NPS:

Ecosystem Management Projects

in

2006

Riparian Habitat Creation on Ross Lake

Final Report: 2006

Skagit Environmental Endowment Commission
North Cascades National Park

Project Start Date: June 5, 2006
Estimated Completion Date: November 30, 2006
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Introduction:

The construction of Ross Dam and the resulting creation of Ross Lake inundated 26 miles of river and approximately 11,000 acres of riparian habitat that had existed in the upper Skagit River drainage before inundation. This mid-elevation wetland habitat had served as a resting stop for over 150 species of migratory birds, breeding range for approximately 75 species of neo-tropical migratory birds and winter range for many mammal species.

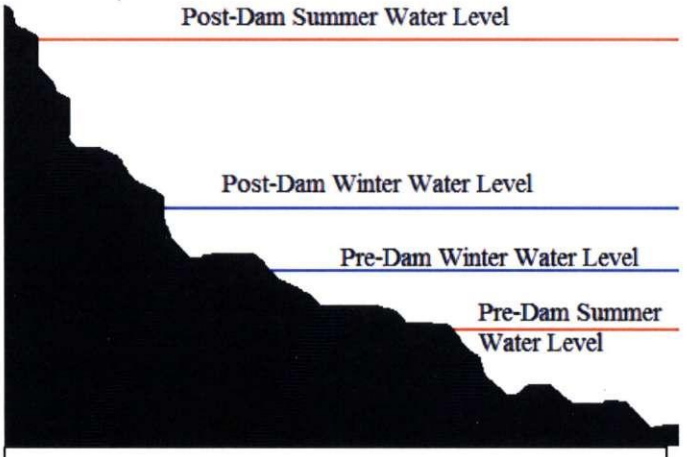


Figure 1: Ross Lake Water Levels. Not to scale

Most of what were riparian areas now are flooded for several months each year and exist as sparsely vegetated mud flats when Seattle City Light (SCL) lowers the reservoir level during energy generation.

After inundation areas that had been upland forest began developing riparian zone characteristics. North Cascades National Park (NOCA) staff noted the establishment of many species of native riparian plants as well as several introduced non-native or invasive species in the area between the highest and lowest reservoir levels (the "drawdown"). This project focused on utilizing several techniques, including the innovative use of "waste" wood, to hasten the development of a healthy riparian plant community in and near Dry Creek Bay on Ross Lake. Integral to the work was the education of NOCA staff, volunteers and visitors about the development and nurturing of riparian areas.

Project Narrative:

Ross Lake is located on the upper end of the Skagit River watershed and is the terminus of several large streams that arise in the wilderness areas of the North Cascades National Park. Production of power from Ross Dam creates water level fluctuations and results in a "drawdown" zone and a shoreline that is continually disturbed.

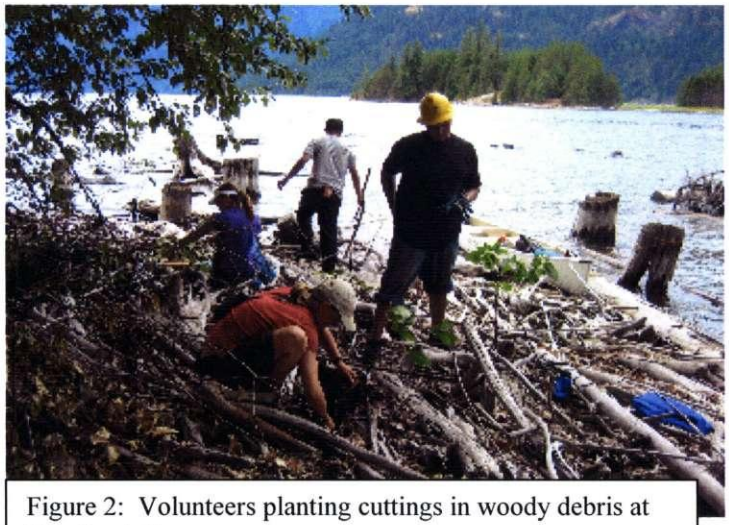


Figure 2: Volunteers planting cuttings in woody debris at Dry Creek Bay

The water level fluctuations are opposite in seasonal timing to natural lake level fluctuations. During winter, when natural lakes are full, water is released to generate power and create space to catch the spring runoff. In early spring the water level may be 80-130ft below the full level. In summer, when there is usually little precipitation and natural lakes in the area experience a drop in water level, SCL fills Ross Lake to the maximum.

This presents unusual challenges for the emergent and wetland plants that are exposed to dry freezing conditions in the winter and flooded during the summer. Native wetland grasses and sedges have been slow to colonize the Ross Lake shoreline because of the limited seed supply due to inundation of pre-lake riparian seed sources and the unusual water regime. Once established many native riparian plants grow vigorously, produce seed and compete successfully with introduced plants under these conditions.

The current colonization of Ross Lake shallows and shorelines by the invasive species Reed Canarygrass (*Phalaris arundinaceae*) is of particular concern because of the likelihood that this species will become established in adjacent pristine wilderness environments. Reed Canarygrass is quite successful in reproducing and establishing seedling plants along the shoreline. This may be due, in some part, to the grasses' tall (up to 2m) seed bearing stems that hold seedheads above the water at full pool. Establishing native plant communities will increase competition for reed canarygrass and other weedy plant species and develop a native plant seed source for further shoreline colonization.

Actions:

Established transects for vegetation monitoring:

Four vegetation survey transects were created at the site under the direction of the NOCA Plant Ecologist. These transects will be used to track seedling establishment and survival related to different treatments as well as general changes in vegetative cover.

Utilized Woody Debris:

Each year a great variety and volume of woody debris washes into Ross Lake from the shoreline, creeks and Skagit River. Seattle City Light employs crews during the spring and summer to gather this debris and tow it to the north end of Ross Lake where it is burned during the drawdown period. This is an expensive practice which results in the generation of air pollutants including particulates and carbon monoxide and dioxide. Ross Lake has been described as nutrient deprived with carbon identified as one of the scarce nutrients. Burning the woody debris results in a loss of carbon and energy from the Ross Lake ecosystem. Retaining the woody debris allows microorganisms to utilize nutrients and energy that enter the Ross Lake food web instead of escaping as heat and global greenhouse gasses.

In 2004 the U.S. Dept of the Interior funded work that used the woody debris collected by SCL as a planting substrate for native trees and shrubs to replace lost riparian habitat and compete with non-native invasive plant species. The wood was piled and used to support the planting of a variety of native wetland plants to limit the growth of the Reed Canarygrass by shading.

In 2006 this SEEC project allowed NOCA to continue and refine the work with SCL crews to receive the woody debris as well as collect and cultivate native plants for the site and plant them during the summer and fall.

Figure 5: An SCA volunteer (right) works with NOCA park employees to help pile woody debris at Dry Creek

Planted seeds and nursery grown plants:

Seed was collected in the wet meadow near Dry Creek Campground and propagated in several ways in an effort to promote the spread of native wetland plants. A total of 691.7g of seed was collected from eight species including grasses, sedges, rushes and shrubs.

Some seed was germinated immediately and the resulting 200 grass plugs were planted in September at Dry Creek Bay. Approximately 226.8g of seed from mixed species was used to seed .25 acres of lake bottom in Dry Creek Bay immediately after the water level began dropping in September. An equal volume will be planted in the spring of 2007 to compare success between fall and spring plantings.

Approximately 141.8g. of the seed was planted at the NOCA nursery in October. A total of 54 seed flats and 26 six-inch pots were started and are being held over the winter. Plants produced by this method will be grown in the nursery and planted in the fall of 2007. NOCA staff worked closely with volunteers during the seed collection, plant propagation, cultivation and outplanting in the fall.

Accomplishments:

- 42 volunteers contributed a total of 160 hours of work. Volunteers included immigrants and inner city high school students from Seattle as well as NOCA Plant Stewards and local high school students. The experience was very educational for both volunteers and NPS staff..

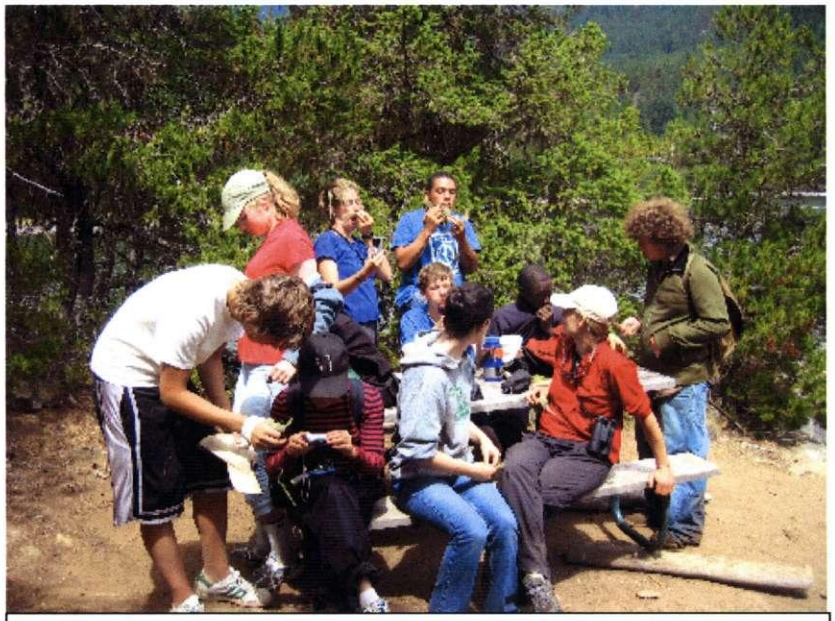


Figure 6: Project Wild Volunteers Unwind at Dry Creek Camp

- An information handout was produced and made available to educate visitors and Park Service staff regarding the riparian habitat improvement work. A copy will be posted on the bulletin board at Dry Creek Campground.

- The Park Service and Seattle City Light are cooperating to change the way woody debris is disposed of on Ross Lake.

- 100 cubic yards of woody material was retained in Ross Lake. This immediately decreased SCL expenses, reduced pollution and improved fish forage and shelter opportunities during full pool.

- The establishment of .25 acres of new riparian habitat was begun using woody debris. As the wood decays it will provide nutrients and act as a substrate for native grasses, shrubs, and trees.

- .25 acres was seeded with mixed species. An additional .25 acres will be seeded in the spring of 2007 and the success of the treatments will be compared.

- 200 cottonwood cuttings (*Populus balsamifera trichocarpa*) and 27 Western Red Cedars (*Thuja plicata*) were installed. The cedars were grown from cuttings at the Marblemount Native Plant Nursery and the cuttings were obtained on site. In an innovative effort cuttings and trees were planted directly into newly deposited wood to mimic the growth of terrestrial plants in bogs and "nurse logs" found in nature. Planting success will be monitored in the future.

Conclusion:

This year's work demonstrates practices and techniques that should be continued at Dry Creek and applied to other areas on Ross Lake and in other reservoirs. Working together Seattle City Light and the North Cascades National Park are improving the way in which woody debris is handled while reducing expenses and contributing to the Ross Lake ecosystem.

All of this work is being done with the aid of volunteers from organizations such as the Youth Conservation Corps (YCC), Native Plant Stewards, Project Wild, and the Student Conservation Association (SCA). This work contributes to the environmental education of staff, students and visitors and will help develop a stewardship ethic among all those who visit Ross Lake.

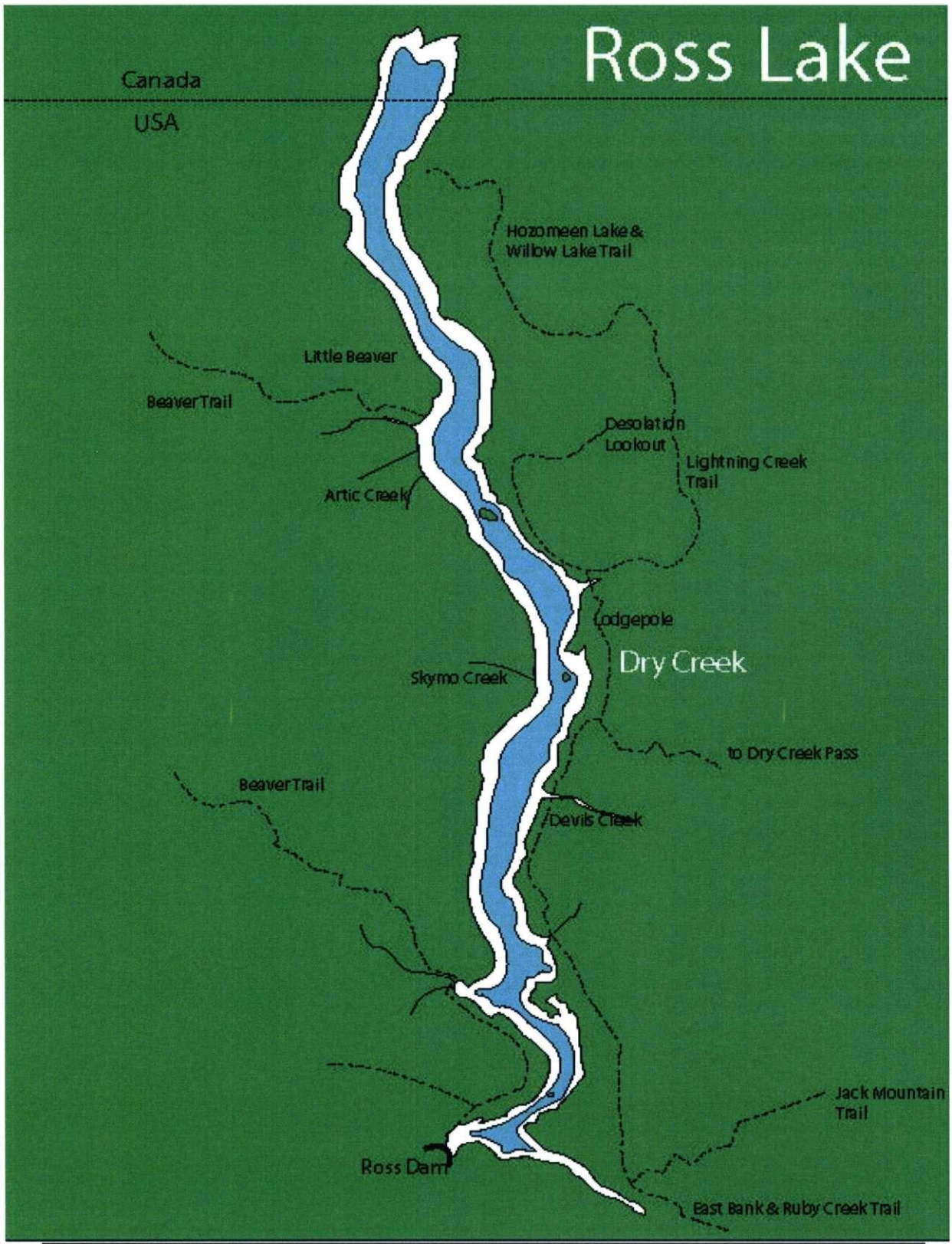


Figure 7: Map of Ross Lake: Note the proximity of Ross Dam to Dry Creek (11.5 miles), relative to the former burning site at Hozomeen (23 miles).

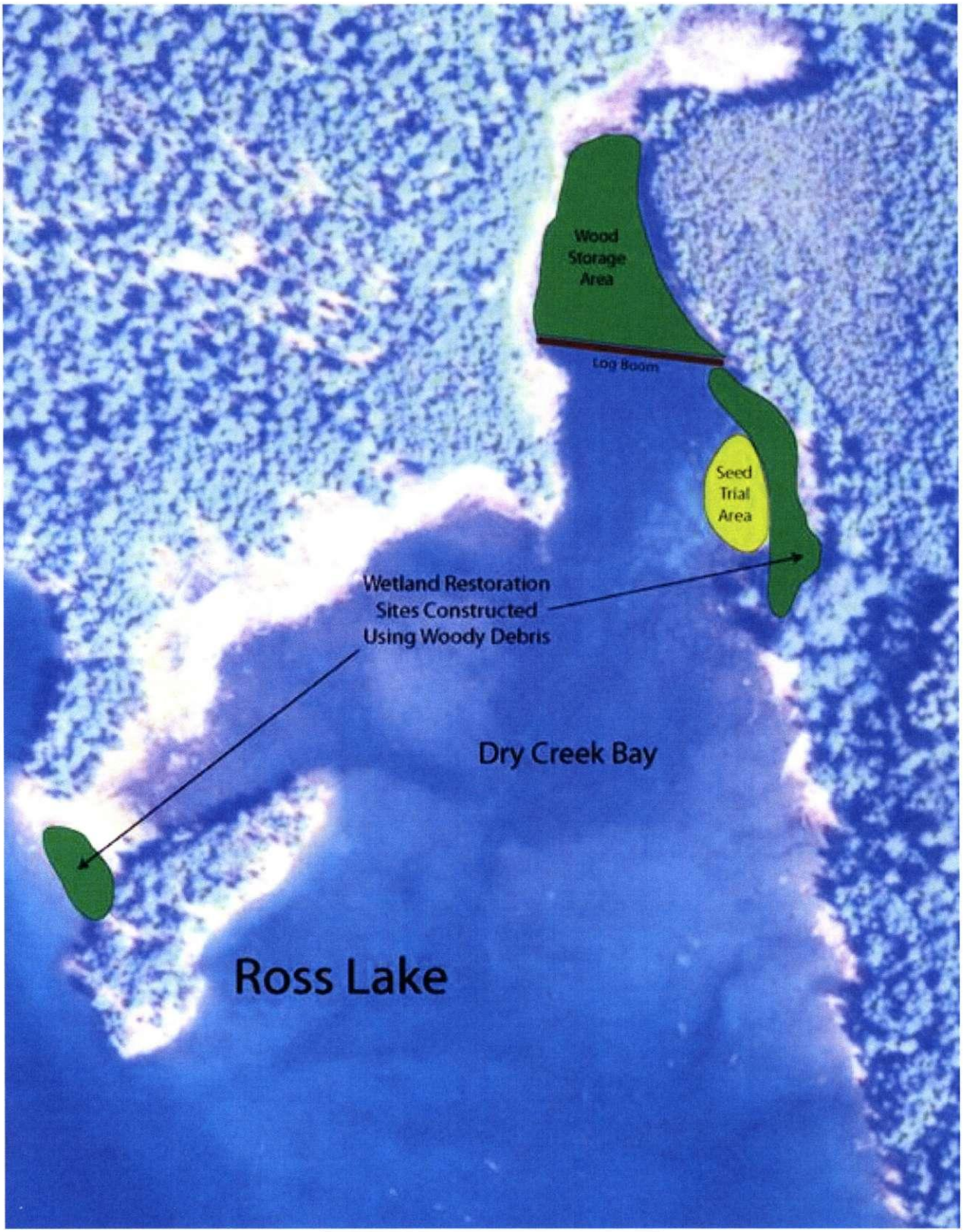


Figure 8: Dry Creek Bay work sites

Dry Creek Riparian Enhancement

National Park Service
U.S. Department of the Interior

North Cascades National Park Complex
Ross Lake National Recreation Area

Ross Lake water level fluctuations are different from the natural lakes in the region. Management as a reservoir subjects shoreline plants to a high level of disturbance and favors the establishment of non-native plant species. At Dry Creek, National Park Service staff and volunteers are working to enhance shoreline habitat and the growth of native plants.

Woody debris, previously floating in the lake, has been piled up on shore. As this wood decays it will supply nutrients and provide a surface from which other plants can grow. Park staff and volunteers have also collected seed and have planted trees, grasses and shrubs at several locations along the shore. This will encourage the establishment of native vegetation and provide competition for the invasive plants. The woody debris and new plantings will provide valuable shelter for birds, mammals and amphibians and enhance the lake ecosystem as a whole.

Project Wild volunteers plant trees in woody debris at Dry Creek Bay.
Top Right: Volunteers collect grass seeds for propagation.

How can you help?

- Please leave the driftwood in place! Gather firewood from further inshore and burn in designated fire rings.
- Please avoid stepping on or otherwise damaging the plants.
- Volunteer! If you'd like more information or are interested in helping please contact:

Michael Brondi
(360) 873-4590 x 54
or Cheryl Holmquist,
(360) 873-4590 x 64

SEEC GRANT Title: Cheatgrass mapping on Ross Lake

Introduction

SEEC funded a cheatgrass mapping effort on the east slopes of Ross Lake National Recreation Area in the field season of 2006. Western Washington University Geography undergraduate students were hired as Student Conservation Association volunteers to conduct these surveys. This effort was matched with National Park Service (NPS) National Fire Program funding to augment the SEEC funding and conduct additional surveys for cheatgrass in Lake Chelan National Recreation area.

Background

Cheatgrass (*Bromus tectorum*) is an invasive non-native grass that has been documented on the eastside of Ross Lake near the mouth of Lightning Creek and on the trail to Desolation Peak. This species is known to increase the frequency of fire in areas as well as displace native plant species. Fire is known to increase the density and extent of cheatgrass when fire is introduced into ecosystems. The area around Lightning Creek and Desolation Peak is designated as a "Wildland Fire Use Area" in the current park Fire Management Plan, a designation that allows for lightning-caused fires to burn so fire can play its natural role on the landscape. Parts of this same area are also scheduled to include prescribed burns, wherein the NPS will burn specific areas to reduce the unnaturally high fuel loads and return fuel loads to levels consistent with the historic fire regime.

This project proposed to map the extent of cheatgrass on the eastside of Ross Lake in advance of any fire management activities in this area. Once the populations are mapped, a management plan and control measures will be developed and implemented so that we can achieve both our desired fire management objectives on the landscape and prevent the spread of the invasive cheatgrass.

Methods

Dr. Mike Medler, a Geography professor at Western Washington University, and his students developed the methodology for these surveys in the spring of 2006 prior to the summer field work as part of class project.

The methods used for the survey were to scour an area using four surveyors walking parallel transects within the boundary of the prescribed burn unit as defined in the Ross Lake National Recreation Area (NRA). The surveyors were generally equally spaced at 5m, each with a GPS unit, creating a swath approximately 15m in width. The transect width varied greatly as a result of variations in ground cover and topography altering the surveyors' ability to observe the terrain and locate cheatgrass. After deviating from the 5m spacing to avoid an obstacle, the surveyors would resume their previous spacing within the transect. Field data was recorded using a Trimble Geoexplorer XT GPS unit and Garmin GPS Map 60C handhelds.

To accurately represent spatial extent and distribution of *Bromus tectorum*

populations, a patch size threshold was determined to evaluate which type of data to record; point or polygon. An ocular estimate at the patch center was made to determine the radius and the percent cover of cheatgrass for a given patch. A threshold of a 10m radius was determined to be adequate throughout the majority of field surveys. If a cheatgrass patch was in excess of a 10m radius, a polygon of the perimeter was taken using the Trimble GEOXT GPS unit and a percent cover attribute was recorded. Patches that had a radius of 10m or less were recorded as a point datum using the Garmin Map 60c GPS units with both radius and percent cover attributes. For the purpose of preserving the integrity of the data, points were taken with the Garmin units in accordance with the polygons recorded. As a result, points with a radius greater than 10m were recorded. Additionally, in cases where extreme topography limited the accessibility of an area, and in locations where there existed poor satellite coverage (high PDOP), points were taken that exceeded the 10m threshold without a corresponding polygon. This data was post processed and mapped in ArcGIS.

Results

Due to accessibility, steep terrain and the extent of the cheatgrass populations the original target of this proposal was not met. The cheatgrass populations were far more extensive than anticipated. We hope to receive additional funding to complete the project area. The Lightning Creek burn unit is believed to have the highest density and greatest extent of cheatgrass in Ross Lake NRA.

The Lightning Creek burn unit was the only are that was completed in the 2006 summer filed season. The unit contains a total area of 1650 acres. The unit is characterized by steep terrain bordering Ross Lake to the west, Lightning Creek to the south, Starvation Ridge to the north, and the Desolation Peak Ridge to the east. With a total elevation change of 5,000 feet, from Ross Lake to the Desolation Peak Lookout, the Lightning Creek burn unit consists of several zones of vegetation. At lake level, vegetation is characterized by Ponderosa pine (*Pinus ponderosa)* stands intermixed with open areas of perennial and annual grasses, and dense shrubs. This is contrasted by sub-alpine fir, blueberry, and heather along the Desolation Peak Ridge.

The southern portion of the unit, above Lightning Creek, is characterized by large cliffs, some in excess of 100 feet, and steep slopes of nearly 60 degrees. Surveys of this area found large patches of cheatgrass within a close proximity to the Boundary trail on both the uphill and downhill sides. Surveys in this area were limited by steep terrain and inaccessibility, particularly directly above Lightning Creek. However, continuous cheatgrass populations exceeding 10 meters in radius were mapped directly above the creek.

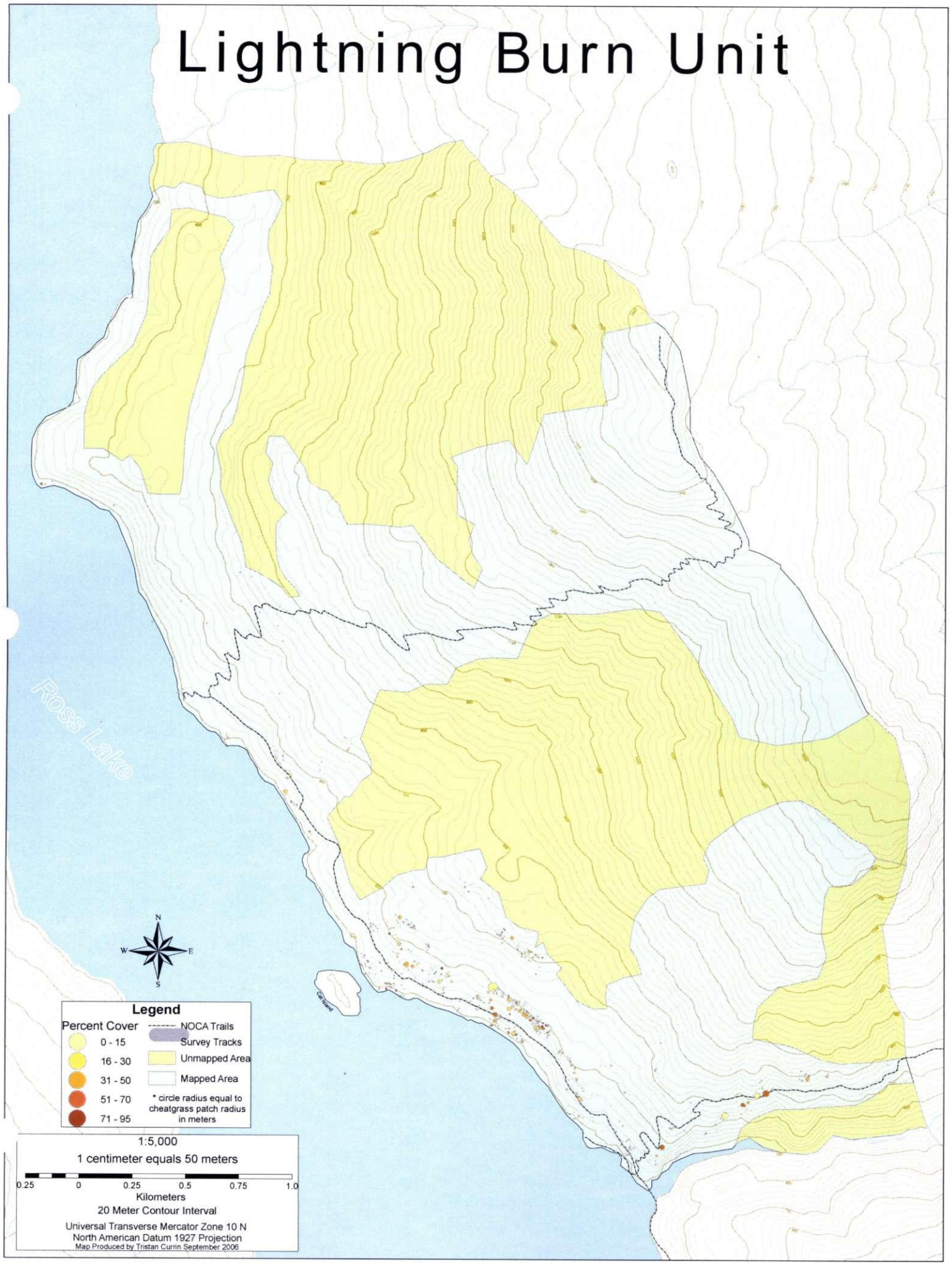
The southwestern portion of the unit is characterized by dispersed cliff faces and clearings between Ponderosa Pine stands. This area was the most surveyed portion of the unit due to easy accessibility along the East Bank and Desolation Peak trails. However, cross country travel on either side was limited by topography and vegetation. The majority of cheatgrass populations mapped within the unit were

located in this area. These populations were characterized by smaller radiuses and lower percent cover than the patches found in the southern portion of the unit above Lightning Creek.

Surveys north of the Desolation Peak trail revealed very few cheatgrass populations with the exception of a few isolated points. However, surveys of this area were limited by dense under story vegetation which rendered transects nearly impossible. Likewise, limited cheatgrass populations were found in all surveys above 3,500 feet.

Products of this project included: a GIS map and associated data layers, an Access data base with data for the survey points and a written report. Attached is a map of the Lightning unit and associated cheatgrass polygons.

Lightning Burn Unit



SEEC Proposal Title: Develop propagation techniques for Pinegrass

Introduction

Pinegrass (*Calamagrostis rubecens)* is a dominant understory plant in dry habitats in North Cascades National Park (NOCA). Within NOCA, it is primarily found in Stehekin area, on the east side of Ross Lake and on the islands in Ross Lake. It is a hardy native grass that spreads by rhizome and is relatively tolerant of foot traffic. These characteristics make it an especially important plant in and around many of the campsites on Ross Lake where restoration of disturbed areas is ongoing. The most efficient means for the establishment of grass species in restoration projects is direct seeding on site with seeds from local sources. Pinegrass infrequently sets seeds and thus is unavailable for this type of restoration technique. The only propagation technique documented in the literature was division. Our proposal requested funding for NOCA staff to develop techniques for the alternative techniques of vegetative propagation of pinegrass as well as techniques to promote flowering and seed set.

Results

The project work this summer was conducted on Cat Island and the east side of Ross Lake near Lightening Creek Camp and at the NOCA native plant nursery in Marblemount. Cat Island is a popular boating and camping destination on the Lake and experiences heavy visitor use. It is located in the rain-shadow of mountains to the west and has shallow droughty soil with areas of exposed bedrock. Pinegrass is an important understory plant on Cat Island where extensive foot traffic has resulted in the destruction of vegetation and increased erosion.

Propagation techniques that were initiated included plant division and direct seed sowing on site and in the nursery. Plants grown in the nursery will be used to test methods to induce greater seed production in mature plants and will eventually be planted on restoration sites on or near Cat Island. Successful techniques will be documented and reports written in winter of 2007. Once finalized these techniques will be documented and shared with other propagation professionals through a scientific publication.

Plants were collected from near Cat Island on the east bank of Ross Lake in the spring of 2006. Twenty small clumps of pinegrass with a minimum of 10cm of rhizome attached were collected from three locations. Eighty percent of the plants collected in the spring had survived and were growing vigorously at the nursery.

Pinegrass seed was collected at Cat Island and along the East Bank Trail between Lightning Creek and the Desolation Lookout trailhead by NPS employees, SCA volunteers and participants in the North Cascades Institute WILD program.

Seed was collected in mid-July and early August. Seed heads were observed to be more or less rare even in thick pinegrass stands. Due of the relative rarity of the seedhead formation, the remoteness of the collection sites and the inexperience of many of the collectors the collected seed heads the amount of seed collected was quite small. Observations of processed the seed heads revealed several problems resulting from the

inexperience of the seed collectors. Seeds that were present most often had stigmas still attached because the seed heads had been collected prior to ripeness. Other florets contained no visible seed and were assumed to be aborted. Additionally, evidence of seed eating insects were found among the bracts. As a result of the extremely small size of the seed and the difficulty experienced in separating the seed from the chaff the post processed "cleaned seed" contained approximately 60% non-seed material.

On August 28, 2006, the small amount cleaned seed was sowed as well as the "waste" material from the cleaned seed heads. Seeds were sown in flats on the surface of a well drained seedling mix. Three flats were sown with an average of 2 grams of the cleaned seed head material each. Additionally, approximately 120 grams of the coarse seedhead material that remained after cleaning was distributed on the surface of 4 flats, resulting in a coating 2-3 glumes thick in most areas. Pinegrass seedlings germinated in all 7 flats within a week. The three flats sown with cleaned seed averaged 200 seedlings/flat 30 days after sowing. Interestingly, the flats sown with the "waste" material yielded 75 seedlings/flat.

Accomplishments:
The following are accomplishments of this project:

- A literature search was conducted and information compiled of suggested propagation techniques for pinegrass.
- The collection and cleaning 58.45 grams of seed material that resulted in an estimated content of 35 grams of pure live Pinegrass seed.
- Sixteen containers of pinegrass were produced by rhizome division.
- Two hundred pinegrass seedlings were out planted in a protected area in the Cat Island Campground.
- 350 pinegrass seedlings are currently growing in nursery bed at the NOCA nursery.
- 31.5 grams of pinegrass seed are being stored that will be propagated in the NOCA nursery or planted directly on site in the spring of 2007.
- The production of a colorful information handout (attached) for visitors and to be used as a poster at Campsites near restoration areas.
- SCA volunteers and high school volunteers from NCI "wild" program were involved in the collection plants and seed as well as the out planting of pinegrass starts on Cat Island.

Conclusions and future research:
Pinegrass was known to be a common understory component of the eastside of Ross Lake and on the islands of Ross Lake. In the summer of 2006, Pinegrass was observed in Ross Lake area to infrequently flower as stated in the literature for other areas. Pinegrass was also found to have low seed production even in those plants that produced seed heads. In addition, training of volunteers to recognize seed ripeness is critical in a species with low seed production. Although seed viability and germination rates were not determined, antidotal observations suggest that germination rates of ripe seeds is high.

We plan to try additional manipulation of Pinegrass plant, both in the greenhouse setting and the field to induce more prolific flowering and seed set. These techniques will involve fertilizing, scorching to simulate burning, and a varying the watering regime.

Pinegrass Restoration

Why Restore Pinegrass?

Pinegrass is native to Cat Island, growing here as an understory plant in dry site forests.

It is a sod-forming grass, with most of the plant weight below ground in a fine network of roots and rhizomes. These roots are key in preventing erosion of Cat Island's thin soil layer.

Pinegrass is an important food source for many herbivores and provides good cover for small mammals and birds.

Pinegrass is also an excellent plant for revegetation efforts as it is somewhat resistant to trampling and does well in open disturbed sites.

Scientific name: *Calamagrostis rubescens*
Family: Poaceae

Identifying Characteristics
Growth form: a medium-sized densely growing, sod-forming grass.
Blades: Leaf blades are 3 to 4 mm wide, 10 to 30 cm long with curved tips and a drooping stature. The sheath has a purple tinge to the base and is hairy near the collar.
Inflorescence: Flowers are in a panicle, 6 to 14 cm long. Awns are bent.
Roots: 53% of plant weight is below ground in creeping rhizomes.

For more information contact:
(360) 873-4590 x58

Mitigate Cat Island Human Impacts

Final Report: 2006

Skagit Environmental Endowment Commission
North Cascades National Park

Project Start Date: May, 2006
Estimated Completion Date: November 30, 2006
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Introduction

Cat Island is located in Ross Lake within the Ross Lake National Recreation Area. The island is less than a fifth of a mile across at its widest point and heavily utilized by Park visitors. It contains four campsites and the convenient dock makes it a popular boating destination on the lake. Cat Island is a dry site composed of glaciated rock with little soil development and located in the rain-shadow of the western mountains.

The island campgrounds of Ross Lake are particularly vulnerable to degradation from human impacts. Visitors arrive by boat and, without more distant destinations to hike to, explore all corners of the islands.

Figure 1: An example of sparsely vegetated ground at Cat Island

Extensive foot traffic on Cat Island has resulted in the destruction of vegetation and increased erosion. In 2002 SEEC funded a North Cascades National Park (NOCA) mapping project documenting these impacts. A 2005 comparison revealed that the network of informal 'social trails' and bare ground areas have been steadily expanding. In many areas it was impossible to identify where the main trail was. This begs the question, "How do we welcome park visitors to enjoy Cat Island without destroying it in the process?" On Cat Island we are combining classic restoration techniques with new approaches and educational outreach to convince visitors to adopt low-impact behaviors.

Project Narrative:

Between 1999 and 2006 FERC-funded work on Cat Island stabilized the eroding shoreline and improved campsites by defining and reinforcing the tent pads. This 2006 SEEC project allowed NOCA to begin revegetating bare ground and addressing Cat Island's network of trails. NOCA's first task in this restoration was to use previously gathered information about visitor travel patterns to determine which trails should be kept, maintained and improved and which should be closed. Essential trails include those connecting campsites, the dock, the toilet facilities, those circling the island and accessing the lake shore, and those going to irresistible destinations such as the island's highest points. To help visitors recognize and use established trails they were delineated by lining them with logs or rocks.

The trails that were judged to be unnecessary were then blocked off and 'disappeared.' In some restoration areas the disappearance of social trails is as simple as obstructing the path entrances but to discourage unwanted foot traffic on sparsely vegetated Cat Island the entire trail had to be covered up. Trail blocking was done using dead trees gathered from the forested areas on the island. Wood used included already fallen trunks as well as hazard trees which could often be pushed over with minimal effort. Many of the Lodgepole Pine trees on Cat Island are naturally approaching the end of their life spans and the large number of dead trees on the island gave the crew an ample source of materials for their trail work.

Denuded areas were revegetated using plants grown in the nursery and from the direct application of seed collected in 2006 and scattered and raked into these areas. A particular effort was taken to plant former social trails and to line the edges of approved trails in places where the path was previously unclear.

To accomplish this work, NOCA recruited volunteers from the Student Conservation Association (SCA), the Boy Scouts of America, the Youth Conservation Corps (YCC), Project Wild, and the North Cascades Institute Canoe Camp. The help of visitors was obtained by direct contact as the work was being done and the posting of an information notice that

Figure 2: A NOCA Crew member plants Oregon Grape at Cat Island

explained the purpose of the project. In addition signs were posted asking visitors to help water recent shoreline plantings using the provided watering cans. This saves NOCA staff the effort of watering these plants; more importantly, perhaps, it encourages a sense of stewardship in the large community of frequent Ross Lake visitors.

Accomplishments and Results

- NOCA staff and volunteers blocked, disguised and planted 1,280 feet of trail. This should facilitate erosion control and allow the revegetation of a substantial area of bare ground now protected from visitor impacts,
- Approximately 700 feet of trail were improved. Improvements included better delineation of the approved trails using logs and rocks, removal of branches and debris obstructing the path and planting and seeding the trail edges.
- Approximately 2,000ft sq of bare ground in and around the campground was delineated using natural objects and revegetation was initiated. NOCA staff and volunteers planted 300 native plants that had been grown from seed collected earlier in the surrounding area. These included Baldhip Rose, Serviceberry, Mock Orange, Vine Maples, Oregon Grape, Oceanspray, and grasses and sedges that are found naturally on Cat Island.

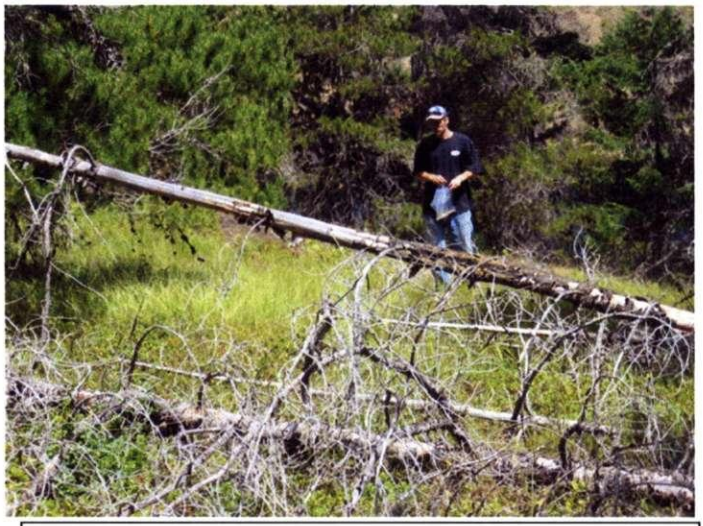


Figure 3: Local Student and YCC member collects seed at Cat Island.

- Over 27 ounces of seed from 15 different species were collected and planted throughout the restoration areas. Plant species used included Salal, Yarrow, Chocolate Lily, Oregon Grape and Bitter Cherry. In all, planting and seeding was done for 9,160 square feet of bare ground.
- NOCA members collected several ounces of Pinegrass (*Calamagrostis rubescens*) seed that was direct seeded on Cat Island or planted in the Marblemount Native Plant nursery. Several flats of this will be transplanted to Cat Island in the spring of 2007and the rest will be nursery grown to aid NOCA botanists in their ongoing research on pinegrass propagation. The 2006 work has helped NOCA staff to develop techniques that will aid in growing this grass for later projects.
- NPS staff and volunteers produced an information handout to educate

visitors and to make them more conscious about their impact on the Cat Island. The information will be posted on the campground bulletin board and presented to visitors who obtain camping permits for Cat Island.

- Over 70 volunteers were recruited to help in the seed collection, planting, and trail work at Cat Island. These included 5 SCA's, 2 YCC's, and 37 Project Wild participants, plus Boy Scout and Canoe Camp groups, coming from a wide variety of backgrounds. The YCC's were local students already familiar with the area and the work being done here. The Project Wild crewmembers were all current Seattle residents (many of them immigrants from other nations) who were selected chiefly because they had had little exposure to nature prior to this experience. Other volunteers traveled from as far away as Michigan, Massachusetts, and Virginia, bringing with them their own skills and experiences to the Cat Island project. Throughout the work there was lively discussion and sharing of a wide variety of perspectives on the Cat Island work and restoration work in general.

Figure 4: Project Wild volunteers learn about lichen

Conclusion

Cat Island is an environmentally fragile area that is heavily impacted by visitors and the restoration work accomplished through this project is necessary and important. Other campgrounds on Ross Lake, particularly those on Tenmile Island and Cougar Island, undergo similar damage every year. It is for this reason that the education of visitors and volunteers is such an important part of the Cat Island project.

The National Park Service does not have the means to restore every delicate environment that park users frequent; it is essential that the users themselves be made aware of their impact on the land and the actions they can take to reduce and mitigate their impacts. By educating and enlisting visitors as stewards we are developing an informed, environmentally conscious and involved community of users. This will do far more to protect and preserve Ross Lake and the North Cascades wilderness than Park Service staff can accomplish working alone. At Cat Island, as in all their restoration work, the NOCA team makes an extensive effort to bring in and educate the people responsible for shaping the future of the Park and of our nation's environment as a whole.

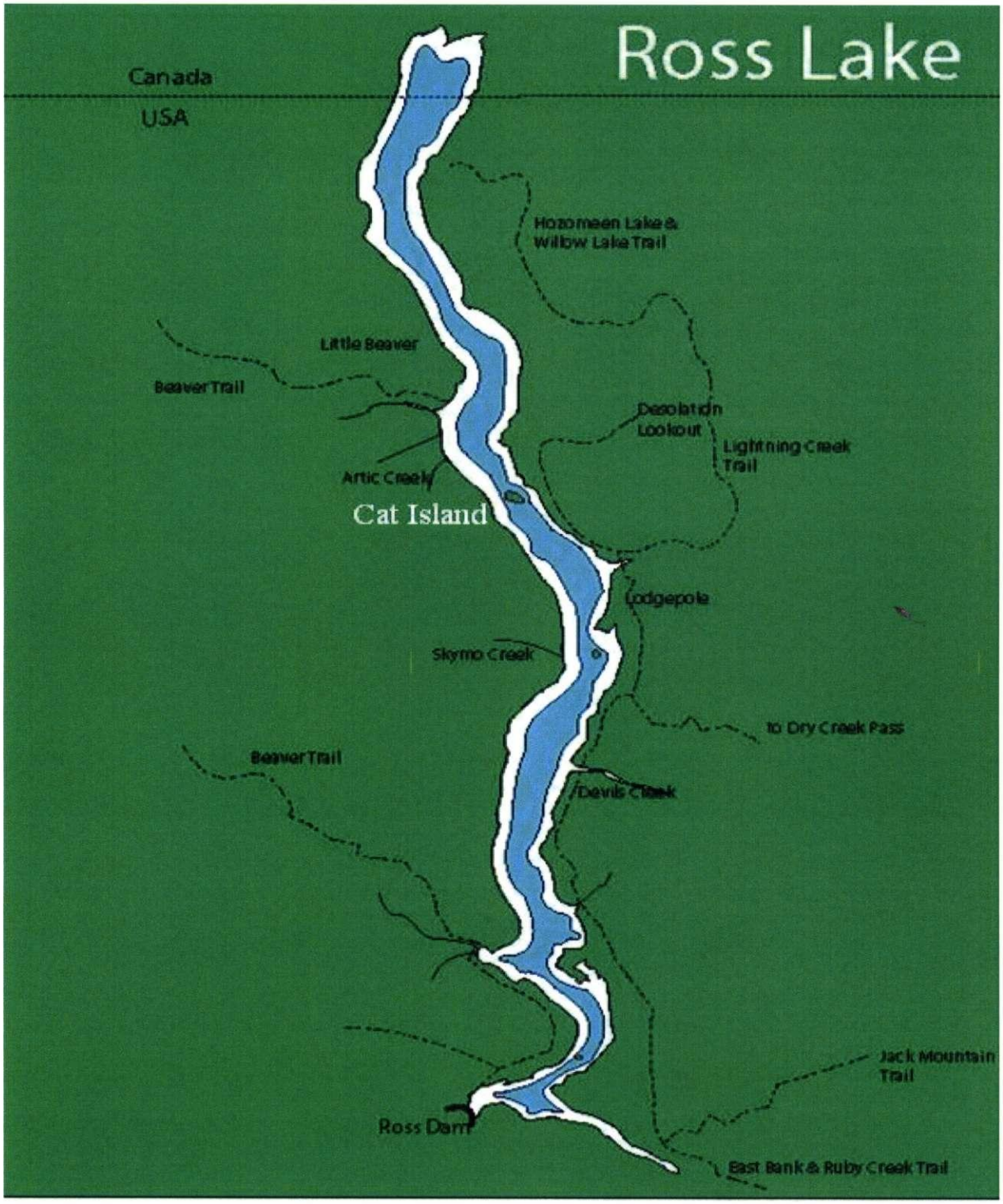


Figure 5: Ross Lake Map

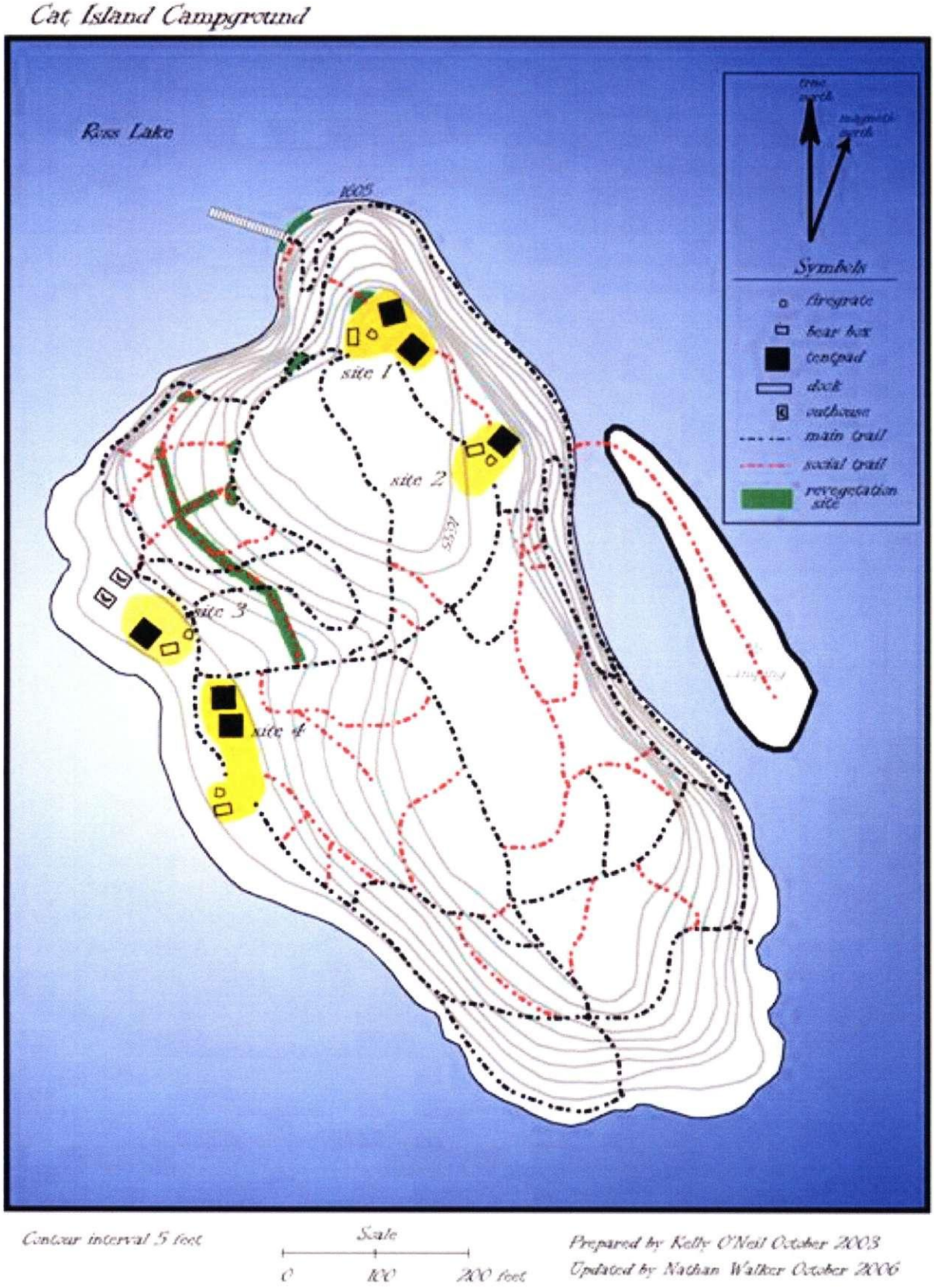


Figure 6: Cat Island Trail Map

Cat Island Revegetation

National Park Service
U.S. Department of the Interior

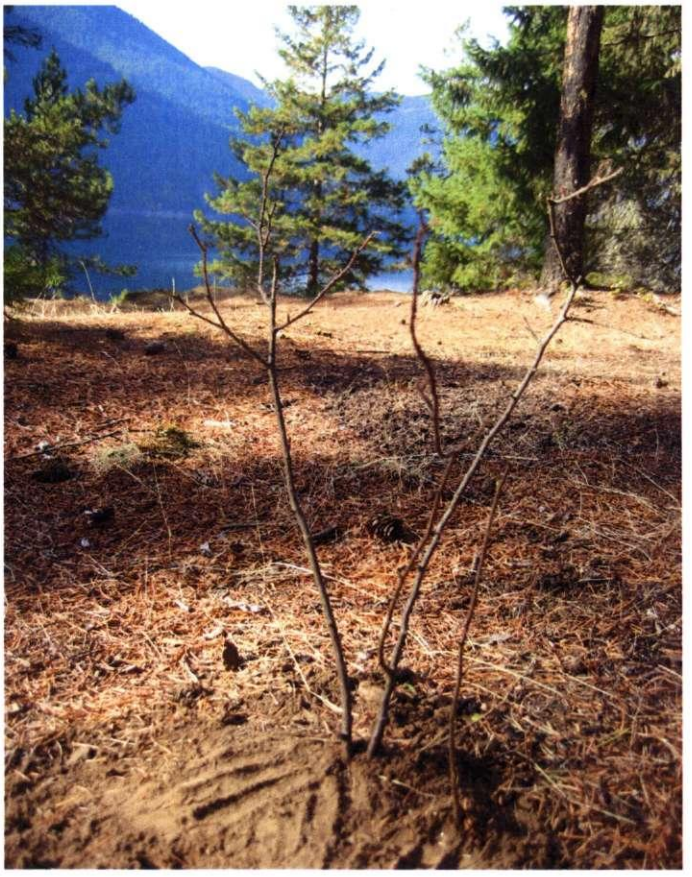
North Cascades National Park Complex
Ross Lake National Recreation Area

What are we doing?

North Cascades National Park staff, interns and volunteers are re-establishing plants on disturbed areas of Cat Island.

We visitors use and explore every corner of this island. Over time a network of "social trails" has developed as people take shortcuts between established trails and campsites have begun to "sprawl" as nearby plants are replaced by bare ground.

Our goal is encourage you to explore Cat Island while helping to maintain the Island's fragile ecosystem and prevent the naturally thin soil layer from eroding further.



How are we restoring Cat Island?

In an ongoing effort North Cascades National Park staff and volunteers collect native plant seeds and plant them directly on the Island or grow the trees, shrubs and grasses for future replanting.

Social trails and other newly disturbed areas are identified as restoration zones. Logs and rocks are placed in the area to discourage foot-traffic and seeds and plants are brought in and planted in these sites.

What can you do to help?

- Please stay on established trails.
- Do not step on any vegetation (including moss and lichen).
- Set up tents in the tent pads provided and keep your camp away from shrubs and small plants.
- Become a Plant Propagation Volunteer!

For more information or to volunteer please contact: Mike Brondi (360) 873-4590 x 54
Michael_brondi@nps.gov