# Crane Island Nature Preserve
# Ecological Assessment

Crane Island, WA

Prepared by:

Samantha & Carson Sprenger
March 2014

Rain Shadow Consulting, LLC

On February 13, 2014 a site visit was conducted as part of an ecological assessment on the roughly 29 acres of Crane Island Nature Preserve property (CINP) (parcel numbers: 261950067000, 261950068000, 261924002000, 261913001000, 261913002000, 261924001000, and 261950084000). During the assessment we evaluated the overall health and condition of the various habitat types (former Douglas-fir woodland, former rocky balds, 2nd growth mixed conifer and hardwood forest, and forested wetland). We also looked at fuel loads throughout the subject parcels (and adjoining parcels) and took note of areas with diseased or insect damaged trees. As part of our assessment we reviewed all documents related to the Preserve along with topographical maps and high resolution aerial photos. This assessment is somewhat limited in scope and should be considered a coarse scale evaluation of the overall health and condition of the preserve lands. Key plants and animals were noted during the site visit but no comprehensive species inventory was conducted and no quantitative data were collected.

*Overview*

In general, the CINP land is typical of low-elevation sites in the San Juan Islands and is characterized by a number of forested habitats including second- and third-growth conifer and mixed hardwood forests, small forested wetlands, seasonal seeps, former fire-maintained Douglas-fir woodlands, and former rocky balds/ fire-maintained grasslands. Nearly all the CINP land is forested and canopy cover ranges from 75-90%. Old growth trees originating pre-settlement (greater than 150 years old) are somewhat rare and, generally, the land is in a state of gradual growth and recovery from previous logging and shifts in the local fire regime[1].

Fire-maintained woodlands are forested habitats that are generally open or ñpark-likeò in structure due to relatively frequent low intensity fires (i.e., 5-20 year burn interval). Overall tree density is relatively low and the dominant tree species are somewhat resistant to low intensity fire. In the absence of fire these woodlands will gradually shift towards closed forest conditions through natural tree regeneration processes. This will lead to a greater abundance of shade tolerant (and fire-intolerant) tree species as well as other compositional changes.

Of note is the location of the seven different CINP parcels (see figure 1). The four main blocks of preserve property are separated by non-preserve ownership. The interior ownership remains as undeveloped forestland but the outer bordering parcels are developed lots. An airstrip is adjacent to two of the CINP parcels and a graveled access road (Circle Road) borders all six of the interior parcels.

[1] The frequency, extent, intensity, severity, and seasonality of fires within a given ecosystem

*Historical Context*

Prior to active Euro-American settlement (i.e., 1860s), fire was a major disturbance mechanism in the San Juan Islands and, from what is known of historical fires on Orcas and other islands (Sprenger and Dunwiddie 2011, Higuera et al. 2005), the historical fire regime for low-elevation Douglas-fir forests is best described as low and mixed severity (Agee 1993). Low severity fires tended to burn frequently (about every 5 to 20 years), causing relatively light damage, killing or damaging a number of small trees, shrubs, and herbs. Mixed severity fires burned less frequently (about every 20-60 years) and caused a variable amount of damage, often killing whole trees or small groups of trees but also behaving in such a way as to only lightly damage most of the mature trees in a stand. Evidence of such fire activity can be found across Crane Island and we found several examples of fire scarred trees and stumps on the CINP parcels. Most of the visible scars were found on older cedars, some of which exhibited 3 to 4 discernable scars. Based on fire scar investigations on Waldron Island, the observed scars would likely date to fires anytime from 80-160 years ago.

All recent investigations into the fire history of low elevation sites (i.e., below 1,000 ft.) in the San Juan Islands (Sprenger and Dunwiddie 2011, Peterson and Hammer 2001, Spurbeck and Keenum 2003, Gray and Daniels 2006), point to Native American burning practices as the primary source of ignition. Native American use of fire in the Pacific Northwest is well documented (Agee 1993, Turner 1999) and a common theme for all the local studies is the conspicuous absence of recorded fires shortly after active Euro-American settlement (the last large fires were all around 1880-1910 which suggests that some of these last fires may have been associated more with land clearing and logging than Native burning practices). In low elevation sites in the San Juan Island, lightning strikes are rare and often associated with precipitation (Agee 1993). It has been over a century since a fire was recorded on the 600 foot elevation ridge that dominates the southern portion of Waldron Island (Sprenger and Dunwiddie 2011). Lightning strike fires occur in the San Juan Islands but these are extremely rare events.

Logging appears to have most recently occurred on Crane Island in the 1950s. Most merchantable trees were removed, especially in the low lying areas with deeper soils. It is also likely that logging was conducted in the early part of the 20$^{th}$ century to help fuel the local lime kilns. Spring board notches in stumps (indicative of early hand-falling) were not found during the site visit.

Grazing was likely done on much of the island, especially in the early days of Euro-American settlement when native grasses were more abundant. Old fencelines and the remains of a small cleared meadow were noted.

*Key Findings*

*Condition of forested habitats*

The forested habitat types, as a whole, are quite diverse both in terms of structure and composition. Though dominated by relatively young trees, the broad species mixture in combination with scattered older and veteran trees, creates a forest structure rich with important features such as down wood, a variety of soft and hard snags, thick cover, and varying tree sizes. Through competition, abiotic disturbance (e.g. wind, snowfall, rockslides), and natural decay organisms (e.g. fungi/stem and root rots), some trees are dying and small gaps are being created. This is a natural process of forest development that gradually increases complexity and ecological resilience. Due to the logging history and extended fire free period (~100 years or more), some of the few old growth veteran trees (very large and old) are at risk of being shaded out and dying due to heavy competition from younger more vigorous trees. Because the veteran trees are so rare, some intervention should be considered.

Snags (standing dead trees) are critically important to wildlife both in terms of foraging (rich source of insects) and nesting and roosting (cavities and hollow sections). Snags are used by a wide variety of birds (e.g., owls, woodpeckers, sapsuckers, song birds) as well as bats, small mammals, and amphibians. A healthy population of high quality snags is present on the preserve. High quality snags for this region are defined as standing dead trees larger than 16 inches in diameter at breast height. These types of snags can remain standing for decades. Snags eventually fall to the ground and become part of the forestǿs coarse woody debris layer, continuing to perform many important functions (e.g., amphibian and small mammal cover, substrate for fungi, source for nutrients and moisture during dry periods).

*Former Rocky Balds*

Rocky balds are areas of shallow soil over bedrock that can host a high diversity of plant life dominated by grasses and forbs. They often appear in conjunction with rocky outcrops, are small in proportion to other habitat features on the landscape, and typically surrounded by the more dominant form of vegetation (e.g., forest, grassland, shrubland). Rocky bald habitats are more common in San Juan County than in other areas of Western Washington due to the drier climate and the frequent burning by Native Americans prior to the arrival of Euro-American peoples. If deer browsing is not extreme, rocky balds may contain a higher biodiversity than the adjacent habitats; providing habitat for several grass and wildflower species as well as invertebrate species which rely on them (Chappell 2006).

A former open rocky bald within the CINP was visited during the recent site visit. This portion of the Preserve is elevated from the rest of the forested area, covered in moss, and has uniformly-sized Douglas-fir trees distributed throughout (though more widely-spaced than in a more typical forested area). No tree stumps, snags, or veteran trees were observed in this area. All Douglas-fir trees were fairly uniform in size and likely came into the open area during a shift in Native American burning patterns. One such tree, of approximately 14-inch diameter at breast height (DBH) was cored and found to be 190 years old. This would imply that this area was primarily open until the early 1800s. Due to the fact that the site was visited in February, herbaceous plants such as wildflowers and grasses were not identifiable.

*Fuel and wildfire risk*

As part of a limited qualitative assessment of woody fuels on the CINP landsð as well as some of the neighboring parcelsð we looked not only for the presence of hazardous fuels, but also the overall abundance and distribution. Hazardous fuels are defined here as above average loadings of surface fuels (on the ground) combined with moderate to heavy *ladder fuels*. Ladder fuels are shrubs, immature trees, and branches extending near the ground (e.g., within 5 feet) that give surface fires a pathway to the upper canopies of the trees.

Surface fuels vary considerably through the forested portions and, in some areas, reach high to moderate levels. These are areas that could support a ground fire and, depending on the weather, lead to difficult to control fires. Areas with high fuel levels are typically restricted to zones of young conifers and dense shrub layers growing along the road or areas where trees have recently fallen. Some areas are also nearly barren in terms of fuels and would likely act to slow or stop a wildfire. In short, surface fuels are distributed unevenly across the CINP and neighboring lands and generally lack the continuity or abundance to support widespread, difficult to control wildfire in all but the most extreme weather (i.e., wind and humidity levels which occur outside of the 95th percentile). Ladder fuels are also present, primarily due to the abundance of cedar and grand fir saplings coming into the understory (the abundance of these shade tolerant species is primarily due to the development stage of the forest and, given the lack of major disturbance, establishment of shade tolerant trees will likely decline over the next ½ century). Ladder fuels are highest along the sides of the road due to available light, but remain variable in abundance. Ladder fuels are not present in sufficient quantities in the interior of the CINP lands to warrant concern. Some fuel reduction work, in the form of limbing and tree removal, was recently conducted bordering the Circle Road. The work appeared to still be in progress and may benefit from clear treatment guidelines such as a defined buffer width, defined pruning height, and defined tree density within buffer (see recommendations).

*Root rot*

Fungal organismsð both pathogenic and saprophytic[2]ð are abundant in our local forests. Some of the more recognized tree diseases are root rots as they can lead to relatively rapid tree decline and death. Stem rot fungi, such as red ring rot (*Phellinus pini*), are actually more common but get less attention as these diseases are more widely distributed throughout the forest and typically do not express crown symptoms like root rots do (e.g., loss of needles, stress cone crops). Most root rots, stem rots, butt rots, and various canker diseases are part of the native forest biota and, in the natural development and maturation of Douglas-fir forests, have important functional roles (Edmonds et al. 2000). For example, these diseases recruit snags and down wood as well as create decay pockets in living trees for foraging and nesting wildlife. As they increase in abundance with stand age they become the main drivers of small to medium sized canopy gaps, thereby initiating regeneration and structural diversity.

[2] Organisms that live and feed on dead organic matter and do not attack live tissue.

At one location on the CINP property, a zone of some type of pathogenic fungi was observed (see yellow stars on figure 1). Symptoms included dead and dying young Douglas-fir and grand fir. Yellowing foliage and stress cone crops were also observed. A sample of decayed root was taken and later identified as tomentosus Root Rot (*Inonotus tomentosus*). Host trees are lodgepole pine, western hemlock, and Douglas-fir. Resistant or immune species include western red cedar and broadleaf species such as alder and big leaf maple (Allen et al. 1996). Tomentosus often causes small gaps in the forest (sometimes called decay ñpocketsò), which may grow to form larger gaps over time. Rate of spread of the disease is between 1-3 feet per year. Larger older trees are generally more resistant compared with saplings and young trees (i.e., less than 30 years). The area of infection is located on both sides of the road and restricted to the younger conifers growing within 30-50 feet of the road. Other diseases may be present (such as laminated root rot and armillaria root rot) as these diseases sometimes inhabit the same sites. Laminated root rot (*Phellinus weirii*) affect the same tree species and is associated with high tree mortality. Laminated root rot kills young trees quickly but can be difficult to diagnose in older trees when the infection is restricted to large structural roots and crown symptoms are not present. Rate of spread is from 1-3 feet per year and the disease can remain dormant in old stumps for up to 50 years (Edmonds et al. 2000).

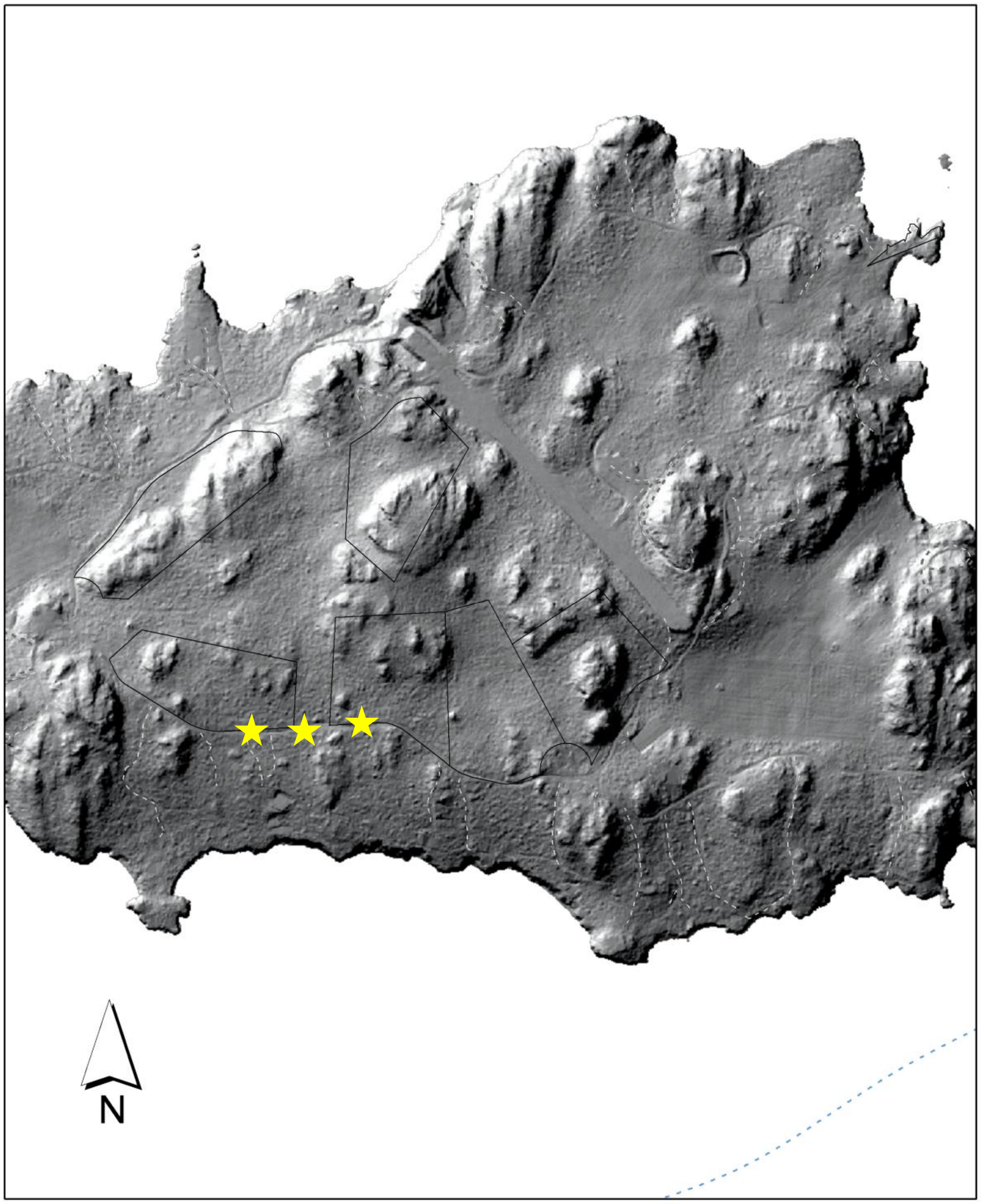


Figure 1. Bare earth image of Crane Island showing Nature Preserve parcel boundaries (seven individual parcels). Yellow stars indicate approximate location of tomentosus root rot infected trees.

*Threats to the Preserve & Management Recommendations*

Identified threats to the Crane Island Nature Preserve:

1. Fragmentation or isolation of the CINP parcels through road development or loss of forest cover across the interior lands.

i. Interior lands do not have the same level of protection.
ii. Connectivity between CINP parcels (e.g., continuous forest cover) is important for species migration and integrity of ecological processes.

2. Invasive species introductions.
    i. Exotic grasses and other plants (i.e., holly, ivy, non-native clematis) disrupt natural process and displace native species, lowering diversity.

3. Loss of snags through hazard tree removal.
    i. Snags and coarse woody debris important biologically
    ii. Clear criteria needed for dealing with hazard trees.

4. Loss of veteran trees.
    i. Encroaching young conifers are threatening the handful of very old trees.

5. Loss of forest cover and associated vegetation due to high severity wildfire.
    i. Risk is low but structure of current vegetation and road access on Crane would make wildfire control efforts very challenging.

6. Community support.
    i. Community support and engagement is vital for the long-term protection of the CINP.

*General Management Recommendations*

As mentioned above, the site visit conducted in February of 2014, was a coarse-scale ecological assessment. Not every portion of the CINP was visited and no comprehensive plant survey was conducted. Based on this initial assessment, we have developed a set of preliminary management recommendations for the Preserve. These recommendations could be expanded on in the future following additional site visits.

1. **Increase the connectivity of the CINP**.
   It would be very beneficial to the long term health of the Preserve if the non-CINP parcels adjacent to it were protected. Through community involvement, pursue a similar level of protection on non- CINP interior parcels (Crane Island Association). Explore the possibility of putting a conservation easement on interior parcels, with an organization such as the San Juan Preservation Trust. Development or logging of parcels adjacent to the Preserve would fragment the landscape and could increase the appearance of exotic species traveling into the Preserve.

2. **Monitor for, and control, non-native, invasive species.**
   The CINP does not appear to have a large problem at this point in time with non-native species. It would be helpful to develop a monitoring plan which can be carried out at specific times of year. For forested areas, the most significant species to monitor and control and/or eradicate are:

   English ivy (*Hedera helix*)
   Old manôs beard (*Clematis vitalba*)
   Holly (*Ilex aquifolium*)
   Spurge laurel (*Daphne laureola*)

   The majority of these species can be found easily during winter months when deciduous trees and shrubs are bare. A more extensive list of species can be found through the San Juan County Noxious Weed Boardôs website. A monitoring plan should adapt over time to target certain species of concern in the county. The terms ñnon-nativeò, ñexoticò, and ñnoxiousò are used interchangeably within the field of ecology. Their meanings vary slightly but generally describe a plant which is not endemic, not native, to the area. The term ñinvasive,ò however, can be used to describe both native *and* non-native species. For example, some might refer to Douglas-fir as a ñnative, invasiveò species.

   Two notable non-native grass species, orchard grass (*Dactylis glomerata*) and tall fescue (*Schedonorus arundinaceus*) were observed on the perimeter of the CINP--- specifically on the southeastern boundary. It should be noted that if adjacent forested areas are heavily thinned and soil is disturbed, these grass species will likely inundate those areas. They thrive in more open woodlands and grassland habitats and, unlike our native grass species which are bunch grasses, these non-native species grow rhizomatously, and tend to create homogenous patches of grass. They are very hard to remove once established and greatly reduce the diversity of the understory. If ground-disturbing projects are carried out on or near CINP boundaries, replant disturbed soil with native grass species such as blue wildrye (*Elymus glaucus*) or Roemerôs fescue (*Festuca roemeri*). One source for such seed is Inside Passage Seeds based in Port Townsend. Alternatively, local Crane Island residents could learn how to collect seeds of native grass species on the island for such projects.

3. **Develop guidelines for the identification and treatment of hazard trees adjacent to roads.**
   Establishing guidelines for identifying and treating (e.g., removal, topping, propping up) hazard trees near the road would be extremely helpful for the Crane Island community. Guidelines should include: identification of hazard trees in areas adjacent to roads,

measures to retain biologically important trees and snags wherever possible, and methods for mitigating hazards other than whole tree removal.

The identification of a hazard tree can be difficult, and should be done by a professional forester or certified arborist on a case by case basis. A tool such as a resistograph can be employed to measure the amount of decay within the tree. Integral to a hazard tree assessment is identification of targets (e.g., people, cars, houses) and an agreement on the level of acceptable risk that a given tree may pose in the event that it fails. Not all snags are hazard trees and not all hazard trees are snags (e.g., live tree with hanging dead limbs, broken topped cedars with multiple poorly attached leaders). To live by and place structures near trees is to accept some degree of risk.

No snags should be treated within the CINP unless they are adjacent to a road and classified as a hazard tree by a professional.

4. **Develop fuel reduction guidelines that prioritize fuel reduction measures within a defined buffer along the road.**

Similar to the need above for guidelines for dealing with hazard trees on CINP property, there is also a need for clearly stating guidelines for how to deal with hazardous fuels (trees and shrubs) along the road. Our recommended approach would involve treating fuels only in areas of the CINP that are adjacent to roads through the installation of a shaded fuel break. A shaded fuel breakð a zone where fuels have been reduced but remains shaded as a number of trees are retainedð along both sides of the road (in partnership with other landowners and Crane Island Association) would be an appropriate and likely visually appealing method of lowering fuel loads in these areas. The following are draft guidelines for the installation of a shaded fuel break (additional site visit is needed prior to finalizing these):

1. Establish a width of 20 feet for treatments.
2. Select leave trees that are:
    a. Dominant
    b. Hardwood if possible
    c. Douglas-fir
    d. Spaced 10-25 feet apart, depending on size.
3. Within buffer, remove oceanspray, young conifers, and prune limbs on leave trees to a height of 9ô
4. Retain salal and other low growing shrubs.
5. Retain snags over 10 inches in diameter.
6. Remove down woody debris less than 6 inches in diameter, retain larger material.

7. Cut material should be chipped and broadcast back inside of buffer.
8. Conduct work in early fall in order to avoid disturbance to wildlife.

**5. Identify and map veteran trees.**

The handful of large veteran trees on the CINP property constitutes a rare and enduring ecological legacy. Because encroachment of younger conifers is threatening the health and growth form of these older trees, we recommend mapping and characterizing all veteran trees followed by a treatment plan for each tree. The treatment plan would be tailored to each tree but likely fall into one of the following three general categories:

1. Monitor tree (no action needed at this time).
2. Girdle select encroaching trees from up to ½ tree length away in all directions. Once the girdled trees die, target tree will receive optimal light conditions to maintain growth and vigor.
3. Combination of cutting and girdling encroaching trees from up to ½ tree length away in all directions. This will achieve more immediate treatment effect for trees exhibiting very low vigor or trees at risk from falling girdled trees.

Monitoring should likely occur on a yearly basis and should include notes on condition of tree (e.g., live vs. dead, broken top, wood pecker foraging activity, etc.) as well as three basic tree measurements (i.e., tree height, tree diameter at breast height, and height to base of live crown). A map showing location of veteran trees could be made and used to help in future monitoring efforts and educational purposes.

**6. Root Rot**

The root rot zone is affecting trees on CINP and neighboring parcels. In terms of threats to the CINP property, the tomentosus root rot is of minor concern. Trees will slowly succumb to the disease, creating snags and recruiting down wood. Overtime, these trees will be replaced with non-host species. The main threat posed by this disease pocket is the creation of hazard trees and excessive fuel loads along the road. The above mentioned guidelines for hazard tree removal and fuel reduction work should allow for the mitigation of these problems.

References

Articles of Organization. The Crane Island Nature Preserve. February 1975, Amended 1982.

Agee, J.K. 1993. Fire Ecology of Pacific Northwest Forests. Island Press, Washington D.C.

Allen, E., D. Morrison, and G. Wallis. 1996. Common Tree Diseases of British Columbia. Natural Resources Canada. Canadian Forest Service.

By-Laws of the Crane Island Nature Preserve. August 2002.

Chappell, C. B. 2006. Plant Associations of Balds and Bluffs in Western Washington. Washington Natural Heritage Program. The Washington State Department of Natural Resources.

Edmonds, R.L., J.K. Agee, and R.I. Gara. 2000. Forest health and protection. McGraw-Hill

Gray, R.W., and L.D. Daniels 2006. Fire history analysis for Patos Island, Washington. Report to the U.S. Department of the Interior Bureau of Land Management, Spokane District, Spokane, Washington.

Higuera, P.E., D.G. Sprugel, and L.B. Brubaker. 2005. Reconstructing fire regimes with charcoal from small-hollow sediments: a calibration wit tree-ring records of fire. The Holocene. 15:238-251

Maps. Topographical and aerial photo basemaps created with publicly available data using ESRI software (ArcView 10.1). Available from Rain Shadow Consulting upon request.

Peterson, D.L., and D.R. Hammer. 2001. From open to closed canopy: a century of change in a Douglas-fir forest, Orcas Island, Washington. Northwest Science. 75:262-269.

Sprenger, C.B. and P.W. Dunwiddie. 2011. Fires History of a Douglas-firð Oregon White Oak Woodland, Waldron Island, Washington. Northwest Science. 85:108-119.

Spurbeck, D.W., and D.S. Keenum. 2003. Fire history analysis from fire scars collected at Iceberg Point and Point Colville on Lopez Island, Washington State. Report to the U.S. Department of the Interior Bureau of Land Management, Spokane District, Spokane, Washington.

Carson & Samantha Sprenger
carson@rainshadowconsulting.com
sam@rainshadowconsulting.com

P.O. BOX 1776
EASTSOUND, WA 98245
360.376.9100 *office*

**Report Prepared By:**

Samantha Martin Sprenger, M.S.
Rain Shadow Consulting, LLC
PO Box 1776
Orcas, WA 98245
Phone: (360) 376-9100
E-mail: info@rainshadowconsulting.com

________________________________________ Date ______________
Samantha Sprenger, Restoration Ecologist

Carson Beebe Sprenger, M.S.
Rain Shadow Consulting, LLC
PO Box 1776
Orcas, WA 98245
Phone: (360) 376-9100
E-mail: info@rainshadowconsulting.com

________________________________________ Date ______________
Carson Sprenger, Ecologist and Restoration Forester