

***Aechmophorus* Grebe Conservation Project
Almanor, Eagle, and Antelope Lakes**

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SUMMARY

In our tenth and final year of the Grebe Project Plumas Audubon Society staff and volunteers conducted a variety of outreach and education efforts including tabling at numerous events, giving school classroom presentations, and leading youth field trips.

We continued our monitoring efforts during the 2019 breeding season at Lake Almanor and observed the loss of an entire generation of *Aechmophorus* grebes on the lake for a second consecutive year. Eagle Lake reportedly had successful reproduction for the third consecutive year after a five-year breeding hiatus (2012-2016). Lake Davis also has successful reproduction. Reproductive success on Antelope Lake this year is unknown.

OUTREACH and EDUCATION

Plumas Audubon Society (PAS) staff and volunteers conducted a variety of grebe outreach and education efforts in 2019 including tabling, classroom presentations, and youth field trips. The information provided at these events included *Aechmophorus* grebe brochures, pictures of and general information about Western and Clark's Grebes, a wooden sculpture of a Western Grebe, a Birds and Climate Change display with information on the predicted range changes for *Aechmophorus* Grebes, and the grebe ring toss and grebe race games that were created by a few volunteers for last year's Grebe Festival.

Plumas Audubon tabled at a number of events this year at which we provided information on *Aechmophorus* grebes. In April, we sponsored and tabled (PAS is the sole tabler) at two small outdoor concerts hosted by the local native plant nursery, California Sister Nursery, with 25-100 attendees at each event. In between sets a PAS representative usually has the opportunity to address the audience and highlight the work we do including grebe conservation. In August, PAS tabled at a Town Talk

hosted by the Lake Almanor Chamber of Commerce and attended by 35. In September, we contributed to the People’s Climate Change event in Quincy, CA attended by approximately 100 community members. A Plumas Audubon staff member addressed the crowd to describe how climate change is affecting birds and PAS had a table with information on birds and climate change, specifically highlighting Western and Clark’s Grebes. Also in September, Plumas Audubon tabled at the annual Sierra Valley Art+Ag event which was visited by about 150 people.

Plumas Audubon also provided outreach in the form of public presentations. In March, Plumas Audubon participated in a community forum hosted by Feather River College entitled “Feather River Water Uses.” At this event Plumas Audubon shared the effects of hydroelectric power generation and how it has affected nesting *Aechmophorus* grebe colonies. In July, Plumas Audubon participated in the Eagle Lake Nature Program offering a presentation on *Aechmophorus* grebes and bird walk for families at Eagle Lake.

Plumas Audubon Society serves as the strategic partner for the Plumas Unified School District’s (PUSD) 5th grade “Year of the Bird” and provide grebe outreach through this role. In June, Plumas Audubon supported three “Big Day” fieldtrips for five 5th grade classes from three PUSD elementary schools. Two of these trips started their Big Days each at one of our study lakes, i.e. Lake Davis and Antelope Lake, where a total 60 students got a chance to see *Aechmophorus* grebes from shore.

Although Plumas Audubon did not have the budget to host the Grebe Festival again this year, we were invited to participate in a new festival, the Woodlands and Watershed Festival, hosted by Sierra Institute and the Lake Almanor Chamber of Commerce. PAS intended to provide three pontoon boat tours to see grebes and other birds up close on the lake, but unfortunately had to cancel due to budget constraints and poor birding on the lake at the time of the festival. We hope to try to participate in this festival in future years as we view this an important outreach opportunity.

SURVEYS and MONITORING

Due to a limited budget, Plumas Audubon chose to focus our survey efforts this year at Almanor where, based on our monitoring efforts from previous years, we consider humans to have the greatest potential to impact grebe breeding success, primarily through water level management.

2018 Survey Results

Table 1. Summary of adult counts, nests, and young on census surveyed lakes.

Lake	Peak # nests	Ave. adult census	Peak ratio juv:adults	Est. # young
Almanor	657	3797	0.0005	< 2 (1.9)
Davis	-	155	0.34	52

Lake Almanor

Breeding success at Almanor this year was the lowest of all study years at 0.0005 with only a single chick observed during a census survey on August 23, 2019. Breeding success is measured as a ratio of juvenile to adult birds. Peak nest numbers were similar to the first two years of this study (2010 and 2011), approximately a quarter of what the numbers were in peak years (2013-2015). The number of nests at Lake Almanor seem to somewhat correlated with whether there is nesting at Eagle Lake: the number of adult grebes and nests at Lake Almanor shot up from previous numbers during the same timeframe that Eagle Lake had zero nesting (2012-2016). Since then, in the last three years with Eagle Lake once again providing breeding habitat, numbers of adults and nests on Lake Almanor have dropped from those observed during previous peak years of 2013-2015 (see Plumas Audubon's 2016 Comprehensive Report).

Eagle Lake

In 2019 *Aechmophorus* grebes were reported to have been breeding at Eagle Lake for a third consecutive year after a five-year breeding hiatus (2012-2016) likely due to lack of breeding habitat from low water levels. Precipitation in Northern California the past several years brought Eagle Lake's water level back up to where tules could successfully grow and once again provide suitable nesting habitat for the grebes. An informal observation from a volunteer on Eagle Lake reported seeing over 1,500 adult *Aechmophorus* grebes on a portion of Eagle Lake and "all but a few pairs had two to three babies".

Lake Davis

Lake Davis also had successful breeding with an estimated 0.34 reproductive success ratio, as observed during a census survey on September 17, 2019. Nests were observed earlier in the season by the Game Warden on the north end of the lake. An opportunistic, volunteer census survey in mid-September found 155 adults and 52 young (likely all Western).

Antelope Lake

Reproductive success at Antelope this year is unknown as it was not monitored this year due to lack of funding.

Reproductive Success at Lake Almanor, 2019

Aechmophorus grebe reproduction was a complete failure at Lake Almanor again this year with the loss of an entire generation of *Aechmophorus* grebes for the second consecutive year. Breeding success in 2019 at Lake Almanor was 0.0005; the lowest we have seen in the ten-year history of this study.

Aechmophorus grebe nesting was only observed along Chester Meadows. Peak nesting occurred around July 31 at which point 657 active nests were observed in the colony (Figures 1 and 2). Eight days later the colony was found to have been entirely abandoned with many nests stranded on land and extensive egg depredation evident (Figures 3 and 4). No additional nesting attempts were observed after the colony abandonment in early August (Table 2).

Table 2. Colony Progression: Nest counts by colony at Lake Almanor in 2019.

Colony	27-Jun	13-Jul	22-Jul	31-Jul	9-Aug	15-Aug	23-Aug
Chester Meadows South	0	4	565	657	0	0	0
Chester Meadows North	0	0	0	0	0	0	0
Causeway	0	0	0	0	0	0	0
Goose Bay	0	0	-	0	0	0	0
Totals	0	4	565	657	0	0	0
North of Causeway	0	0	-	-	-	-	-

A full-lake census survey was conducted on August 23, 2019 in which 3,797 adult *Aechmophorus* grebes were counted, but only one young was reported to have been seen. The reproductive ratio of 0.0005 is the lowest we have seen on Almanor.



Figure 1. Photo looking northward at part of the Chester Meadows colony, observed near its peak on July 31, 2019. Photo credit: Teresa Arrate



Figure 2. Chester Meadows colony (Almanor) near its peak on July 31, 2019. Birds seen on the nests are Western and Clark's Grebes. Photo credit: Teresa Arrate



Figure 3. Chester Meadows colony (Almanor) after abandonment as observed on August 9, 2019. Birds on nests in this photo are Ring-billed Gulls which are known to depredate on grebe eggs. Photo credit: Teresa Arrate



Figure 4. Grebe egg shell on beached, abandoned nest, observed on August 1. Photo credit: Teresa Arrate

Water Management and Nest Success at Lake Almanor

The Chester Meadows colony was located over shallow water. On July 22, colony nests were located in less than 3 feet of water and by July 31 the nests were in less than 2 feet of water. On August 9, abandoned nests were found in 0-17 inches of water. Many nests were stranded on land while most still in water had 6-10 inches or less under them and few had 13-17 inches of water left under them.

During this time of active nesting (7/13/19-8/7/19) water elevation drop rate was, on average, -0.69 inches (-0.057 ft) per day. However, during the middle of the nesting period, July 24 through July 29, swift elevation drops averaging -1.04 inches/day were experienced (ranging from drops of -0.72 inches up to -1.2 inches in a given day). Water elevation dropped a total of 1.5 feet from the date of the first nests observed (July 13) to the day before colony abandonment was observed (August 7).

While other factors such as water surface elevation, wind, human disturbance, predation of eggs and adults, habitat availability, and fish prey population all influence *Aechmophorus* grebe population size, number of nests, and reproductive success to various degrees each year, the most important, consistent, and influential factor on *Aechmophorus* grebe reproductive success on Lake Almanor is the water level drop during their nesting period.

PG&E manages Almanor's water and finds the strategy of keeping water level drop rates below a recommended maximum rate nearly impossible with energy supply obligations and other operational constraints and complexities. Plumas Audubon Society and PG&E representatives have been discussing other management strategies to try to lessen the impact of water level changes to nesting grebes. These include:

- Filling Butt Reservoir with water directly from Almanor early in the season to mitigate Almanor water drops on high heat days later in the season.
 - This strategy was attempted this year, but alone, it was not effective.
- Dropping Almanor's water to a certain elevation before breeding season begins to promote breeding habitat and subsequent nesting colonies to occur in deeper water.
 - This strategy is based on the hypothesis that the grebe may be more vulnerable to water level drops in high water years when breeding habitat may be found in shallower parts of the lake.
- Creating a reservoir within the reservoir to hold water levels more stable.
 - This strategy is unfeasible.
- Creating artificial floating nest platforms per Riensche, et al. (2009).
 - This strategy is considered to have many associated challenges with the great numbers of birds and with boats on the lake. However, creating a dozen or so trial platforms as an experiment is considered a possibility if funding were available.
- Incorporating "water holding" events in water management in order to stabilize water elevation levels for 3-5 day periods during active nesting.
 - A management strategy that includes water holding events, such as those in 2017 (see 2017 report), during the grebe nesting season, may result in more consistent reproductive success on Almanor in the future. This strategy alone will not maximize the potential success of grebe reproduction on Lake Almanor as effectively as keeping the water level drop rates slow during active nesting. However, waves of breeding colonies may still be more likely to succeed with water holding events moderating the total water level drop during incubation periods. Regular water holding events (eg. at 3-5 week intervals for periods of 3-5 days) between June 25 and September 15 or "directed" water holding events (eg. 3-5 day periods of water stabilization once or twice during observed active or peak breeding, likely in late July or the month of August) may be a more feasible management strategy for PG&E to implement to benefit grebe conservation efforts at such an important breeding ground as Lake Almanor. "Directed" water holding events would require timely coordination between biologists actively monitoring grebe nesting with PG&E water managers who adjust the output volume from the lake.