



Crater Lake National Park Terrestrial Branch 2013 Project Summary

By

Sean Mohren, Terrestrial Ecologist

Jen Beck, Botanist





Introduction

As we continue to wrap up the 2013 field season Jen and I have been reviewing all of the wonderful work that the terrestrial team has accomplished over the last year. In case you did not know, the Terrestrial Branch is one of three branches (terrestrial, aquatic, GIS) of the Resource Preservation and Research Division at Crater Lake National Park. In 2013, the Park's Terrestrial Branch consisted of a Terrestrial Ecologist, Botanist, and 2 seasonal wildlife technicians. In addition, project funding helped support 4 botanical technicians that contributed to the rim road rehabilitation, invasive plant survey and treatment, and whitebark pine conservation projects.

We believe it is important to understand the work each division is undertaking so we can figure out better ways of working together to meet the Park's mission. This year we received assistance from all the divisions which helped contribute to such a great season and we want to thank all of you for that help. I know we are all very busy and at times it is hard to take some time to see what others are getting accomplished. Therefore, Jen and I have put together this short summary of many of our 2013 projects. Please take a look at a few of the projects that might interest you. For many of the projects, we are hoping to continue working on them again in 2014 so if you are interested in learning more about the projects or would like to assist us in 2014 just give Jen or myself a call.

Some of the more interesting achievements that occurred this year included: 1) park staff submission of the Collared Dove and Muskrat as occurring in the park which have now been added to the park's species list; 2) the survival of 77-90% of the whitebark pine seedlings planted for restoration; 3) documentation of native red fox in park which are likely the Sierra Nevada red fox; 4) seasonal closure of the Llao Rock Research Natural Area to protect rare plant habitat; 5) the removal of over 59,000 invasive plants; 6) collection of 9 bear collars that will be used to document home range, denning locations, and habitat use in the park, and 7) the development of prescriptions to revegetate areas that will be disturbed as part of the rim drive rehabilitation project.



Landbird in Pumice Desert photographed by wildlife crew using a remote camera



Invasive Plant Management

Background

Over the last fifteen years, non-native, invasive plant species have been spreading throughout the park. Some of the park's most offensive invasive plant species include St. John's wort, bull thistle, Canada thistle, spotted knapweed, sheep sorrel, and woolly mullein. Invasive species are found along park roads and trails, around facilities, and also in the park's backcountry – especially near the park's boundaries and in wetland and riparian areas. The park has been actively treating invasive plants since 1998 with annual efforts made since 2003.



The invasive plant bull thistle in wet meadows near Castle Creek. Photo by Jen Beck.

Why is this important?

Non-native, invasive species are considered one of the most critical threats to biodiversity. It is imperative that invasive plant populations are treated while still at small and manageable levels to protect the park's native plant communities. Crater Lake possesses a relatively pristine flora, with some plant communities comprised entirely of native members. Protecting against non-native plant invasions through preventing new invasions, early detection and rapid response to new invasions, and regular treatment/control of established invasive plant populations helps maintain the diversity and integrity of native plant communities and the suite of species that depend upon them.

2013 Activities

Progress was made toward reducing the abundance and distribution of invasive plants throughout the park. One botanical technician (Melody Frederic) was charged with leading field efforts in invasive plant control. She received assistance from the Botany staff, Oregon Department of Agriculture, Friends of Crater Lake, and the Youth Conservation Corps. A total of 58,953 plants were removed park-wide this year. In 2013, three new invasive plant species were recorded in the park for the first time: Dyer's woad, field bindweed, and tall lettuce.



Canada thistle along the Crater Lake shoreline. Photo by Jen Beck.

Project Summary/Future Work

Invasive plant management will be an ongoing project for the Terrestrial staff. Despite tremendous progress that has been made in controlling and treating invasive plants to date, new infestations emerge annually that require regular treatment. The park has had some success in reducing invasive plants throughout the park; for example, in the late 1990s thousands of spotted knapweed plants were removed from roadsides in the park's Panhandle area. Over the last few years, only an isolated plant or two have been found in

this area. With assistance from the Oregon Department of Agriculture, the park has been treating roadside St. John's wort populations with herbicide. When this effort commenced in 2007, 57 gallons of spray mix were used compared with only 8 gallons used in 2013. The Botany staff is working on a new Invasive Plant Management Plan and Environmental Assessment that will enhance control options park-wide.



Northern Spotted Owl Monitoring

Background

The first recorded observation of a Northern Spotted Owl (NSO) in Crater Lake National Park was in 1934 and between 1934 and 1978 several other sightings were reported. The first formal surveys for spotted owls were conducted in 1978 in cooperation with the Oregon Department of Fish and Wildlife and the United States Forest Service. In 1992, the first survey was conducted following an established protocol but was limited in scope. More intensive surveys following the protocol were completed between 1993 and 1997 whereby all potential habitats in Crater Lake National Park were surveyed. Survey efforts in 1998 to present focused on monitoring long-term trends in the population at known NSO activity centers and completing surveys in areas where park management activities may have an effect on this species.

Why is this important?

After a status review by the US Fish and Wildlife Service the spotted owl was listed under the Endangered Species Act as "Threatened" in June of 1990. In 2008 the USFWS developed a spotted owl recovery plan that describes 4 basic steps to NSO recovery including: 1) Completion of a range wide habitat modeling tool; 2) Habitat conservation and active forest restoration; 3) Barred owl management; and 4) Research and Monitoring. As part of this monitoring plan the NPS is listed as one of the responsible parties for the following activities: 1) Monitor population trend; 2) Utilize habitat modeling to help with recovery measures; 3) Design and conduct experiments concerning habitat, prey, and spotted owl fitness; 4) Establish protocols to detect and manage barred owls; and 5) Ensure the monitoring protocol adequately detects spotted owls. In order to help with the recovery effort and to ensure park management activities and high numbers of park visitors have no negative effect on NSO the park monitors known sites, surveys for new sites, and surveys areas where management activities are planned using the standardized protocol developed by the USFWS.



Northern Spotted Owl
photographed by Jeff Murphy

2013 Activities and Results

This year we sampled 11 of 15 known spotted owl activity centers and 7 sites where hazard tree cutting, fuels reduction, and habitat restoration projects were planned. Spotted owls were found at 4 locations and barred owls were found at 5 locations that were surveyed. Only 1 fuels treatment site had NSO presence so that treatment was not implemented. We also implemented a pilot project using acoustic sound stations to see if they can be used to help supplement our monitoring efforts.

Project Summary/Future Work

Crater Lake National Park has been monitoring NSO using a standardized monitoring protocol since 1992. Sampling efforts have varied over years due to funding constraints, shifting priorities, and limited time. Since 1992, an annual report has been developed that describes what was accomplished each year. In addition, region wide assessments of NSO recovery were completed in 2004 and 2008; another assessment is planned for 2014. The last assessment suggested reproduction and survival was on a decline and barred owl presence and habitat loss were partly responsible for this decline.



Whitebark Pine Conservation

Background

Whitebark pine (*Pinus albicaulis*) is a keystone and foundation species that inhabits the park's highest elevations. It has been declining for decades due to white pine blister rust, which was first documented in the park in 1936. A decade of mountain pine beetle attack has further reduced mature whitebark pine throughout the park, and the beetle has surpassed blister rust as whitebark pine's leading mortality agent. Whitebark pine is eligible for listing as threatened or endangered under the Endangered Species Act; however, this action is precluded by lack of funds and higher priority work and remains a "Candidate" for listing. Whitebark pine has received management attention over the last 15 years with efforts made to monitor whitebark pine communities, identify trees with natural resistance to blister rust, and conduct restoration outplantings of seedlings from rust-resistant "Parent" trees.



Whitebark pine with cone cages photographed by Jen Beck.



"Gray ghost" of mountain pine beetle killed whitebark pine.
Photo by Jen Beck.

Why is this important?

Whitebark pine is highly susceptible to the fatal blister rust pathogen; low levels of genetic resistance to blister rust have been reported for whitebark pine. Without management intervention, it is likely that whitebark pine will continue to decline park-wide. As both a foundation and keystone species, whitebark pine plays a key role in supporting the park's high elevation biodiversity. Whitebark pine is considered a "pioneer" species that can grow on harsh, exposed sites. Once established, they can act as a "nurse" species that provide shelter for a variety of other species. In addition, their highly nutritious seeds help support a host of wildlife species that occur at high elevations, including the Clark's nutcracker.

2013 Activities

One botanical technician (Elena Thomas) was devoted to whitebark pine conservation efforts. Over 60 rust resistant and potentially rust resistant whitebark pines were protected with bark beetle repellent. Assistance was received from the USFS Forest Health Protection program that facilitated tree climbers from the Deschutes National Forest to cage and collect cones from twelve new whitebark pines. Seeds from these twelve trees were sent to the USFS Dorena Genetic Resource Center (DGRC) where they were extracted, stratified, and entered into rust resistance trials.

Project Summary/Future Work

The total number of whitebark pines that have had cones collected (2003-2013) and sent to the DGRC is 101. The park's four whitebark pine restoration plantings experienced survival rates between 77-90%. Results from the park's long-term monitoring plots indicated that total blister rust infection (active & inactive cankers) has changed from 11.5% in 2003 to 22.2% in 2013; mature whitebark pines (> 15 cm DBH) have been reduced by 23.5% since 2003. Twenty-five percent of the park's known rust resistant whitebark pines are now dead; all have been killed by the mountain pine beetle. The Terrestrial Ecology staff will continue with whitebark pine monitoring efforts and application of bark beetle repellent to high-value trees in 2014. Additionally, the next restoration outplanting (scheduled for 2016) is in the planning stages.



Red Fox Distribution and Genetics Research Project

Background

The Sierra Nevada red fox is a subspecies of red fox that historically ranged from the southern Sierra Nevada Mountains northward through the southern Cascade Mountains of California and Oregon. Prior to this project, the only two known populations of Sierra Nevada red fox were in Lassen Volcanic National Park and Sonora Pass in southern California. It is estimated that the population of these two known sites is less than 50 individuals. In 1939, a red fox was struck by a vehicle in Crater Lake National Park and the Park Ranger at the time submitted the species to our archives. In 2009, genetic analysis was used to test this specimen and it was confirmed to be a Sierra Nevada subspecies. In 2011, the former Terrestrial Ecologist, Greg Holm, captured an image of a red fox located at high elevation habitat near North Junction suggesting it may be a native red fox. This sighting spurred a more in-depth sampling of red fox during the summer of 2012. Using remote cameras and hair snares, multiple photographs of red fox along the caldera rim were obtained along with one hair sample. The hair sample was analyzed but could not conclusively show the species as being the Sierra Nevada Red Fox.

Why is this important?

In 2011, the Center for Biological Diversity submitted a petition to the USFWS to list the Sierra Nevada red fox. In January of 2012, the USFWS released the 90-day finding on this petition and found the petition presented substantial scientific information indicating that listing this subspecies as threatened or endangered may be warranted. After the allotted 1 year to complete the review of this species, the USFWS announced they will make a final decision in 2015.



Red Fox photographed by Sean Mohren

Confirming if the Sierra Nevada subspecies is currently present in Crater Lake National Park, and if it is present, knowing the distribution of this species in the park will allow us to better respond to the decision of the USFWS when it is made. If this species is listed, and because we are being proactive in our search for knowledge about this species at the park, we will be ahead of the curve in doing our part as the NPS to make sure we are protecting this rare mammal.

2013 Activities

In 2013, the wildlife team utilized remote cameras to survey 33 areas above 6000 ft to try and document the distribution of Red Fox in Crater Lake National Park. Areas above 6000 ft were selected because Sierra Nevada red fox are thought to occur above this elevation. The Caldera Rim was excluded from sampling because we already know red fox occurs along the rim as shown by the 2012 sampling and the 36 incidental sightings (with pictures) submitted by park staff and the public in 2013. We also obtained 3 red fox samples (2 scat, 1 road kill) that were submitted for genetic analysis which showed all three were from native red fox species which suggest they are Sierra Nevada red fox.

Project Summary/Future Work

Based on the work from previous years we are confident that there is a population of Sierra Nevada red fox in Crater Lake National Park. We have submitted grants in an effort to obtain funding to continue to examine the distribution of red fox in and around the park. Our hope is to continue to learn more about the ecology of this species so we can ensure its longevity. In addition, USFS is actively searching for funding to support similar efforts in the forest surrounding the park.



Pumice Grapefern Monitoring



Individually tagged pumice grapefern (left). Photo by Jen Beck. Pumice grapefern sampling frame with tagged individuals (right). Photo by Kathryn Williams.

Background

The pumice grapefern (*Botrychium pumicola*) is a rare plant found in the southern and central Cascade Range. The pumice grapefern is listed as threatened by the state of Oregon. It is also on the Oregon Biodiversity Information Center's "List 1" which includes species that are "endangered or threatened throughout their range or presumed extinct." Crater Lake contains one of the world's largest pumice grapefern populations, which is also the "type locality" for the species. A type locality is the physical location where a species is first collected and described; therefore, it "defines" and serves as a genetic reservoir for the species. The park has been monitoring populations of pumice grapefern since 2010 to determine dormancy rates in this species.

Why is this important?

The pumice grapefern has a prolonged subterranean "dormant" phase in which it is completely dependent upon its mycorrhizal associates for photosynthate (its food source). It is currently unknown what percentage of the pumice grapefern population is dormant annually and how this varies over time. Long-term demographical monitoring provides critical information for managing this species, and dormancy rates are essential to determine total population size and fluctuations in population size over time.

2013 Activities

2013 marked the fourth year of pumice grapefern monitoring at three locations park-wide.

Project Summary/Future Work

It is difficult to determine if "new" plants encountered each year are ones breaking dormancy or new recruits to the population; several additional years of monitoring will be required to determine true dormancy rates.

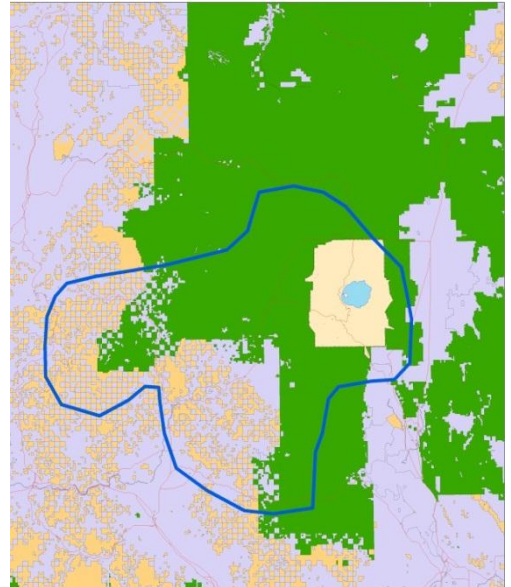
Year	% Population Emerged	% Population Dormant	% Population New
2010	n/a - baseline	n/a - baseline	n/a - baseline
2011	74	5	21
2012	88	6	6
2013	87	12	1



Black Bear Ecological Research Project

Background

Beginning in 2009 the wildlife team at Crater Lake National Park began a focused effort to better understand the ecology of black bears in and around the park. As part of this effort, two projects were implemented to help us understand the population size, distribution, and denning activities of black bears in the area. Starting in 2009, a capture/recapture project was implemented in an attempt to estimate the population size of bears in the park. As part of this project, hair snares were placed throughout the park to collect black bear hair. Once collected, hair samples could undergo genetic analysis to identify individual bears. Using this method, we are able to estimate the population size of black bears in the park. The second project concentrated on learning about the distribution and denning habits of black bears. As part of this project, 10 bears were captured and fitted with GPS collars that collected their location once every hour for 2 years. Using this data, we are able to determine if captured bears den in the park, if they stay in the park or leave the park throughout the year, what habitat they are using, and what is their home range.



General area used by Black Bears in 2012 and 2013. Map by Sean Mohren.

Why is this important?

Black bears have resided within Crater Lake National Park since before the park was established yet there is no scientific data available about which areas and habitats the bears use or prefer, how much time they spend within and outside of the park, and where they den. Having a basic understanding of the ecology of the species that occur in the park is vital to ensure the NPS understands the effects of our management activities. In addition, The Oregon Department of Fish and Wildlife would like to know how black bears utilize the landscape around the park to better inform them of the potential vulnerability of bears to harvest.

2013 Activities

Bear collars were set to automatically drop off the bears during the summer of 2013. Of the 10 bears collared, 9 collars have been recovered. The remaining collar is on a black bear that entered its den in mid-November in the southern portion of the park. Attempts to collect its collar will occur next spring. The blue line in the image above reflects the general area the 9 bears were utilizing.

Project Summary/Future Work

In 2012, Emeritus Professor T. Luke George from Humboldt State University worked with the wildlife team to finalize the hair snare portion of this effort. In his final report, it was estimated that the park supported 41 black bears with a possible range of 31 to 72 bears. A final report and scientific publication on the telemetry project is suspected to be completed in 2014. Preliminary analysis suggests black bear den within park boundaries. Females appear to have much smaller home ranges than males. Both female and male bears wander beyond the Crater Lake National Park boundary, however, females tended to stay close to the park while males traveled long distances away from the park.



Pika Occupancy Research Project

Background

The American pika, a small mammal related to rabbits and hares, occur in rocky environments and are largely restricted to boulder-strewn talus fields and slopes where abundant crevices and cavities provide sufficient cover. Beginning in 2010, Crater Lake National Park was one of 8 National Park units in the western United States that began working on the “Pikas in Peril” project (see link below) which was being spearheaded by the NPS Upper Columbia Basin Inventory & Monitoring Network. As part of this project, a standardized protocol was developed for surveying pika populations. Each of the park units implemented this protocol so results could be compared across the region. In addition, genetic samples were collected to measure gene flow and model the connectivity of pika populations at five of the eight park units that are participating in this project. This year marked the fourth season of sampling pika populations and the goal of the project is to sample for one more year (five years total).



Pika photographed by Sara Hansen

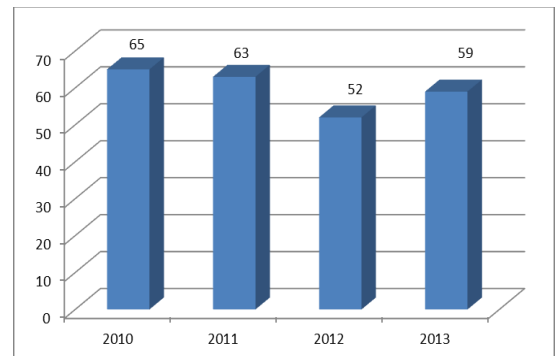
Why is this important?

Initially, the National Park Service Climate Change Response Program funded this project to address questions regarding the vulnerability of the American pika to future climate change scenarios projected for the western United States. Pikas are extremely sensitive to heat stress and are generally restricted to higher elevations. Recently, localized extirpations of the species have been documented in isolated mountain ranges of the Great Basin. It is thought that the cause of the extirpations is increased warming resulting from accelerated climate change, and given the current predictions of climate change over the next century, the risk of extinction is now considerable. If you have spent any time around the caldera of Crater Lake you have probably

observed one of these species. Pika are currently abundant along the talus slopes of the park and are a major food source for a diversity of species that live in the park such as coyote, pine marten, weasels, birds of prey, bobcats, and fox. If temperatures rise as predicted by climate change scenarios this could mean a decrease or extirpation of the pika population in the park which could then result in a decrease or even loss of many of these other species.

2013 Activities

The wildlife team sampled 100 locations covering the majority of talus habitat in the park. Most locations were visited one time, however 40% of these locations were visited twice to help determine our accuracy in detecting pika. Based on 2013 data, we estimate the occupancy rate to be 59%. This means that within the area sampled, if you were to randomly pick a site you would have a 59% chance of finding a pika. Results for all four years of sampling are provided in the figure to the left.



Occupancy rates for pika at Crater Lake National Park

Project Summary/Future Work

This occupancy study is slated to last 5 years with 2014 being the final year of sampling. Once complete the wildlife staff will work with the Upper Columbia Basin Network and other contributing parks to develop a report that discusses our findings. More information about the Pikas in Peril project can be found at: http://science.nature.nps.gov/im/units/ucbn/monitor/pikas_in_peril.cfm.



Rim Drive Rehabilitation Revegetation Project



Crumbling pavement edge on West Rim Drive (left); collecting seed for revegetation of areas to be disturbed by the Rim Drive Rehabilitation project (center left, center right, right).
Photos by Kathryn Williams.

Background

The Rim Drive Rehabilitation project proposes to reconstruct and/or repave West and East Rim Drives starting in 2015. This project will cause ground disturbance along many sections of road by obliterating unofficial pullouts and realigning segments of road that are falling into the caldera. Rare plant species will be impacted by this project, including the third-largest known population of the Crater Lake rockcress (*Boechera horizontalis*).

Why is this important?

Rim Drive is a popular park road, providing access to the caldera rim during the summer months. The condition of the road is poor in many places, which jeopardizes the safety of road users. Without correcting these deficiencies, the road will further deteriorate and fall into disrepair.

2013 Activities

Three botanical technicians (Kathryn Williams, Susie Roe-Andersen, & Elena Thomas) with assistance from a LE Ranger (Paul Schauer) were charged with completing field efforts for this project. They developed revegetation prescriptions for each area of proposed disturbance along West and portions of East Rim Drives and collected seed to revegetate these areas. Additionally, surveys for rare and invasive plants and five-needle pines (whitebark and western white pine) were conducted along the project area. All invasive plants encountered were removed. Specific revegetation prescriptions were developed for 8.3 acres of disturbance within the project area. Rare and sensitive plant surveys found 3 new Mt. Shasta Arnica (*Arnica viscosa*) plants and 228 five-needle pines within the project area; impacts to these will be mitigated when feasible. Seeds were collected to support revegetation efforts – including ones from the Crater Lake rockcress population that will be impacted. A total of 1,935 invasive plants was removed from the project area.

Project Summary/Future Work

This was the first of a multi-year effort to mitigate impacts to rim vegetation and soils from the Rim Drive Rehabilitation project. Efforts in 2014 will continue to prepare for the project by collecting seed for customized seed mixes used to revegetate specific areas and for plant propagation. Starting in 2015, areas disturbed by the project will be seeded and planted with site-specific native materials and revegetated areas will be watered and monitored for invasive plant establishment. This will continue into 2016 and 2017. Salvage and transplant of rare and sensitive plant species will occur as feasible. Revegetation efforts will be monitored for their success and any follow-up planting and/or seeding will occur in 2017 and 2018 to help ensure the recovery of impacted areas. Invasive plants will be controlled within the project area two years prior to, during, and two years after the project.



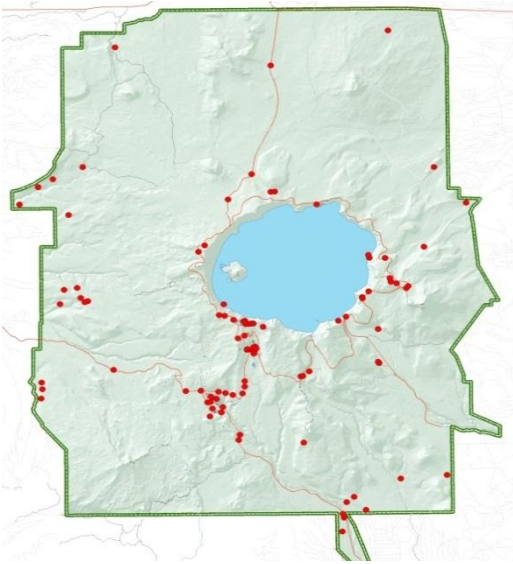
Incidental Wildlife Observations

Background

In general, the Terrestrial Branch base funding supports the Terrestrial Ecologist and one seasonal technician that are dedicated to the wildlife program. In 2013, we were able to have 2 seasonal wildlife technicians because we received project funds that helped support our botanical program. Wildlife staff is dedicated to completing many of the projects described in this document so very little time can be committed to general species inventories. Taking advantage of the fact that NPS employees from other divisions spend much of their time in the outdoors, and the park has ~500,000 visitors traveling through the park each year, this gives us the opportunity to record wildlife observations in areas that our core staff may not have time to inventory.

Why is this important?

Incidental observations of wildlife are an extremely valuable piece of information that can be used to help inform many of the tasks the wildlife team takes responsibility for as part of our program. Incidental observations, especially when accompanied with pictures, can be used to help update park species lists, inform the sampling design of species specific projects, and can draw concern about species that may be disappearing from the park. However, care needs to be taken on how we use observational data. For example, if I were to say to you as of 2013 I have 234 observations of species X in Oregon then would it be safe to assume this species is present in Oregon? If you answered yes then you believe Big Foot has been observed in Oregon!!! As another example, do wolves occur in Crater Lake? There have been multiple sightings over the years however many (not all) have been shown to be dogs or coyotes.



2013 Incidental Wildlife Observations

2013 Activities

In fiscal year 2013, we received 106 incidental observations of 32 species from NPS staff (78%) and the public (22%). Species observed included:

Birds: American Dipper, Bald Eagle, Barred Owl, Black-backed Woodpeckers, Dark-Eyed Junco, Great Blue Heron, Great Gray Owl, Kestrel, Northern Goshawk, Osprey, Peregrine Falcon, Pileated Woodpecker, Sooty Grouse, Sapsucker, and White-headed Woodpecker

Mammals: Badgers, Black Bear, Broad Footed Mole, Coyote, Mule Deer, Muskrat, Pacific Fisher, Pika, Pine Marten, Porcupine, Red Fox, and Marmot.

Insects: Brushfoot Butterfly. **Reptiles:** Garter Snake, Northern Alligator Lizard, and Tree Frogs

Project Summary/Future Work

The collection of incidental observations has varied over the years and many of the observations are currently in hardcopy format. This winter we will convert the historic data into a digital format which will give us the opportunity to track this information over time. We will also continue to urge the park staff and the park visitors to submit wildlife observations throughout the summer and winter.



Resource Advisor Program



Greg Funderburk sizes up the Snowy fire (left), photo by Jen Beck. The CRLA fire crew suppressing the Snowy fire (center), photo by Greg Funderburk. Lightning scar on a red fir tree within the Fisher fire, photo by Jen Beck.

Background

Crater Lake receives an average of 13 lightning-ignited fires every year. While a select few are allowed to grow in size as fires managed for multiple objectives including restoring fire as an ecosystem process, the vast majority of fires are suppressed. It is typical to bring in outside resources (e.g., fire crews, engines, water tenders, helicopters) to assist with managing park fires. These outside resources may have little knowledge of park ecosystems, sensitive resources, and light-on-the-land tactics. The Resource Advisor (READ) program provides a direct link between fire and resource managers to incorporate resource management concerns into fire management activities.

Why is this important?

The park contains many threatened, endangered, or otherwise rare species and their habitat along with sensitive cultural resources and wetland and meadow habitat. Fire is a necessary and vital force shaping park landscapes and restoring and maintaining ecosystem health. Providing fire managers with current and relevant site-specific information is essential to mitigate impacts of fire suppression/control activities and allow management to occur in an informed fashion.

2013 Activities

The park experienced 18 lightning-ignited fires in 2013. The park received approval to manage lightning-ignited fires on September 3rd, and decided to manage the Bear, Marmot, and Porcupine fires to achieve resource management objectives. However, early-season storms put a damper on fire behavior, and the largest of the three fires attained only 2.1 acres in size.

Project Summary/Future Work

READs assist with fire management activities by delivering briefings to outside resources; creating maps of sensitive resources in relation to fire locations; assisting with planning and objective-setting for wildland fire management; approving locations of spike camps, helispots, and fireline; communicating resource concerns to fireline leadership; ensuring rehabilitation of firelines and fire suppression activities; and, most importantly, providing support to fire staff in managing wildland fire, which is one of the most important and powerful management tools available for restoring and maintaining ecosystem health.



Other Projects

In addition to the projects listed in this report the Terrestrial Branch worked on a variety of additional tasks and projects. Below is a list of those items and if you are interested in learning more about any of the project listed here or above please contact the park Botanist, Jen Beck at 541-594-3072 or our Terrestrial Ecologist, Sean Mohren at 541-594-3074.

- A pilot study testing out the feasibility of using acoustic sound stations to help samples spotted owls within the park.
- Review of unique vegetation communities to determine the need for potential restoration. Areas surveyed this year included a large aspen stand and a small white oak stand on the west site of the park and a hemlock encroachment site at Williams Crater.
- Multiple rehabilitation projects to repair damage caused by visitors at Pumice Desert.
- Contributing to park outreach efforts by participating in casual conversations (whitebark pine, black bear, coyote, pika, and invasive plants), presenting at the Climate Change for Educators workshop (whitebark pine), assisting in educating interpretive staff about wildlife species and botanical issues, and helping develop materials for the Interpretation Division's educational programs. Additionally, our whitebark pine conservation program received media attention with a nationally-syndicated Associated Press newspaper article and a live radio interview with our Botanist for Jefferson Public Radio's Jefferson Exchange program.
- Working with the USFWS to inventory areas of the park for the rare Leona's Little Blue Butterfly.
- Assisting an Oregon Institute of Technology student with a LIDAR project focused on detecting spotted owl habitat.
- Monitoring Peregrine Falcon and Bald Eagle historic nesting locations within the caldera.
- Contributed to the planning team in charge of managing the rock fall mitigation project that is occurring along Rim Drive.
- Assisted the Klamath Inventory and Monitoring Network with a variety of projects that were implemented in the park in 2013 including: Landbird Monitoring, Vegetation Monitoring, Vegetation Mapping, Lake Monitoring, Whitebark Pine Monitoring, and Invasive Plant Species Monitoring.
- Surveyed for a rare grass called *Calamagrostis tweedyi* or Tweedy's reedgrass.



The Terrestrial Branch 2013 Natural Resource Team



From left to right. Front: Elena Thomas and Jeff Murphy. **Middle:** Melody Frederic. **Back:** Sara Hansen, Susie Roe-Andersen, Jen Beck, Kathryn Williams, Sean Mohren. **Inset photo:** Paul Schauer.

We would like to personally thank the terrestrial ecology seasonal employees for all the work you accomplished during the 2013 season. This report only highlights our major projects and does not come close to describing everything you have done for us this year. Your hard work, dedication, and passion for the protection and understanding of natural resources at Crater Lake are very much appreciated and we look forward to having you return next year.

We would also like to thank many of the staff members from other divisions who have been a great help to us this year. We are thankful to Maintenance, Interpretation, and Visitor & Resource Protection divisions for working with us when natural resource-related issues occurred, reporting wildlife and invasive plant sightings, volunteering to assist with our projects, and helping us protect our natural resources through many of your actions (e.g., educating park visitors about natural resource issues; fencing the sewage ponds; reporting vehicle/animal accidents; enforcing park regulations; avoiding nesting birds, sensitive plants, and invasive plants during maintenance activities; funding wildlife staff to help with hazard tree reduction; and many more).