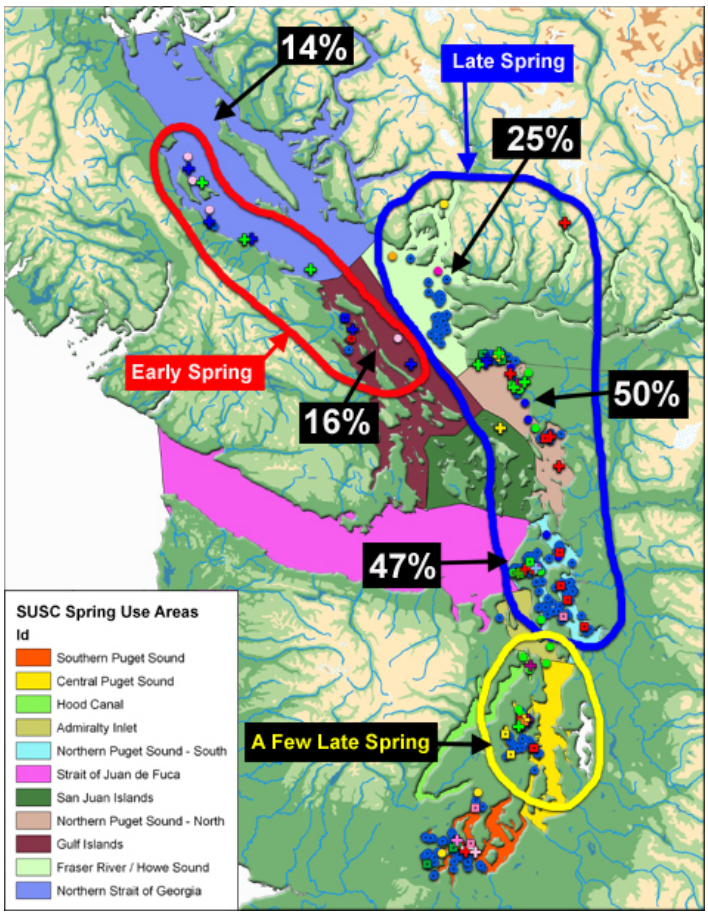

Figure 1. Spring Use by Individual Washington Winter- Resident Surf Scoters in Salish Sea 2005

Breeding areas: Figures 2 overlays the locations of breeding duck survey strata with the nesting areas for Surf and White-winged Scoters that wintered in Washington and were tracked by our project over the first three years of WDFW PTT data. There is some suggestion of slightly different breeding ranges or preferences, if you draw a line between centers of Great Bear Lake, Great Slave Lake, and Lake Athabaska. This beginning data set would suggest that White-winged Scoters from Washington wintering areas favor the more western and southern areas, also distributed more widely from north to south, while Surf Scoters from Washington may favor an area more to the north and east. The scoters that winter in Washington come from only certain portions of the overall breeding strata, which will relate to some different trends we will discuss later.

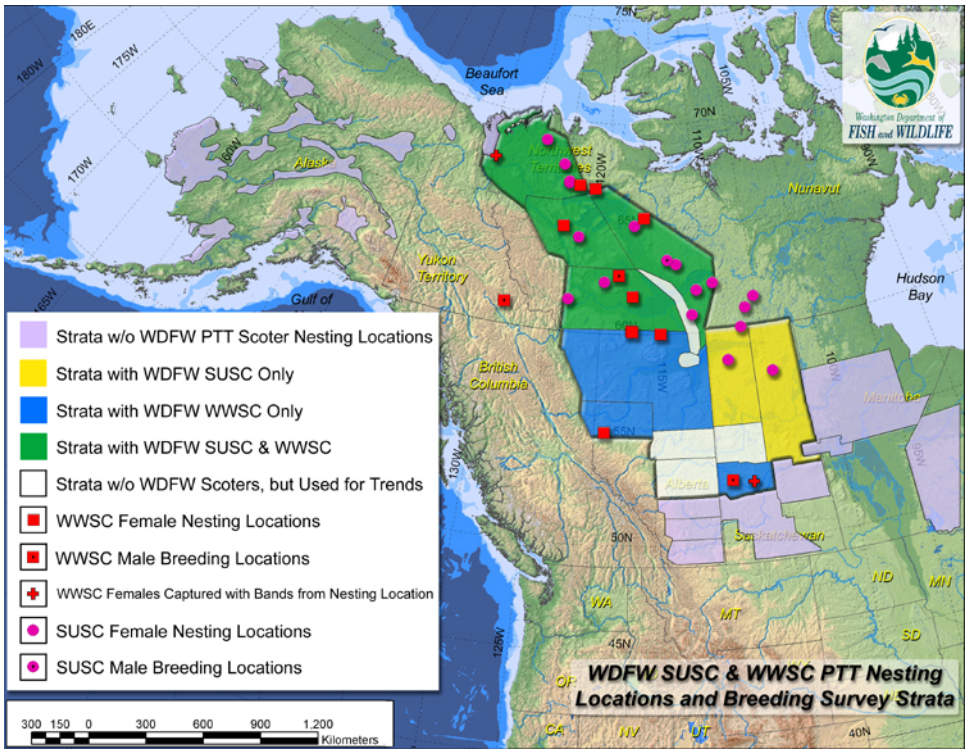

Figure 2. Washington Scoter PTT Nesting Locations and Northern Waterfowl Breeding Survey Strata.

Southern migration staging areas and molting areas: Our previous reports have mentioned the different areas used by molting scoters along the Pacific Coast. Figure 3 displays the molting areas used in Washington State and nearby British Columbia for scoters up through 2006. Here again there are suggestions of differences in percentages and areas used between the two scoter species. A sizable proportion of Washington scoters molt in Washington State, but around 15% of Surf Scoters tracked from other regions like San Francisco Bay, Baja Mexico, and British Columbia also molt in Washington.

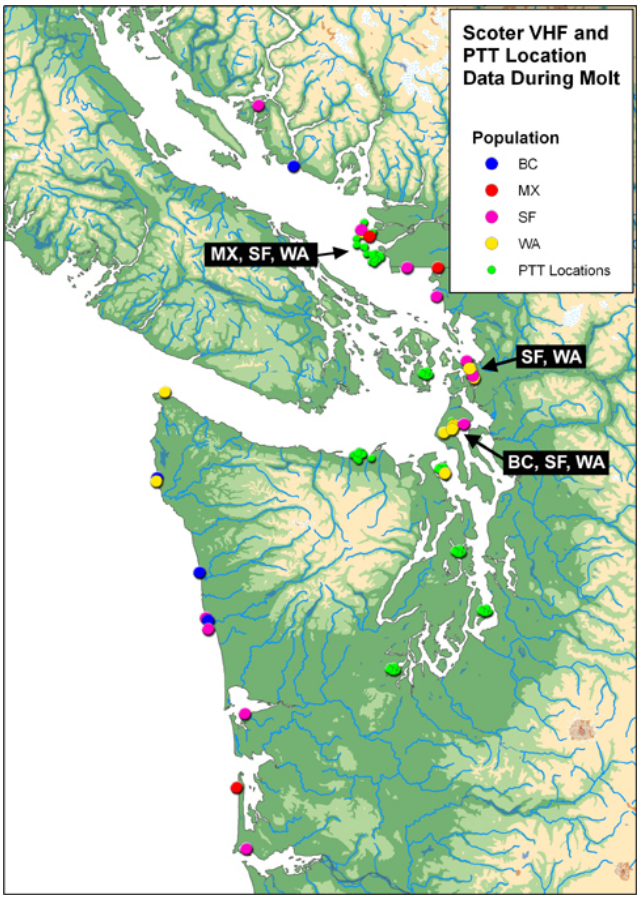

Figure 3. Molting Locations Used in Washington State and Nearby British Columbia by Scoters from Different Wintering Areas Throughout the Pacific Flyway

Nocturnal/Diurnal Distribution and Activity Patterns: Varied patterns of distribution and activity were observed on wintering, migration, and breeding grounds. Migration generally occurred at night. Nocturnal locations of transmitted scoters were often different from those observed during the day (Figure 4). It was evident from both PTT and VHF data that scoters congregate together in large flocks at night at various resting areas. There were usually primary and secondary preferences for these night resting areas in each of our sub regions of western Washington marine waters. An example for southern Puget Sound is shown in Figure 5. All of these have implications for the scoter biology as well as management implications or concerns such as oil spills.

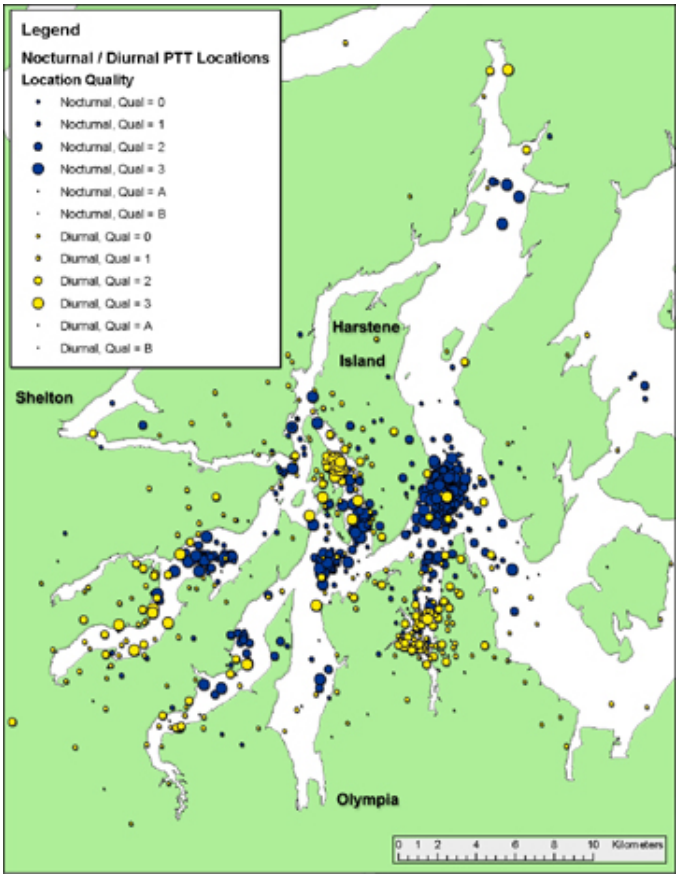

Figure 4. Diurnal and Nocturnal Distributions of PTT Transmitted Surf and White-winged Scoters Wintering in Southern Puget Sound, Washington State, 2005.

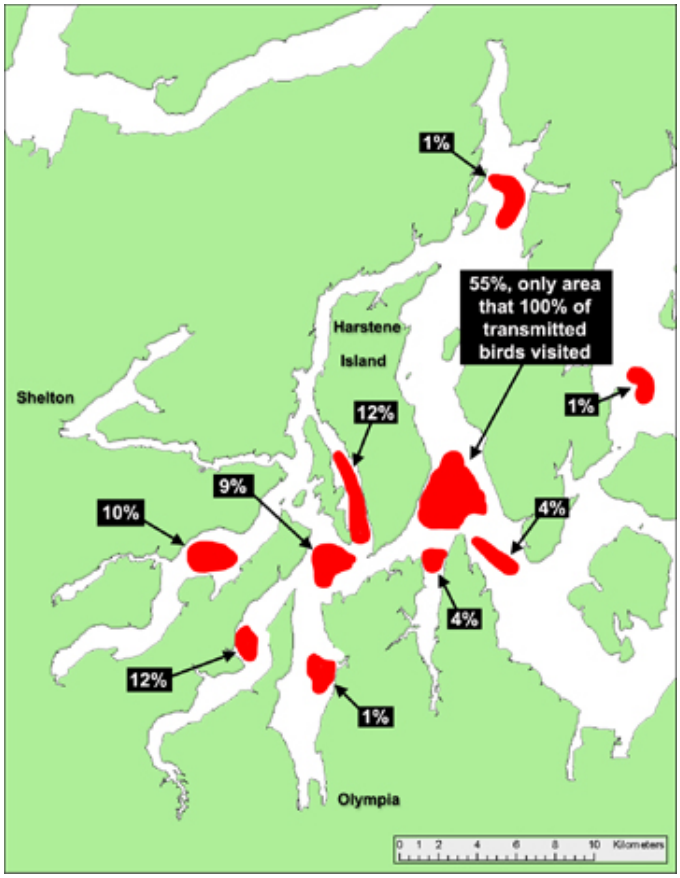

Figure 5. Nocturnal Resting Areas of Scoters Observed in Southern Puget Sound from PTT and VHF Data.

(Note: Percentages reflect the proportion of total southern Puget Sound nocturnal PTT locations found within each separate resting area.)

Associated Trends between Winter and Breeding Ground Indices

Trend data differs for two portions of the breeding ground aerial surveys of scoters (Figures 2 and 8a). It suggests that Washington wintering scoters come almost completely from those breeding strata in the north where the declines are greatest. Figures 8a and 8b show how the winter survey indices for scoters in Washington mirror the breeding grounds trends quite closely.

Figure 8. Comparison of Scoter Trends from Canadian/Alaskan Summer Breeding Surveys and Puget Sound Winter Surveys, 1978 – 2002.

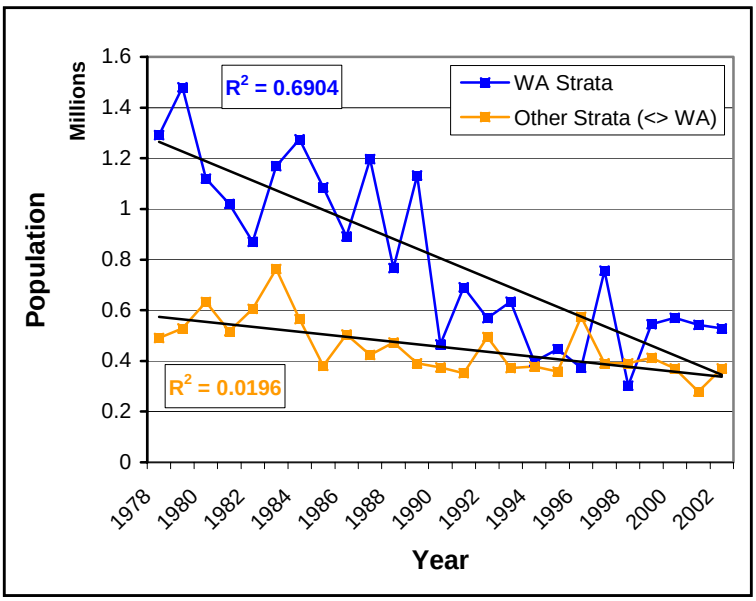

Figure 8a. Scoter Population Trends from Breeding Surveys of the Canadian Interior and Alaska: Strata Used by Washington Scoters Compared to Strata not Used by Washington Scoters, 1978 - 2002.

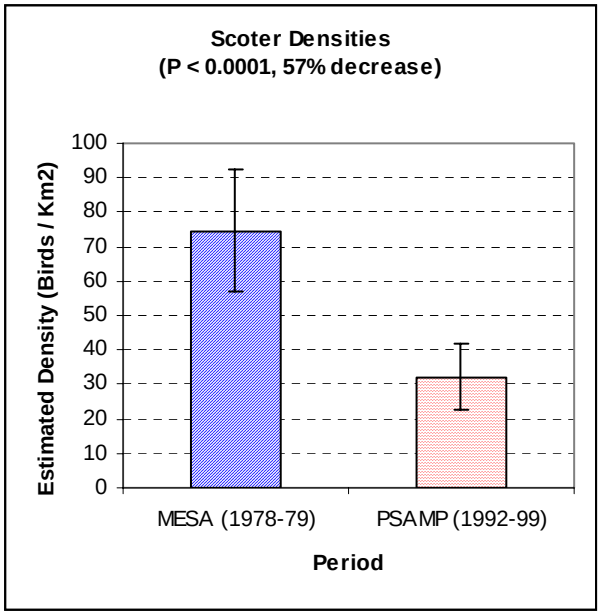

Figure 8b. Washington Wintering Scoter Trends in Densities from MESA (1978-79) and PSAMP (1992-99) Surveys.

Site Fidelity, Mortality Estimates, and Habitat Usage or Distribution Patterns

PTT's in Surf Scoters:

Of the 47 PTT transmitters we implanted in Surf Scoters, 34 have provided us with multiple seasons of location data (most of which were followed for a year or a little more). Causes of mortality within Washington included losses to hunting, eagles, and surgery recovery here in Washington. We lost about 30-35% to these causes before the birds left their wintering sites. Some additional birds encountered mortality on migration, breeding, or molting grounds and thus we lost 3 out of 23 up through 2005-06 winter. We have lost 2 of the 11 Surf Scoters, which went north, on the breeding grounds. Hopefully, the remaining 9 Surf Scoters with PTT's will return. This would make a total of 34 scoters that left, with 29 returning. So 29 of 47 Surf Scoters implanted continue to provide us data to evaluate site fidelity, etc. the following winter.

VHF's in Surf Scoters:

In 2004, we had unusual failure of VHF transmitters (premature battery failure) and were unable to use that data for site fidelity that year. We did not have this problem in 2005 and may not have had this type of problem in 2006. We had 21 VHF's of 33 from the 2005 captures that migrated north and that were useful for examining topics like site fidelity. If loss and mortality percentages are similar as in 2005 (61-63 % survived), we might be expecting 19 (but maybe up to 25) VHF's from 2006 to be returning, if they are tracked this coming winter.

Project Status:

Our project was successful again this year in implanting a number of PTT and VHF transmitters into female Surf Scoters, with a high survival rate throughout the winter and up to the breeding grounds. This complements work coming out of San Francisco Bay and other regions. Some new understanding has also been gained about the degree of mortality these species may incur from hunting, eagle predation, and other factors. Information for the first time on distribution data such as their nocturnal concentrations is now available. All of this will be

helpful for WDFW and other agencies in the development of management strategies for these species in Washington. We are documenting interesting differences between subregions in Washington used by wintering scoter concentrations and our work complements the foraging/prey work ongoing by Anderson and Lovvorn.

The WDFW project is not deploying transmitters in scoters this next year. Staff time is being allocated to data analyses and publication preparation, with some lesser degree of tracking on those VHF frequencies that are still transmitting. Our project recently gathered some feedback on statistics and other ways that the data gathered might be appropriately analyzed. We are collaborating with other scoter investigators in producing publications with share authorship. At the last sea duck conference in Annapolis, the principal investigators of the west coast scoter studies met and generally agreed on allocation of topics and lead authors for different components of this work. WDFW will continue to produce detailed maps showing migration routes, spring and fall migration areas, and local movements throughout the life of the transmitters implanted. The additional maps and data for the 2006 tracking will be created and added to those already created for our agency web site which will display these. We have hopes of getting this site completed and available to all this year. Other maps, locations, and data summaries will be provided additionally to interested parties as requested.