

## **Geos Institute Final Report to the USFWS**

September 19, 2014

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USFWS Agreement #: F13AP00562

2. Date of Report: Sep. 19, 2014

Grant Period: Aug. 27, 2013 to June 30, 2014

### Project Accomplishments:

(a) **WORKSHOP** – The Geos Institute, Society for Conservation Biology (Humboldt State Chapter), and the Environmental Protection Information Center (EPIC), with support from North Pacific Landscape Conservation Cooperative and California Landscape Cooperative hosted a workshop and a field trip September 7-8, 2013 at Humboldt State University. This project:

- brought together scientists and land managers with expertise in redwood ecosystems
- evaluated the leading science on stressors to redwoods, including climate change
- identified and prioritized adaptation strategies for increasing the resilience of redwood ecosystems

More than 40 participants attended the workshop from diverse groups, including the Redwood National and State Parks, BLM, Forest Service, university researchers, tribes, conservation groups, local decision makers, and private landowners. Prior to the workshop, we compiled a climate change science assessment that reviewed the current status of redwoods and the state of our knowledge on climate change specific to this ecoregion. This background document provided participants with a better understanding of current and future trends in redwood distribution. It presented a launching point for the discussions on current and future trends throughout the range of redwood forests.

The workshop was organized to spur discussion on overall adaptation strategies for the redwoods ecoregion. Participants discussed three potential approaches – managing for resilience, resistance, and transition. All three approaches are appropriate in the context

of redwood forest ecosystems, but at different times and in different locations throughout the range. Workshop participants were asked to organize and prioritize adaptation strategies based on the collective understanding of the ongoing stressors to the redwoods ecosystem, climate change trends that have already been documented, expected future climate change projections, and potential management outcomes.

Geos Institute and NP LCC scientists helped to take notes and document the results that came from the group. A report summarizing the output was compiled and sent back out to the participants for comments. A web page was set up on the Geos Institute site, allowing participants to access background materials, review the workshop summary, and get additional information. <http://www.geosinstitute.org/climatewise-program/completed-projects/1042-managing-coast-redwoods-for-resilience-in-a-changing-climate.html>

Following the workshop was a field trip that allowed participants to have a gain a better understanding of the ecological and logistical issues involved with managing coast redwood forests for resilience. We learned about the management history of the redwoods region, the diverse challenges of conservation, and some recent breakthroughs in management techniques that are promising for future efforts. The field trip was an important on-the-ground experience that reminded participants of the complexities of on-the-ground management and how this does not always align with the intentions of documented strategies for a variety of reasons.

(b) MANUSCRIPT – The information from the science assessment and workshop output were combined and drafted into a manuscript entitled “Managing an Ancient Ecosystem for a Modern World: Redwoods and Climate Change”, which is currently in white paper format and is going through internal review with the USGS. This manuscript was a team effort by Marni Koopman and Dominick DellaSala, Geos Institute; Phil van Mantgem, USGS; Ben Blom and David LaFever, BLM; Joe Seney and Jason Teraoka, NPS; and Robert Shearer, Humboldt State University. We decided on producing a white paper rather than a peer reviewed journal article because much of the information that was collected – workshop output from diverse participants – was based on their experience and personal knowledge but was not scientific data per se. Also, because there was a diversity of opinions that needed to all be represented and documented in the output, the paper has some long tables that we felt were important to retain intact. It was unlikely that a journal editor would allow that level of detail. We may be able to publish a subset of the information at a later date.

The manuscript includes information on climate change trends in the region, an overview of resistance, resilience, and transition strategies for redwoods, and more in depth discussion of those resilience strategies that were identified by the group as highest priority. We completed additional spatial analysis to determine the future viability of redwood across the landscape and to inform restoration placement and approach. Land managers and conservation groups throughout the Coast Redwood ecoregion can use the information in the manuscript to prioritize adaptation strategies specific to their area and to build upon the lessons that have been learned in others areas, specific to restoration technique and reducing overall stressors to redwood ecosystems.

(c) WEBINAR – Key findings of this work were disseminated through a webinar sponsored by the U.S. Fish & Wildlife Service North Pacific and California Landscape Conservation Cooperatives, and attended by more than 50 viewers.

<http://californialcc.org/webinars/managing-coast-redwoods-resilience-and-adaptation-changing-climate>

(d) OUTREACH – The manuscript is going through USGS review. Once it has been reviewed and any issues addressed, it will be posted on [databasin.org](http://databasin.org), CAKE, CA Climate Commons, and the Geos Institute website to support continuing dialogue. It will also be sent back out to all of the workshop participants, and shared at future workshops as well.

(e) REPLICATION – We produced a rapid and cost-effective assessment of key science and management priorities related to adaptation planning in the southern terminus of the NPLCC. This assessment is in place, as well as the output from the workshop, and needs to be built upon to further this work. We have a database now with the names and contact information for many of the people and organizations that need to be involved in future efforts. We heard from numerous participants about how valuable it was to have a venue where they can exchange information in a low-stress environment and start to build new avenues of communication and integrated planning. A second set of workshops and field trips might pick up where this group and where the resulting manuscript left off, and begin to coordinate and share information across the region. A follow-up field trip in redwood forests managed for harvest could be highly informative.

(f) LESSONS LEARNED – The manuscript contains information that was collected from across a wide variety of managers, researchers, and conservation groups throughout the region. We compiled information on climate change, stressors, and restoration techniques from workshop participants, proceedings from other workshops, scientific literature, and other white papers. Managers and scientists were also able to share information directly with one another at the workshop, shaping the strategies for adaptation that were collaboratively developed during that process.

3. Delays and problems: Spatial data for the entire range of the redwoods is incomplete because of a lack of information about the status of redwood forests on private lands. Some groups have spatial datasets that cannot be shared but which include private lands information. Workshop participants communicated that range-wide coordination and information sharing is a high priority, but efforts by the Geos Institute to begin to compile range-wide information came up short due to land ownership and data sharing issues. This lack of information on age class, past management applications, current status, and future land use options makes it difficult to impossible to move forward on regional planning. Additional workshops to engage private landowners in climate change adaptation are incredibly important as an outreach tool to increase information sharing and coordination.

We were able to compile spatial information for a subset of the redwoods range that has high public ownership. This mapping effort was included in the white paper. Similar mapping, for the entire range, that shows old growth stands, areas prioritized for restoration, vegetation stability through this century, and potential areas of connectivity is vital to inform regional planning that increases resilience across redwood forests. Continued efforts to gain access to spatial data and make it available to all interested parties would greatly benefit the LCC's and their efforts to streamline climate change planning across the redwoods ecoregion.

4. Pertinent info regarding project results: The most important result of this work was likely the connections that were made. These connections are vital for continued coordination and communication throughout the region. We heard from many participants that the opportunity to talk to other managers, to have an avenue for communication between managers and scientists, and to share learning across conservation and harvest interests was extremely valuable. Building on new relationships and developing joint solutions to many of the region's ongoing issues are high priority next steps.

The second most important result of this work is the summary of science on climate change and redwood management issues and techniques into a single overview document that also provides some initial adaptation strategies that can be moved to implementation in many areas. This gives managers actionable recommendations, while further strategy development and coordination takes place.

The third most important result of this work is that it sets up an opportunity for further work, with a large body of support already behind it, increasing the likelihood of success. Development of regional coordination is a daunting task, yet highly supported by workshop participants of diverse backgrounds. Work needs to begin to coordinate for adaptation soon, so that the support is still there and the momentum can continue to grow. Participants identified a high priority need for a clearinghouse of information and support specific to the redwoods region, which fits well with the mission and goals of the NP LCC and the CA LCC.







