

Conservation of *Aechmophorus* Grebe Colonies at Six Northern California Lakes:
Semi-Annual Financial and Programmatic Report

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Submitted by:
Desiree Loggins,
Chapter Network Manager for Central Valley and Sierra
Audubon California
400 Capitol Mall, Suite 1535
Sacramento, California 95814
916-737-5707
dloggins@audubon.org

EXECUTIVE SUMMARY

March – September

Audubon California and Audubon chapters began this phase of the Grebe Conservation Project with a renewed focus on outreach and education around breeding Western and Clark's grebe (*Aechmophorus occidentalis*, and *A. Clarkii*) populations. This effort combines regional knowledge, five years of lessons learned, and genuine excitement for grebes and their habitat to carry out successful community engagement activities and ultimately increase the protection and breeding success of these species. In addition, chapters continue regular nesting surveys that add to historical breeding colony data. Disturbance from both human and non-human stressors, occurrence of nesting, and reproductive success are recorded and analyzed to track what events may prevent breeding grebe populations from growing to help adapt and improve conservation efforts. Notable highlights from the 2015 breeding season include the following:

A. Monitoring and Evaluation

The massive Rocky, Jerusalem, and Valley wildfires that severely burned significant portions of Lake County did not have a noticeable effect on breeding grebes, who arrived early June. Redbud Audubon Society monitors noted that the fires' smoke did not infiltrate the sky directly above the lake and therefore did not cause disturbance. Instead, disturbance from windstorms and flying predators proved to be the most relevant threat to grebe breeding success. Lessons learned from the first phase of the project are being strategically applied to ensure that these natural disturbances are counterbalanced with successful outreach and education to the public.

B. Outreach and Education

Plumas Audubon Society is integrating climate science, findings from the National Audubon Society's climate study, and grebe conservation science into a 5th grade "Bird Year" curriculum with the Plumas Unified School District. The curriculum is being piloted at one elementary school this academic year (2015-2016) and is expected to expand to all 5th grade classrooms in the following school year. This is a major win for grebe conservation as a generation of students will grow up learning about the species and its place in their community.

C. Colony Protection

Because this project has been sustained over years through generous support from the Luckenbach council, NOAA fisheries, and the National Fish and Wildlife Foundation (NFWF) strong partnerships have developed between Redbud Audubon Society and Lake County Department of Water Resources (DWR). In previous years the grebe grant provided reimbursement for time and supplies spent carrying out protection measures like distributing speed limit buoys during nesting season; but due to Phase II grant budget constraints, Lake County DWR has donated time and supplies to continue colony protection measures for breeding grebe colonies. This is an example of the work from this project being successfully adopted by local agencies.

Additionally, resources like education templates and protocols have been uploaded to Audubon's SharePoint platform AudubonWorks so that chapters throughout the national network may access tested tools that make sensitive species conservation accessible and sustainable. Continued below, this Semi-Annual Report for March – September 2015 summarizes the activities, findings, and outcomes from the beginnings of this project phase.

INTRODUCTION

Western and Clark's grebe (*Aechmophorus*) are charismatic members of California's diverse migratory waterbird population. Audubon recognizes the grebes as residents of several Important Bird Areas (IBAs) and as a Climate Endangered species¹. Their breeding success is an important indicator for the overall health of California's northern lakes which are coveted by breeding grebes and human recreationalists alike. *Aechmophorus* grebes are diving specialists that breed at the shallow margins of large lakes and forage in open water. Audubon California, in partnership with Redbud, Plumas, and Altacal chapters set a long-term goal of protecting and improving grebe reproductive success at six intermountain lakes through outreach and education, monitoring and evaluation, and colony protection. The study area includes Eagle Lake, Lake Almanor, Clear Lake, Thermalito Afterbay, Lake Davis, and Antelope Lake which serve as nesting sites for 76 percent of the total nesting *Aechmophorus* grebes in California (Ivey 2004). This report presents the results of the monitoring and outreach efforts for the 2015 breeding season, as well as highlights from some of the major conservation milestones that have been accomplished by our team with the generous support of the Council, NOAA, and NFWF.

METHODS

This *Aechmophorus* grebe survey protocol described below was used by the Grebe Conservation Project to study and monitor grebes nesting in Northern California on Clear, Eagle, Almanor, Davis, and Antelope Lakes, as well as the Thermalito Afterbay. While public outreach and education is the primary goal of this project, these surveys allow the chapters to not only continue to add to a growing data set on these species but also to better tailor their outreach and education efforts real-time in response to the results they are seeing.

The protocol was based on Gericke, et al. (2006) and has been modified based on our experiences on the lakes during the last five breeding seasons.

Monitoring and survey efforts were categorized as follows: nest initiation surveys, nest monitoring surveys, abandoned nest surveys, disturbance surveys, population surveys, and brood surveys.

Nest Initiation Surveys

Weekly nest initiation surveys were conducted from the shore using binoculars and spotting scopes and from the lake by canoe and kayak. Nest initiations vary by lake and ranged from May through August.

Nest Monitoring Surveys

Discrete nesting areas were described as colonies and defined as a grouping of grebe nests at least 400 meters from other grebe nests. Colonies were mapped from shore using kayaks and boats. On Clear Lake,



Fig. 1. American Coot (*Fulica americana*) charging a grebe caught by Clear Lake wildlife cameras. The two waterbirds usually coexist without issue.

¹ The National Audubon Society identifies birds as climate endangered when a species is projected to lose more than 50 percent of their current range by 2050 if global warming continues at its current pace.

each nest was classified as either a “shore nest” if built among emergent macrophytic vegetation near the shore or an “open water nest” if placed in open water greater than 1 meter from emergent vegetation. For colonies located in open water, the maximum distances for the nests from the shore or emergent vegetation was measured using a laser range finder or GPS unit.

Nest counts on Lake Almanor were conducted from strategic observation points around colonies. Nest monitoring was conducted before noon whenever possible. Data collected included a count of all nests determined to be active using factors such as size, nest cup, nest completeness, and presence of an incubating adult or eggs. A nest which lacks these characteristics was considered under construction or abandoned. If applicable, an egg count was recorded.

Disturbance Surveys

Disturbance index surveys performed by chapters accounted for the potential and actual effects of natural stresses on grebe colonies and human disturbance pressure. Specific measurable events include avian and mammalian predation, wind disturbance, water level fluctuation and various types of human disturbance.

A disturbance was defined as an action causing a grebe to noticeably alter its behavior. Weekly disturbance and potential disturbance surveys were conducted once nesting began. [At Clear Lake we limited nest disturbance surveys to periods when eggs were present; we also conducted surveys for periods as short as 15 minutes] These were done at random times of day and week.

Colonies would be observed for more than an hour to quantify the disturbance and grebe response.

Population and Brood Surveys

Population counts and brood surveys were conducted by motor boat, canoe, or kayak depending on lake size. Brood surveys start after young were first observed on a lake and were repeated 1-2 times a month until the beginning of October. Population counts required at least two surveyors, one data recorder, and one boat driver, while population/brood counts were conducted with four observers, two recorders, and one boat driver. Clarks and Western grebes were distinguished when possible and otherwise counted as *Aechmophorus*.

Grebe young were categorized by size as or full sized compared to adults. The survey route was tracked with GPS and the start and endpoints of transects were marked as GPS waypoints. The ratio of young to adult grebes was calculated per transect and averaged across transects to determine an average ratio for a lake. Population counts were conducted during brood surveys to obtain a census of the entire grebe population on the lake.

Water Level Monitoring

An important component of both the Plumas and Altacal monitoring and outreach was determining how the management of water levels on artificial reservoirs affects nesting grebes.



Fig. 2. An American Crow (*Corvus brachyrhynchos*) eating grebe eggs from an abandoned nest.

Wildlife Cameras

The most accurate and effective way of monitoring individual nest successes, disturbance, and predation was to use wildlife cameras to monitor individual nests. Observations were reported from three cameras at the Plumas lakes and three cameras at Clear Lake.

Data Management

Data sheets were scanned as PDF's for archival records. Microsoft Excel was used to tabulate data.

RESULTS

The team is on track to accomplish major project deliverables through a commitment to collaboration, conservation, and community. Audubon California staff were responsible for budget tracking assistance, reporting, and managing funding to ensure that the overall project needs were met. The Redbud, Altacal, and Plumas Audubon chapters led project deliverables including public outreach and education and monitoring and evaluation at study sites utilizing citizen scientists. Notable progress is detailed below.

Public Outreach and Education

Grebe outreach and education for adults and children increased local knowledge about this species. Engagement tools used targeted each community's love of recreating in nature and learning new things. Outreach and education is valuable not only for direct conservation but for building future generations' respect and understanding of the species

Plumas Audubon – Lake Almanor, Antelope, Eagle, and Davis Lakes

- Plumas Audubon hosted outreach and education tables at six events: Plumas Children's Council Fair, California Sister's Pat Hull Concert, Plumas District Hospital's Autumn Fitness Festival, Plumas National Forest's Kid's Fishing Derby, Plumas Arts presents Wild and Scenic Film Festival, and Plumas National Forest's Fall Fest. The chapter distributed grebe brochures, and displayed pictures and general information about Western and Clark's Grebes. Much attention was paid to a life sized wooden grebe sculpture and a birds and climate change display with information on the predicted range changes for grebes. 275 individuals came to the booths to learn about grebes and their conservation.
- The chapter led 6 field trips focused on grebes including a tour of Antelope Lake where 14 participants learned about grebes and were able to participate in a monitoring survey.
- Plumas Audubon's education coordinator gave several presentations on grebes at multiple schools and two Audubon chapters: Yosemite Area Audubon and Lahontan Audubon society in Reno.



Fig. 3. Feather River College students on grebe tour at Lake Almanor.

- The chapter is working with Plumas Unified School District to develop a curriculum for a 5th grade “Bird Year” that is being piloted at one elementary school this academic year. It is expected to expand the following year to all 5th grade classes. Additionally, the chapter is working with Plumas Charter School to develop a bird and climate change unit with science teachers that highlights Western and Clark’s grebe, two species with climate endangered status.
- Six student interns are being mentored from around the state by Plumas Audubon and are working with the chapter on grebe outreach and fieldwork.

Redbud Audubon – Clear Lake

- Redbud Audubon hosted Audubon California grebe staff on April 16 and provided a tour of Clear Lake and the colony protection measures the chapter put in place. The day was featured in a blog post that was shared on Audubon California’s Facebook page and website. The posting received over 700 ‘likes’ and comments. The piece can be found here: <http://ca.audubon.org/news/grebe-conservation-project-five-years-and-still-going-strong>
- Redbud operated a grebe exhibit booth at the Earth Day and Pear Festival community festivals, which receive up to 3,000 attendees each year. Redbud Audubon also conducted an annual two-day event called Heron Days where the chapter talked to 250 visitors about grebes and led boat tours where visitors witnessed the grebes elaborate courtship display. During these events, visitors could view the permanently installed interpretive signs at local public parks that provide an overview of grebes and their breeding habits.
- Redbud Audubon gave a successful presentation at Lower Lake Magnet School to 50 engaged 4th-grade students. The presentation lead to a 25 minute discussion sparked by students about grebes in Lake County. The students have an entire unit of study based on the grebes of Clear Lake due to Redbud’s outreach. Students watch a video created by the project’s surveyor on breeding season, visit the lake to observe the bird, and used the five years of grebe data in a math assignment that makes future numerical projections. Students also developed their own public service announcement on how young people can protect grebes.



Fig. 4. Marilyn Waits, Grebe Team leader at Redbud Audubon standing next to interpretive grebe sign at Clear Lake bathroom.

Altacal Audubon – Thermalito Afterbay

- Altacal Audubon focused on keeping the project sustainable by uploading all grebe project protocol and tools onto OneDrive specifically for the chapter. The files can now be easily accessed by current and future chapter volunteers for the grebe project and other conservation efforts. This creates a historical record that will allow Altacal to continue this project even as volunteers change and provides resources for other chapters to borrow from.
- The chapter used their annual Snow Goose Festival, which is attended by over nine hundred visitors, to recruit project volunteers and spread the word about grebe colony vulnerabilities and behavior.
- Altacal Audubon led a nest building activity there that attracted and engaged many individuals at their outreach exhibit. They created a game where participants build their own floating grebe nest in water using grass and moss. Disturbances are modeled on their nests to demonstrate how

grebes are vulnerable to wake and predators, teaching the public how to protect this vulnerable species

- Two classroom presentations were given at a high school and community college reaching fifty students.
- The chapter manned a grebe outreach booth at five community festivals including the Endangered Species Fair in Bidwell Park.
- To allow people a firsthand and personal experience with the species, Altacal hosted a “Meet the Grebes” paddle event where the chapter took visitors out on the waterway to get a close look at grebe courtship displays. This type of direct experience and interaction with grebes creates a lasting memory of the species and the conservation efforts around the bird.



Fig. 5. Visitors at the Thermalito Afterbay display their grebe body art.

Seasonal Breeding Colony Protection

In conjunction with outreach, education, and monitoring, active colony protection is essential to maintaining the viability of these sensitive species until drought management practices better account for the habitat needs of breeding bird populations. Likewise, understanding colonial trends will enable us to get a better sense of what limits and enhances breeding success over time.

Plumas Audubon

- Plumas Audubon is integrating grebe related climate science and range projections from the National Audubon Society’s climate study into their outreach and education to demonstrate the importance of Lake Almanor to breeding grebe populations. This outreach and education effort teaches the public that Lake Almanor is an Important Bird Area (IBA) that could serve as a refuge for grebes. The goal is that this knowledge produces long term effects that ensure Lake Almanor’s breeding grebes are watched over and kept from disturbance as they gradually lose historic breeding areas due to changes in climate.

Redbud Audubon

- Redbud volunteers continue to work with the local Sea Scouts troop to continue their regular monitoring of 19 fishing line recycle bins installed by the chapter at local parks and shoreline resorts where grebes are found. Tangled fishing line, a hazard to diving birds, is sent to a plastic recycling manufacturer.
- Lake County DWR provides pro bono staff to place speed limit buoys around breeding grebe colonies to shield the birds from wave disturbance from recreational vehicles.

Altacal Audubon

- Altacal reported that a large colony of White-faced Ibis nested on top of the grebe colony at the Thermalito Afterbay. Similar to the 2014 White-faced Ibis event, the birds did not appear to harm or disturb nesting grebes. The relationship continues to be monitored so that potential disturbances can be prepared for.

Monitoring and Evaluation

Monitoring and evaluation data assists in measuring the success of our project and also allows us to adapt our conservation strategies to address the most important threats. Consistent monitoring is critical for

clear understanding of changes in grebe breeding populations. This data allows us to work with stakeholders to help make management decisions about how to protect breeding grebes at our study sites and along the Pacific Flyway.

Plumas Audubon – Lake Almanor, Antelope, Eagle, and Davis Lakes.

- Plumas Audubon Society found that the total number of grebes on each lake has been comparable to previous years, but reproduction was lower on all lakes this year compared to last years.
- On Lake Almanor, the rate of drop in water surface elevation was the second fastest of the last six years and reproduction fit the historic trend line, corroborating the strong relationship between rate of water level drop and reproductive success. One of the reasons for low rate of nesting success was the number of storms with high wind in July. These storms caused nests to deteriorate, become detached and float away. Brood surveys

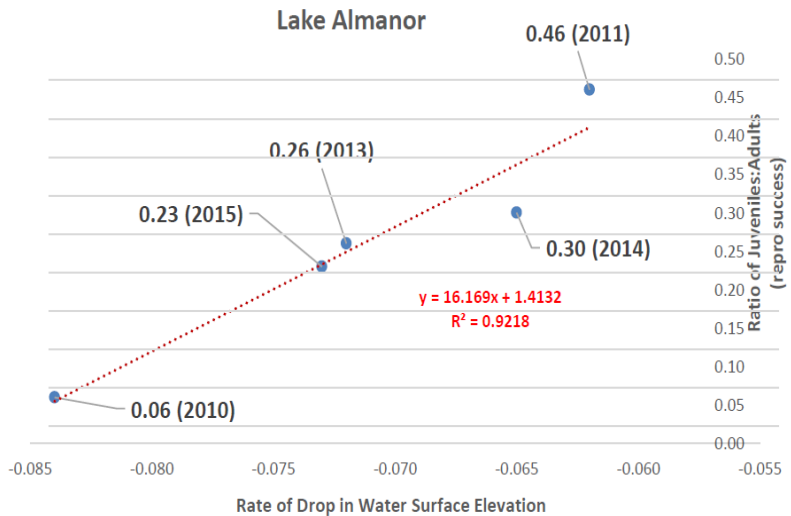


Fig. 6. Rate of drop in water surface elevation related to reproductive success (ratio of juvs:adults) at Lake Almanor, 2010-2015 (2012 excluded due to effect of Chips Fire).

demonstrated an adult: juvenile ratio of 0.23 which is the third lowest reproductive rate observed in the last six years despite there being 7,743 total adults at Lake Almanor.

- The three other lakes had no successful reproduction. Storms and high egg depredation by gulls were well documented on motion sensitive nest cameras and could have prevented successful reproduction.
- At Antelope Lake, water levels were slightly higher than last year. At its peak there were 13 nests in the colony. Unfortunately, none were successful.
- Lake Davis water levels were lower this year than in the past three years, but there were more nests than previously observed. Most of which were in open water as the preferred emergent vegetation was not available. Again, high winds may have prevented successful nesting.
- Eagle Lake’s water levels dropped lower than ever recorded in the last 140 years. The lack of viable habitat prevented nesting.

Redbud Audubon – Clear Lake

- Reproductive effort and success in 2015 were the lowest Clear Lake surveyors have observed since the study began in 2010. This seems to be due to high rates of nest abandonment, presumably from insufficient food in the lake, and nest destruction from wind.
- Redbud Audubon’s 2015 surveys found 888 nests in 21 colonies at Clear Lake. This low nest count follows the 2014 high count of almost 6,000 nests. 59.4 percent of this year’s nests were attended by Western Grebes and 40.6 percent by Clark’s Grebes. Nearly all nests were in

northern arm of the lake and 96 percent were open water nests. These nests are more vulnerable to predation and disturbance as they are not shielded by emergent vegetation.

- Birds and other wildlife created the most disturbance. A Great Blue Heron was documented displacing a grebe pair from their nest. Human disturbance by canoe was documented only once via a nesting camera. Curiously, many nests were abandoned without disturbance being recorded. This could be due to weather. Nest cameras documented over a hundred nests with eggs being blown ashore by strong winds in July.
- The motion-activated nest cameras provided valuable insight into breeding grebe behavior and documented events uncommon to this project. Redbud Audubon recorded footage of daytime and nighttime courtship, mating, egg laying, and the inadvertent destruction of eggs by a wave generated from a large Common Carp.

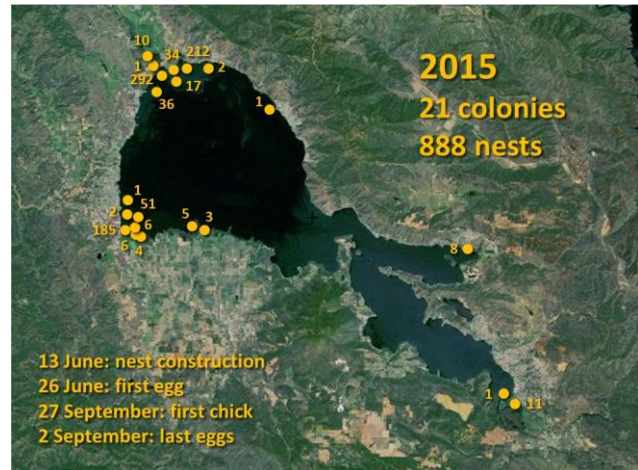


Fig. 7. Map of Clear Lake put together by grebe science lead Floyd Hayes of Redbud Audubon.

Altacal Audubon – Thermalito Afterbay

- Water levels at the Thermalito Afterbay were kept stable with the implementation of a 5 ft. water drop limitation by the DWR. This limit has been enforced most years since 2005, but Altacal Audubon continues to be in conversation with DWR to keep its implementation consistent through the years.
- At the height of the season in June, the Thermalito Afterbay saw 75 active nests and 39 eggs. However, only 7 of those nests were successful in producing chicks.

CONCLUSION

By engaging families and the curious public through festivals, field trips, classroom presentations and citizen science, the Grebe Conservation Project Team is able to defend grebes from potential human disturbance and support a community that cares about being stewards of the species. The deliverables outlined in the project's Scope of Work detail what steps our team must take to achieve the goal of protecting and promoting the breeding success of select grebe populations. To date, Audubon California and chapters have met most of those deliverables and will work to go beyond what was originally planned for this year while supporting current projects. Thanks to the support of the Luckenbach Council the team is able to move forward with strategic grebe conservation initiatives and add to the significant body of work around the species.

LITERATURE CITED

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