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

July 1 - September 30, 2012

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Summary

The Plumas Audubon Society monitored grebe populations on Lake Almanor, Eagle Lake, Lake Davis, and Antelope Lake while continuing education and outreach efforts in Plumas, Lassen, and Sierra Counties. Grebe monitoring was conducted weekly at Lake Almanor and Eagle Lake and monthly at Lake Davis and Antelope Lake. We collected important data on population size, nesting locations, reproductive success, disturbance and other factors related to the conservation of these four grebe populations in northeastern California.

Outreach and education programs were conducted every week and reached numerous youth ranging in age from 4 to 15, as well as many adults in school districts throughout Plumas, Lassen, and Sierra counties. In addition, Plumas Audubon hosted the Audubon California Grebe Conservation Project annual conference in Chester, which included presentations on the monitoring results at each lake, an outreach and education workshop, and field trips to Lake Almanor and Eagle Lake.

Monitoring

The Plumas Audubon Society monitored grebe populations on Lake Almanor, Eagle Lake, Lake Davis, and Antelope Lake in northeastern California (Figure 1). Monitoring was conducted weekly at Lake Almanor and Eagle Lake and monthly at Lake Davis and Antelope Lake.

Lake Almanor

During the *Aechmophorus* grebe nesting season at Lake Almanor, observers visited the two nesting colonies, located at Chester Meadows and the Causeway (Figure 2), at least weekly to monitor grebe nesting and to conduct disturbance surveys. This season the Chips fire affected lake conditions while burned from July 29th through early September, 2012 (see: http://inciweb.org for info on the fire). Fire activity was north of Highway 70 in the Feather River Canyon and progressed north-east towards Butt Valley Reservoir and Lake Almanor. The smoke plume could be seen for miles and affected some of our monitoring efforts in August. However, despite the fire and the smoke, we continued to collect accurate data on grebe nesting activity throughout the season at Lake Almanor.

The fire threatened transmission lines and other parts of the "Stairway of Power", causing the Pacific Gas and Electric Company (PG&E) to slow or stop drafting water from Lake Almanor for production of electricity at their hydroelectric plants. This slower drawdown in the surface elevation of the lake provided grebes with stable nesting habitat for longer time periods than the previous two years (Figure 3). In addition, heavy smoke on Lake Almanor reduced the recreational activity at the lake, resulting in less anthropogenic disturbances to nesting grebes than earlier in the summer and in previous years.

Brood surveys and census counts were conducted using a pontoon boat four times during the summer (Table 1). These boat-based surveys were done when the weather conditions were clear and calm. The last survey was conducted on September 20th and the grebe population was estimated to be 4,364 adults and 577 juveniles (Table 2). The brood survey transects estimated a 0.19 adult to chick ratio and the lake census estimated a 0.13 adult to chick ratio (Table 5). The reduced ratio from the lake census is because survey transects only record grebes up to 100 m from the boat, whereas the lake census records all grebes that can be distinguished at any distance and juveniles cannot be distinguished at greater distances. Therefore, the brood survey transects provide a more accurate estimate of the number of juveniles on the lake and grebe reproductive success whereas the lake count provides a more accurate estimate of the total grebe population on the lake.

The Chester Meadows colony (Figure 2) was first observed on Lake Almanor on June 27 with 18 active nests (Table 3). Much of this colony was located in the willow brush inundated with water. As the lake surface elevation dropped, grebe nests were built away from the willows where the water was deep enough. This pattern continued through the summer, with new grebe nests being built further out in the lake and also further south along the shoreline. The largest

active nest count during the season was 610 nests on August 16th (Table 4). At the end of the nesting season, the last part of the colony to still be active was the portion furthest south. A nest survey on September 21st recorded no active nests; and any eggs that may have been abandoned had been consumed or removed from the nests by predators.

Figure 1. The four lakes surveyed by Plumas Audubon Society (PAS) in 2012.

On July 30th another colony was observed forming to the south-west of the Causeway, with 11 nests initially (Figure 2, Table 4). This colony grew steadily to a peak of 316 active nests observed on August 22nd (Table 4) before a wind event lasting a couple days destroyed many nests, leaving 56 active nests on August 28th. A nest survey on September 10th recorded only 2 active nests, and one on September 21st documented no active nests as well as no grebes in the shallow water around the colony site.

Once colonies were formed, disturbance surveys were conducted at least weekly at both colonies, with each survey lasting more than one hour. Approximately 28 hours were devoted to disturbance surveys and the results were analyzed in order to determine the most common types of disturbances (Figure 4). Most disturbances yielded no response from the grebes. Certain types of disturbance caused the grebes to become restless and occasionally leave the colony. Gulls, river otters, bald eagles, corvids, kayakers, ski boats, jet skis, fishing boats, humans on shore, and aircraft were observed in proximity to grebe colonies. Most disturbances were due to avian predators. Anthropogenic disturbance was reduced in August due to the Chips fire, which decreased recreational activity on the lake. Predatory events were observed by gulls (California and ring-billed) and corvids (ravens), usually when grebes were away from their nests or after nests had been abandoned. Although river otters were not observed depredating nests, they were assumed to be a predator because they were seen on several occasions in and near the grebe colonies and nest predation by otters has been observed at Clear Lake by Redbud Audubon.

In addition to the monitoring techniques mentioned above, motion-activated cameras were installed to monitor nests at the Chester Meadows colony (Figures 5 and 6). Those cameras took photos of both Clark's and Western grebes from August 29th to September 20th and yielded hundreds of photos. This method of monitoring will again be used to monitor nests during the 2013 field season. Benefits of utilizing these cameras include being able to see natural events take place without the concern of disturbing the colony and leaving grebe nests vulnerable to predation. The cameras also took photos at night, enabling observation of grebe activity at all hours (Figure 6).

Figure 2. The location of grebe nest colonies at Lake Almanor in 2012. The active nest numbers are the peak number of nests in each colony.

Figure 3. Lake Almanor water surface elevation graphed over the past 4 years (data courtesy of California Department of Water Resources).

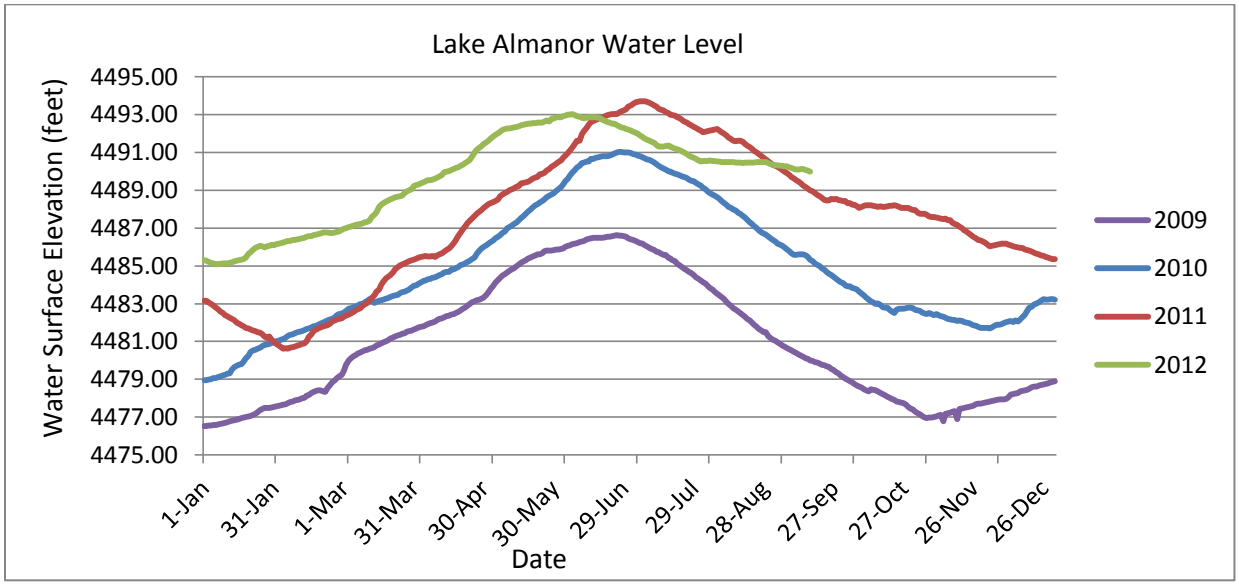


Figure 4. Disturbances documented at the Chester Meadows and Causeway grebe colonies in 2012 during approximately 28 hours of observation.

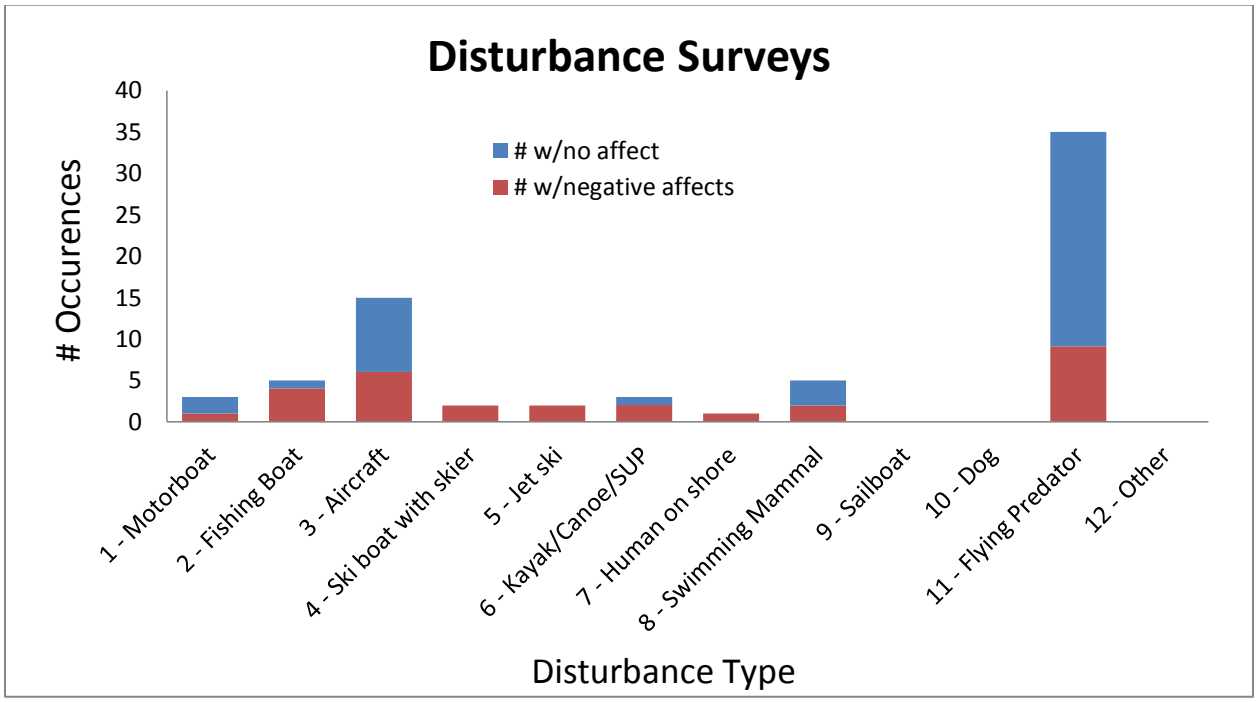


Figure 5. Photo through spotting scope of motion-activated camera that was set-up in the Chester Meadows grebe colony in August and September 2012.

Figure 6. Motion-activated camera night-time photograph of agitated grebe in the Chester Meadows colony (Note the eye shine in background of other alert grebes).

Eagle Lake

There was very little snowpack in northeast California during the winter of 2011-2012. As a result, the water surface elevation on Eagle Lake was low at the beginning of the season and dropped steadily through the summer of 2012 (Figure 7). Surface elevation of Eagle Lake started off almost two feet lower this year than in 2011 (data courtesy Valerie Aubrey), which prevented grebes from using historic nesting locations. Due to the lower water levels, almost no suitable nesting habitat was available for *Aechmophorus* grebes and there was no nesting observed on Eagle Lake this season. Forster's terns (*Sterna forsteri*) and eared grebes (*Podicepis nigricollis californicus*) were observed nesting in tules earlier in the summer in areas that *Aechmophorous* grebes use later in the summer in most years. Historic colony locations at Spaulding, Stones Ranch, Troxel Bay, and Pine Creek Mouth (Figure 8, Ivey 2004) were searched weekly in addition to observations around the lake in other potential nesting locations and no nesting or young were observed. We did observe countless courtship displays and during two consecutive visits to the Gallatin Marina observed western grebe pairs placing vegetation on floating tire buoys east of the jetty. These grebes were never observed trying to sit on these nests and the nests were not completed.

Brood surveys were accomplished with the help of Valerie Aubrey, Eagle Lake Fishing guide, through the use of her boat, time, and experience on the lake. Brood surveys were conducted monthly (Table 1), even though no nesting was observed. The surveys were conducted to estimate the total grebe population on the lake and to search for juveniles. The largest population estimate on Eagle Lake was 6,552 adult grebes that we counted on August 19th (Table 2). The adult to juvenile ratio was 0.00 this year, as there were no locally hatched juveniles observed. Our survey data shows a correlation between weather conditions and population estimates (total grebes counted during the survey); our counts were consistently higher on days when the wind started later in the day and was lighter (Table 9). Winds almost always pickup by late morning on Eagle Lake and survey dates must be planned during the best weather forecast possible.

There were no disturbance surveys conducted as there were no colonies to monitor. However, grebes were disturbed by fishing boats traveling across the lake. It did not appear that boaters ever intentionally chased grebes; however, grebes are almost everywhere on the lake so it is nearly impossible to travel where there are no grebes. One grebe was observed tangled in fishing line and was attempting to remove the line that was tangled around its wings, legs, and neck (Figure 9). On the Eagle Lake field trip during the August grebe conference, Lassen County sheriff deputies offered to help catch the tangled grebe with their boat and the assistance of two Audubon members. Unfortunately the grebe was still quite mobile, avoiding capture by diving, and it was not possible to catch the grebe.

Figure 7. Eagle Lake water surface elevation over last 3 years (data courtesy of Valerie Aubrey, Eagle Lake Fishing Information and Network, http://eaglelakefishing.net)

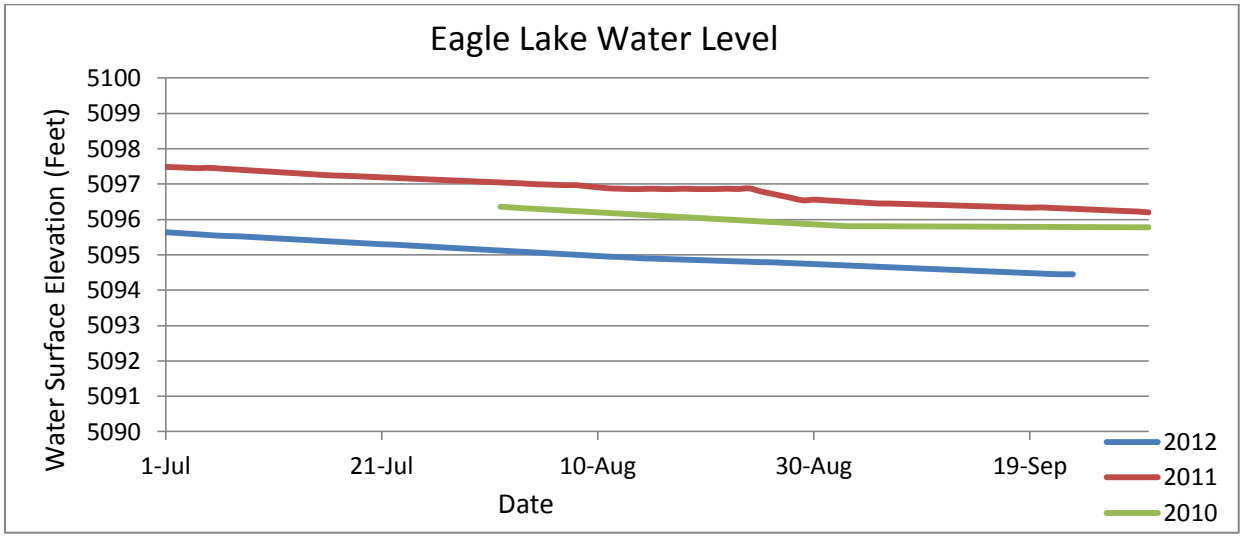


Table 1. Boat survey (brood counts and lake censes) dates for the four lakes monitored by PAS in 2012.

Boat Survey Dates	
Lake Almanor	June 24
	August 1
	August 30
	September 20
Eagle Lake	July 17
	August 6
	August 19
	September 17
Lake Davis	September 11
Antelope Lake	August 31

Table 2. Grebe census data from four lakes monitored by PAS in 2012.

Water Body	Date Observed	Census	
		Adult	Juvenile
Lake Almanor	9/20/2012	4,364	577
Eagle Lake	8/19/2012	6,552	0
Lake Davis	9/11/2012	112	63
Antelope Lake	8/31/2012	82	49

Most of the Clark's grebes we observed during the August 19 and September 17 boat surveys were in the middle basin (the area between Halfmoon Bay, Bucks Bay, and Pelican Point). This was different than in previous years, when they were more concentrated in the deeper water in the South Basin.

Figure 8. Historic Eagle Lake colonies searched in 2012 by PAS. No nesting was observed.

Figure 9. Western grebe tangled in fishing line observed at Eagle Lake (photo courtesy of Robert Patton, Redbud Audubon Society).

Table 3. Nesting dates for four lakes surveyed by PAS from 2010-2012.

Nesting Initiation and Peak 2010-2012						
Lake	Nest Initiation 2010	Peak Nesting 2010	Nest Initiation 2011	Peak Nesting 2011	Nest Initiation 2012	Peak Nesting 2012
Eagle Lake	Aug 6	Sept 1	July 24	Aug 25	NO NESTING *	NO NESTING *
Lake Almanor	July 22	Sept 2	July 12	Aug 13	June 23	Aug 13
Lake Davis	No Data	No Data	No Data	No Data	June 4**	July 24
Antelope Lake	No Data	No Data	No Data	No Data	July 2**	Unkown

* 2 full size juveniles observed on 9/17, but were much too developed to have been born on Eagle Lake. It is presumed that the young were born earlier in the year, perhaps on coastal or southern waters, and migrated with their parent(s) to Eagle Lake for the summer.
**Nest initiation based on the size of the oldest young observed during the first survey.

Antelope Lake

This year PAS surveyed Antelope Lake, located in Plumas County (Figure 1), for *Aechmophorus* grebes. There are few references regarding previous grebe surveys on the lake, but they have been historically observed there (Ivey 2004). Surveys were conducted in August from boat and shoreline. On August 14th, 13 active nests were counted near the Lost Cove boat ramp (Figure 10), with 34 adults observed on the lake. Some were seen with broods and others did not have broods and likely did not successfully nest in 2012. A population census and brood survey were conducted on August 31st and 82 adults and 49 juveniles were observed (Table 2). Thus, Antelope Lake had an adult: juvenile ratio of 0.60 (Table 5).

Nest initiation was based on the oldest observed young seen on the lake during the first survey and was estimated to be around July 2nd (Tables 3 and 7). The peak number of nests observed was on Aug 14th with 13 active nests in the Boat Ramp colony (Table 4). Based on the number of juveniles observed at the end of August, there were more nests in the colony prior to our first visit on August 14. The peak timing of nesting is unknown, but was likely sometime between the end of July and beginning of August.

Disturbance surveys were not conducted at Antelope Lake; however, the colony was situated in the same cove as the primary boat ramp for Antelope Lake (Figure 10). During one of our visits a jet ski drove directly at a group of nests, turning at the last minute and practically swamping the nests. This type of disturbance is quite intense; however, Antelope Lake usually has less recreational boaters (ski boats and jet skis) and more fishing boats than other lakes in the area. Coupled with the small size of the lake, large boat wakes are less common here than other larger bodies of water.

Antelope Lake water surface elevation is monitored by the California Department of Water Resources (DWR, Figure 11) and is one of the higher elevation lakes of the State Water Project.

Figure 10. Grebe nesting colony location on Antelope Lake in 2012.

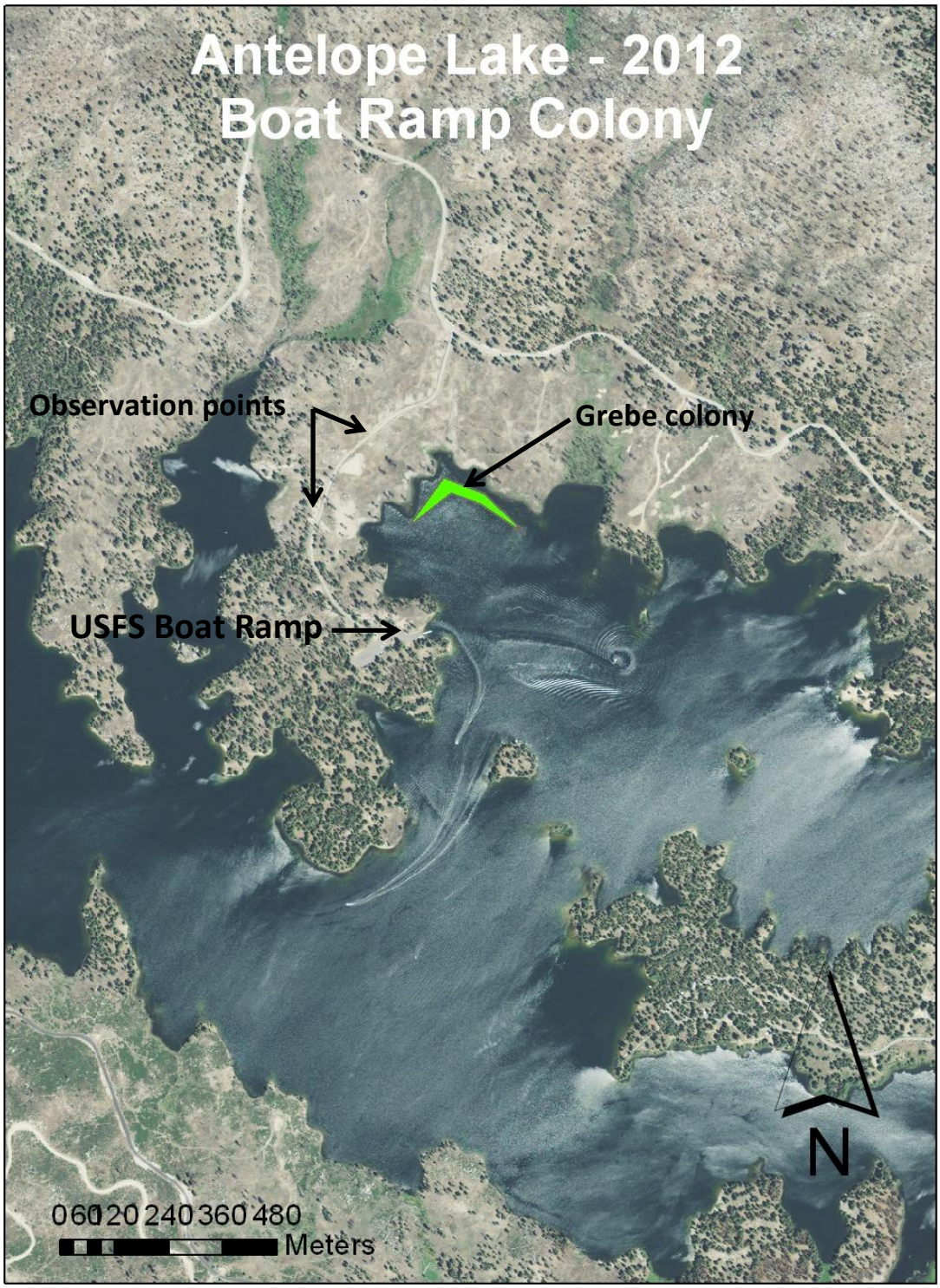
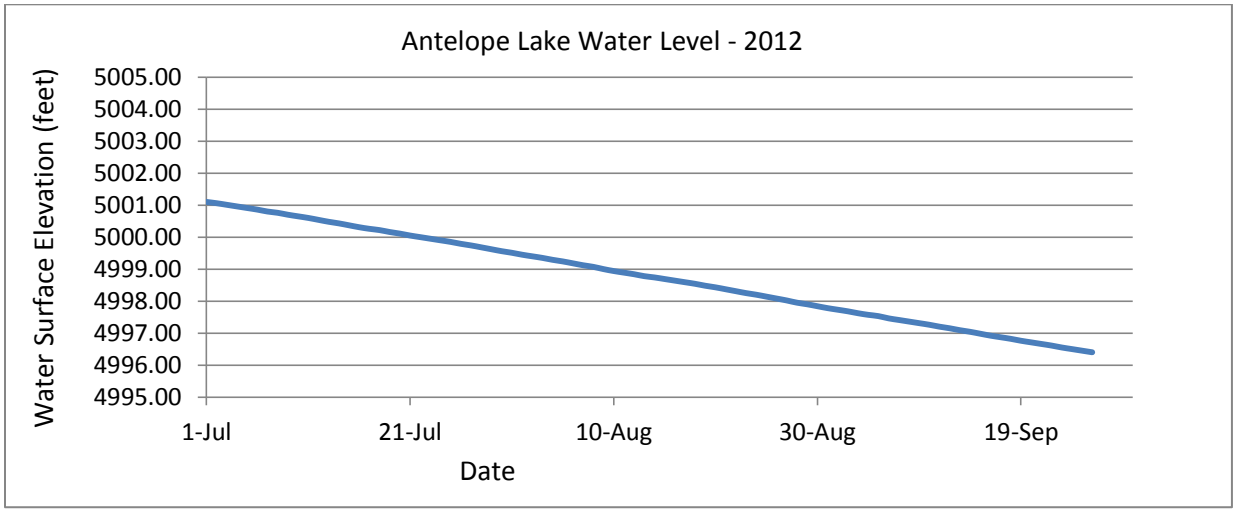


Figure 11. Antelope Lake water surface elevation during the 2012 grebe nesting season (data courtesy DWR- http://cdec.water.ca.gov).



Lake Davis

In addition to the aforementioned lakes, PAS also surveyed Lake Davis during the 2012 nesting season. Lake Davis currently supports the second largest *Aechmophorus* grebe population in Plumas County. It is unknown if grebes have nested at Lake Davis in the past five years because the water elevation of the lake has been slowly rising since the lake was drastically lowered in 2007 as part of the pike eradication project conducted by the California Department of Fish and Game.

Grebes were monitored from July through September, with a brood survey conducted on September 11. The grebe population was small enough that the entire population could be effectively counted without conducting transect surveys as is done for the larger grebe populations at Lake Almanor and Eagle Lake. This brood survey was made possible with the help of local resident Wade Linford who volunteered his time and rental of his boat. Results from this brood survey and census were determined to be the most accurate population estimate as the weather was ideal for surveying and the power boat was able to circumnavigate the lake. The total lake census was 112 adult and 63 juvenile grebes (Table 2). This lake census total gives an adult: juvenile ratio of 0.56 (Table 5).

Nest initiation was not directly observed, and timing was therefore estimated based on chick growth rates (Ratti 1977). Based on the size of the first young observed on the lake, nesting was estimated to have been initiated around June 4th (Table 3). Multiple nest surveys were conducted on the north end of the lake as this was the only location nesting was observed, with the greatest active nest count being 30 during the July 24th survey (Table 4). Other nests were possibly active during this time, but were located deeper in willow bushes and impossible to observe.

Disturbance surveys were not conducted on Lake Davis as the nests were not in typical colonies, but rather small numbers of nests strung out along vegetated shorelines and situated in emergent vegetation and willow bushes (Figure 12). Numerous nests were also found singly, not associated with any other grebes and therefore were difficult to label a "colony". Lake Davis is a relatively shallow lake primarily visited by fishermen and wildlife watchers, with very little high speed recreational boat traffic such as jet skiers or ski boats (pers. obs.).

Lake Davis is also part of the State Water Project and water surface elevation is monitored by the California Department of Water Resources (DWR) and provided on their website (www.water.ca.gov, Figure 13).

Figure 12. Lake Davis grebe nesting locations in 2012.

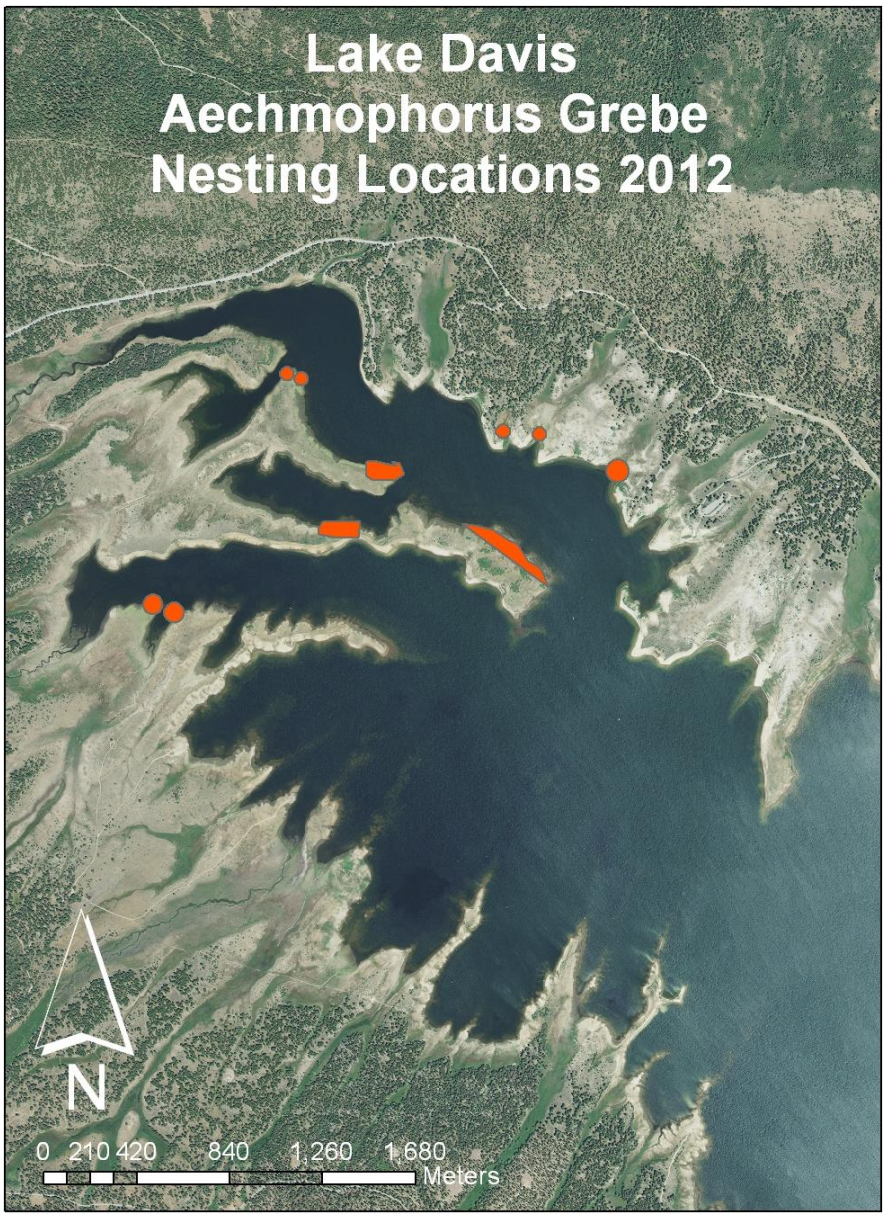


Figure 13. Lake Davis water surface elevation during the 2012 grebe nesting season (data by DWR- www.water.ca.gov).

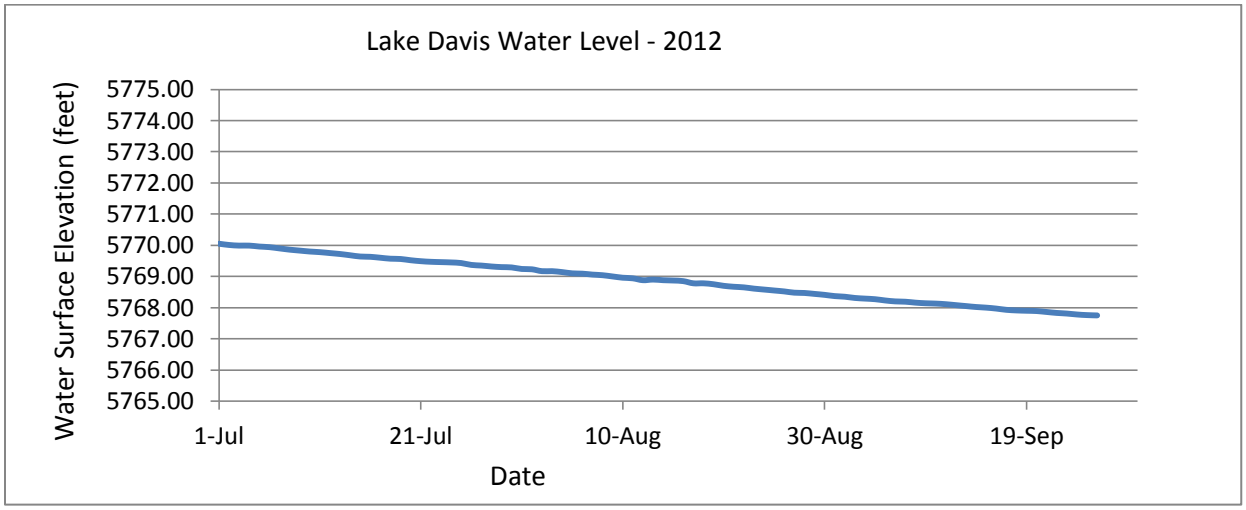


Table 4. A sample of nest counts at each lake monitored by PAS in 2012.

Nest Counts								
Lake	**Colony**	**6/15**	**7/1**	**7/15**	**8/1**	**8/15**	**9/1**	**9/15**
Lake Almanor	Chester Meadows	0	18	60	455	610	5	0
	Causeway West	0	0	0	11	316	56	0
Eagle Lake		0	0	0	0	0	0	0
Lake Davis	Total	N/A	N/A	5	30	30	5	0
Antelope	Boat Ramp	N/A	N/A	N/A	N/A	13	3	0

Table 5. Grebe population and nesting data for the four lakes monitored by PAS in 2012.

Lake	Year	Date	Transect Number	Adult Western Grebes	Adult Clarks Grebes	Juvenile Grebes	Adult:Juvenile Ratio	Adult:Juvenile Average	Adult: Juv ratio	TOTAL Lake Census Adults	TOTAL Lake Census Juveniles	Adult:Juv Ratio from census	Lake Elevation rate of decrease	Data Source
Eagle	2012	7/17/2012	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1502	0	0	-0.0158	http://eaglelakefishing.net/eagle-lake-water-Temp-Algae.php
Eagle	2012	8/6/2012	1	62	2	0	0.000							
Eagle	2012	8/6/2012	2	104	5	0	0.000							
Eagle	2012	8/6/2012	3	11	0	0	0.000							
Eagle	2012	8/6/2012	4	33	1	0	0.000							
Eagle	2012	8/6/2012	5	95	2	0	0.000							
Eagle	2012	8/6/2012	6	77	8	0	0.000							
Eagle	2012	8/6/2012	7	41	2	0	0.000							
Eagle	2012	8/6/2012	8	26	12	0	0.000	0.000	0.000	3130	0	0	-0.0158	http://eaglelakefishing.net/eagle-lake-water-Temp-Algae.php
Eagle	2012	8/19/2012	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6552	0	0	-0.0158	http://eaglelakefishing.net/eagle-lake-water-Temp-Algae.php
Eagle	2012	9/17/2012	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5347	*2	0.000	-0.0158	http://eaglelakefishing.net/eagle-lake-water-Temp-Algae.php
														-
Antelope	2012	8/14/2012	N/A	N/A	N/A	N/A	N/A	N/A	N/A	33	17	0.515	-0.0546	http://cdec.water.ca.gov/cgi-progs/queryDaily?ANT
Antelope	2012	8/31/2012	N/A	N/A	N/A	N/A	N/A	N/A	N/A	82	49	0.598	-0.0546	http://cdec.water.ca.gov/cgi-progs/queryDaily?ANT
														-
Davis	2012	7/24/2012	N/A	N/A	N/A	N/A	N/A	N/A	N/A	126	10	0.079	-0.0272	http://cdec.water.ca.gov/cgi-progs/queryDaily?DAV
Davis	2012	8/8/2012	N/A	N/A	N/A	N/A	N/A	N/A	N/A	174	11	0.063	-0.0272	http://cdec.water.ca.gov/cgi-progs/queryDaily?DAV
Davis	2012	9/11/2012	N/A	N/A	N/A	N/A	N/A	N/A	N/A	112	63	0.563	-0.0272	http://cdec.water.ca.gov/cgi-progs/queryDaily?DAV
														-
Almanor	2012	6/24/2012	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1148	0	0	-0.0282	http://www.project2105.org/lake_elevation/2010_daily_lake_levels.htm
Almanor	2012	8/1/2012	1	49	6	0	0.000							-
Almanor	2012	8/1/2012	2	111	5	0	0.000							-
Almanor	2012	8/1/2012	3	21	0	0	0.000							-
Almanor	2012	8/1/2012	4	171	22	0	0.000							-
Almanor	2012	8/1/2012	5	141	12	0	0.000							-
Almanor	2012	8/1/2012	6	67	6	0	0.000	0.000	0.000	3139	14	0.004	-0.0282	http://www.project2105.org/lake_elevation/2010_daily_lake_levels.htm
Almanor	2012	8/30/2012	1	45	0	26	0.578							-
Almanor	2012	8/30/2012	2	63	2	31	0.477							-
Almanor	2012	8/30/2012	3	87	0	18	0.207							-
Almanor	2012	8/30/2012	4	66	4	4	0.057							-
Almanor	2012	8/30/2012	5	147	24	51	0.298							-
Almanor	2012	8/30/2012	6	85	6	0	0.000							-
Almanor	2012	8/30/2012	7	317	38	8	0.023							-
Almanor	2012	8/30/2012	8	117	4	0	0.000							-
Almanor	2012	8/30/2012	9	302	11	1	0.003	0.183	0.105	3851	313	0.081	-0.0282	http://www.project2105.org/lake_elevation/2010_daily_lake_levels.htm
Almanor	2012	9/20/2012	1	63	3	16	0.242							-
Almanor	2012	9/21/2012	2	215	8	27	0.121							-
Almanor	2012	9/22/2012	3	676	53	87	0.119							-
Almanor	2012	9/23/2012	4	900	70	36	0.037							-
Almanor	2012	9/24/2012	5	93	9	25	0.245							-
Almanor	2012	9/25/2012	6	259	24	25	0.088							-
Almanor	2012	9/26/2012	7	28	1	13	0.448	0.186	0.095	4364	577	0.132	-0.0282	http://www.project2105.org/lake_elevation/2010_daily_lake_levels.htm

* 2 juveniles probably not hatched on Eagle Lake this season.

Table 6. Surface water elevation data sources for 2009-2012.

Water Body	Year	Source
Lake Almanor	2009	http://www.project2105.org/lake_elevation/2009_daily_lake_levels.htm
	2010	http://www.project2105.org/lake_elevation/2010_daily_lake_levels.htm
	2011	http://www.project2105.org/lake_elevation/2011_daily_lake_levels.htm
	2012	http://www.project2105.org/lake_elevation/2012_daily_lake_levels.htm
Eagle Lake	2010	Valerie Aubrey (Eagle Lake Fishing Information and Network)
	2011	Valerie Aubrey (Eagle Lake Fishing Information and Network)
	2012	http://eaglelakefishing.net/eagle-lake-water-Temp-Algae.php
Lake Davis	2012	http://cdec.water.ca.gov/cgi-progs/queryDaily?DAV
Antelope Lake	2012	http://cdec.water.ca.gov/cgi-progs/queryDaily?ANT

Table 7. Growth rates of *Aechmophorus* grebes based on size class of juveniles compared to adults (Ratti 1977).

Aechmophorus grebe growth rates	
size class	days since hatched
one-fourth	~3-12
one-third	~13-18
one-half	~19-23
two-thirds	~24-33
seven-eighths	~34-50
full (note plumage differences)	~51-70

Table 8. Water surface elevation drop compared with adult: juvenile ratios (see Table 6 for water level data sources).

Rate of water drop compared to adult: juvenile ratio						
Year	Lake	Trendline slope	feet/week	days to drop 1 ft.	Ratio from transects	Ratio from census
2010	Lake Almanor	-0.0786	0.529	13.2	0.062	0.024
	Eagle Lake	-0.0070	0.062	113.8	0.081	0.079
2011	Lake Almanor	-0.0624	0.370	18.9	0.458	0.430
	Eagle Lake	-0.0142	0.099	70.7	0.296	0.325
2012	Lake Almanor	-0.0282	0.198	35.4	0.186	0.132
	Eagle Lake	-0.0158	0.106	65.9	0.000	0.000
	Lake Davis	-0.0272	0.187	37.5	N/A	0.563
	Antelope Lake	-0.0546	0.374	18.7	N/A	0.598

Table 9. Wind intensity during brood and census surveys showing lower counts on windier days.

Lake	Date	Adult Census	Wind (Beaufort scale)
Lake Almanor	6/24/2012	1148	6
	8/1/2012	3139	2
	8/30/2012	3851	2
	9/20/2012	4364	2
Eagle Lake	7/17/2012	1502	5
	8/6/2012	3130	3
	8/19/2012	6552	3
	9/17/2012	5347	1
Lake Davis	9/11/2012	112	1
Antelope Lake	8/31/2012	82	3

Discussion

Lake Almanor- Lake Almanor's water levels dropped at a slower rate than in previous years due to the Chips fire and this prevented nests from failing due to stranding. However, it appeared that some grebes abandoned their nests when the submergent and emergent vegetation became dense under and around their nests even when the water under the nest was still 2-3 feet deep. Furthermore, strong winds during late August swamped numerous nests in the Causeway colony and otters in the Chester Meadows colony may have increased nest failure due to predation. Therefore, reproduction was lower this year than in 2011 despite the slow water level drop.

Eagle Lake- We observed no nesting on Eagle Lake during the 2012 breeding season. However, on our September 17th brood survey two full-size juveniles were observed. The juveniles were nearly indistinguishable from the adults, but they were begging and being fed. Based on chick growth curves (Ratti 1977) and their well-developed plumage it is not likely that these juveniles could have been born on Eagle Lake (the juveniles were likely more than 90 days old). We suspect that they were hatched from early season nests on coastal or southern waters and migrated with their parent(s) to Eagle Lake.

Antelope Lake- This particular water body has numerous bays and coves providing protection from wind in ideal nesting locations, but had a relatively small number of *Aechmophorus* grebes. However, the population had high breeding success indicated by a high adult: juvenile ratio.

Lake Davis- Grebes nested in smaller groups, often singly, on this lake compared to the other three lakes that we surveyed. This could be due to the lack of competition over nesting habitat, as Lake Davis has plenty of emergent and submergent vegetation and miles of shoreline that afford protection from the wind. At both Antelope Lake and Lake Davis, grebes had high reproductive success, and these lakes could be good models for successful management of grebe populations. As this was the first season grebes were monitored on Lake Davis, continued survey efforts in future years will help elucidate factors contributing to the productivity of grebes nesting at this lake.

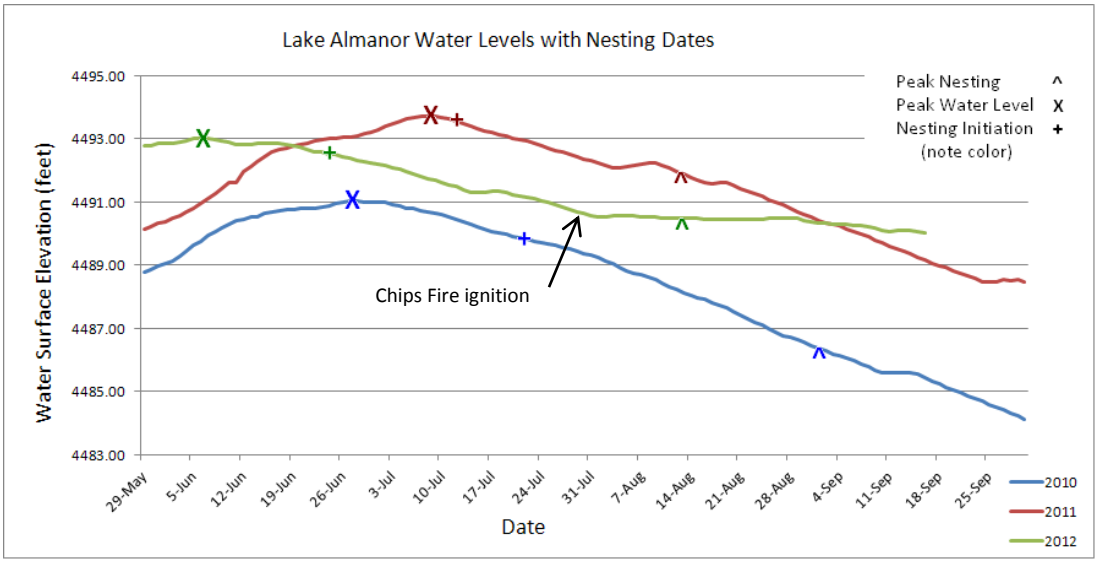
Aerial Survey

On September 25th, the California Department of Fish and Game volunteered a pilot and plane to enable PAS to aerially survey grebe populations in the region. Although all the colonies surveyed had been abandoned, we took this opportunity to photograph historic colony locations and attempt to count grebes from the air and with aerial photos. This survey also allowed us to establish limitations for surveying and photographing active colonies during the nesting season in future years. Transects similar to our brood surveys should be implemented when trying to count grebes from the air on larger bodies of water, whereas census counts can be accomplished on the smaller bodies. Next year DFG will have new photography equipment with technology enabling high resolution mosaics to be created from images taken from an aircraft-mounted camera.

Future Monitoring Efforts

In 2013, PAS will continue monitoring efforts on these four lakes to determine trends in population sizes and reproductive success in relation to disturbance, predation, and water levels. Continued data collection and analysis will further elucidate factors contributing to grebe reproductive success so we can determine ways in which lakes can be managed to help conserve grebe populations. Lake Davis and Antelope Lake will be more thoroughly surveyed in 2013, with disturbance and early season nest initiation surveys being done to protocol. Water levels will continue to be compared to nest initiation dates and peak nesting times in order to develop a model that can be used to regulate water drawdowns from managed lakes to avoid causing grebe colony nest abandonment (Figure 14).

Figure 14. Water surface elevation drop graphed with peak water levels, nesting initiation dates, and peak nesting dates on Lake Almanor (Water level data courtesy of DWR).



Outreach and Education

The Plumas Audubon Society has continued to develop and implement a diverse range of outreach and education opportunities for the communities located near the lakes that support grebe populations. We have developed a Summer Youth Outing Program for our region in Northeastern California that brought over 100 local youths on day trips to learn about and observe grebes on Lake Almanor, Eagle Lake, Lake Davis, and Antelope Lake. This program has served the communities of Loyalton in Sierra County; Portola, Quincy, Greenville and Chester in Plumas County; and Westwood and Susanville in Lassen County (Figure 15).

Figure 15. Region covered by PAS for education and outreach programs in 2012.

We presented at campgrounds located on the grebe nesting lakes and connected with over 100 campers with our grebe talks. We also presented to a variety of local organizations such as the Chester and Susanville Rotary, the Lake Almanor West board of directors, and the residents of the Lake Almanor Country Club **(**Figure 16**).** These presentations to local groups have exposed approximately 220 people to grebe natural history and conservation in our region.

Figure 16. Presentation to Chester Rotary on September 20th (Photo courtesy of Chester Rotary).

The following is a list of organizations that we have been involved with during the past quarter.

- Susan River Watershed Group
- Lahontan Basin Integrated Regional Watershed Management Group
- Feather River Integrated Regional Watershed Management Group
- Feather River Coordinated Resource Management Group
- Pacific Gas and Electric Company
- Collins Pine Company
- Lassen Land and Trails Trust
- U.S. Forest Service
- Bureau of Land Management
- Feather River Publishing
- 4-H
- Girl Scouts of America
- Boy Scouts of America
- Future Farmers of America
- Indian Valley Parks and Recreation
- Central Plumas Parks and Recreation
- Almanor Parks and Recreation
- Sierra County Wilderness Challenge
- Lake Almanor Country Club
- Lake Almanor West Community
- Sierra Institute for Community and Environment
- Pine Creek Coordinated Resource Management Program
- Westwood Family Resource Center
- Long Valley Charter School
- Lassen Family Services
- Lassen County Office of Education
- Plumas County Office of Education
- KJDX Radio

Newspaper and Radio Outreach

During this past quarter different aspects of the grebe project have been featured in five articles in Feather River Publishing newspapers (Figure 17). We connected with up to 18,000 local readers through these newspaper articles. We have also used our local radio outlets to announce grebe related activities to garner community participation and support. We connected with up to 15,000 listeners through these radio announcements.

Figure 17. Examples of articles featured in Feather River Publishing newspapers in 2012.

Lassen County Times

Tuesday, A

Audubon Society leads outreach program for chil

Jordan Clary
Staff Writer
jclary@lassennews.com

The water has dropped in Eagle Lake and the effects are reverberating around its vicinity. The tule grasses, which grow along the water's edge, have dried and that's a problem for the grebes.

Grebes like to either build floating nests or nests in plants where they can swim up to them. Last year there were 1,500 nests in Eagle Lake. This year, according to Nils Lunder, a biologist and outreach coordinator for the Plumas Audubon Society, there's a good chance there won't be any.

On Aug. 8 Lunder and Liz Hauner, an intern at Plumas Audubon, led a group of local children on an educational tour around Eagle Lake.

The outing was a pilot project Plumas Audubon is hoping to continue year after year.

"We want to develop a program that will offer kids a different perspective on the environment and how the local habitat supports wildlife and birds. Basically, we're trying to get people engaged by doing things outside where they can enjoy and appreciate the outdoors," said Lunder.

The grebes were the focal point of the outing. Oil companies, to help compensate for the damage grebes have suffered due to ocean oil spills, funded the grebe pro-

Erin Nickell, left, Leanndra Harper and Serena Polzak look for raptors in the cliffs behind Eagle Lake. Photo by Jordan Clary

he said. "They're very adaptable. Historically, if the lake is deeper, there is so much more nesting habitat. All this tule grass is just waiting, but it can't thrive without water, so when the water comes up, there will be more nests."

While the purpose of the trip was to learn about grebes, that was by no means

gether here. The Cascades are a huge geological province with its rounded volcanoes. The energy that feeds the volcanoes is from plate tectonics where you have the oceanic plate diving under the continental plate. The Sierra Nevada is another province.

The Diamond Mountains

about ancient Lake Lahotan and some of the geological

history of Eagle Lake.

"Eagle Lake is a remnant of

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For more
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PAYLESS BUILDING SUPPLY

Woody says, "We are you "link" to g

2C Wednesday, July 25, 2012

Bulletin, Record, Progressive, Reporter

Plumas Audubon launches new summer youth program

James Wilson
Sports Reporter
sports@plumasnews.com

The importance of birds in Plumas County is undeniable. The area is seated in one of California's main reservoir areas, and birds play an important role in deciphering the health of our planet. Due to their long distance of travel and exposure to many different ecosystems, birds act as a barometer for the earth. If birds are in trouble, so are humans.

The Audubon Society recognized the crucial link birds and humans have more than 100 years ago. Conservation and preservation have always been the mainstays of the Audubon Society and Plumas County's chapter is no exception.

Plumas County's chapter focuses extensively on tracking the behavior of birds. When asked what some of the Plumas Audubon Society's greatest achievements were, Nils Lunder, volunteer for the chapter, said, "The main things this chapter is proud of are their monitoring efforts and their different conservation programs. They've been involved with developing nesting habitat for burrowing owls ... and a lot of community outreach programs."

One such outreach program is the new Summer Outings for Youth. The first outing took place July 18 with a trip to Lake Davis. Lunder and fellow volunteer David Hamilton drove out to Lake Davis with Sierra County's Wilderness Challenge group. Wilderness Challenge is an alcohol and other drug abuse prevention program that gives youths ages 8 – 18 healthy activities in which to participate throughout the summer.

Right after arriving at the Lake Davis Dam, the kids participating in the program were treated with the sight of an osprey snatching up a trout from the lake and flying it back to its nest. Lunder and Hamilton talked to the children about the different living habits of osprey: why osprey always nest near water, how they hunt and how long they keep their nests.

Lunder brought the kids to the shore where he pointed out several species of birds that were viewable with binoculars. After giving the kids a chance to see all the birds, Lunder talked about the importance of observation and record keeping in the field. Later in the day the group enjoyed a free and healthy lunch while exploring the lake and spotting more birds.

"The purpose of the program," Hamilton said, "is just to get more kids out and involved in the natural environment and kind of spark interest. To provide something that's healthy and educational. To get them out in the woods and see some of these things that a lot of them really don't know are here."

There are four more outings listed on the Plumas Audubon website. On Aug. 1, the society will be taking kids out to Eagle Lake. Aug. 13 provides an outing to Lake Almanor, and on Aug. 14 and 15 the outing will be back at Lake Davis. There may be more trips planned this summer, however, so everyone is encouraged to check the website frequently for updates. All trips in the Summer Outings for Youth program are completely free to attend.

The Plumas Audubon society is fully funded through membership. Those who are already members of the National Audubon Society and have a Plumas County address are automatically members of the Plumas chapter. Those interested in joining the Plumas chapter can contact Darla DeRuiter at 283-2939. Membership is $20 per year and includes the Audubon Society's monthly magazine along with the Plumas chapter's monthly newsletter.

Those interested in the Summer Outings for Youth program or volunteering their own time are invited to visit plumasaudubon.org or contact David Arsenault at 283-0455.

Keith Miller checks out a bird through a telescope while Brianna Roen patiently waits for her turn. Roen and Miller both participate in the Wilderness Challenge Group. Photo by James Wilson

Interpretive Panels

In an effort to better inform people who use the grebe nesting lakes for recreation, interpretive panels have been designed for placement at Eagle Lake and Lake Almanor (Figures 18-20). We developed Memorandum of Understandings (MOUs) that permit us to install these interpretive panels at four different locations, three of which will be at Lake Almanor (Figure 19) and one at Eagle Lake (Figure 20). The four interpretive panels will be seen by up to 9,000 boaters, fishermen, and recreationists each year.

Figure 18. Draft informative panel design to be installed at local area lakes (image courtesy of California Department of Fish and Game).

Figure 19. Proposed locations of interpretive panels at Lake Almanor.

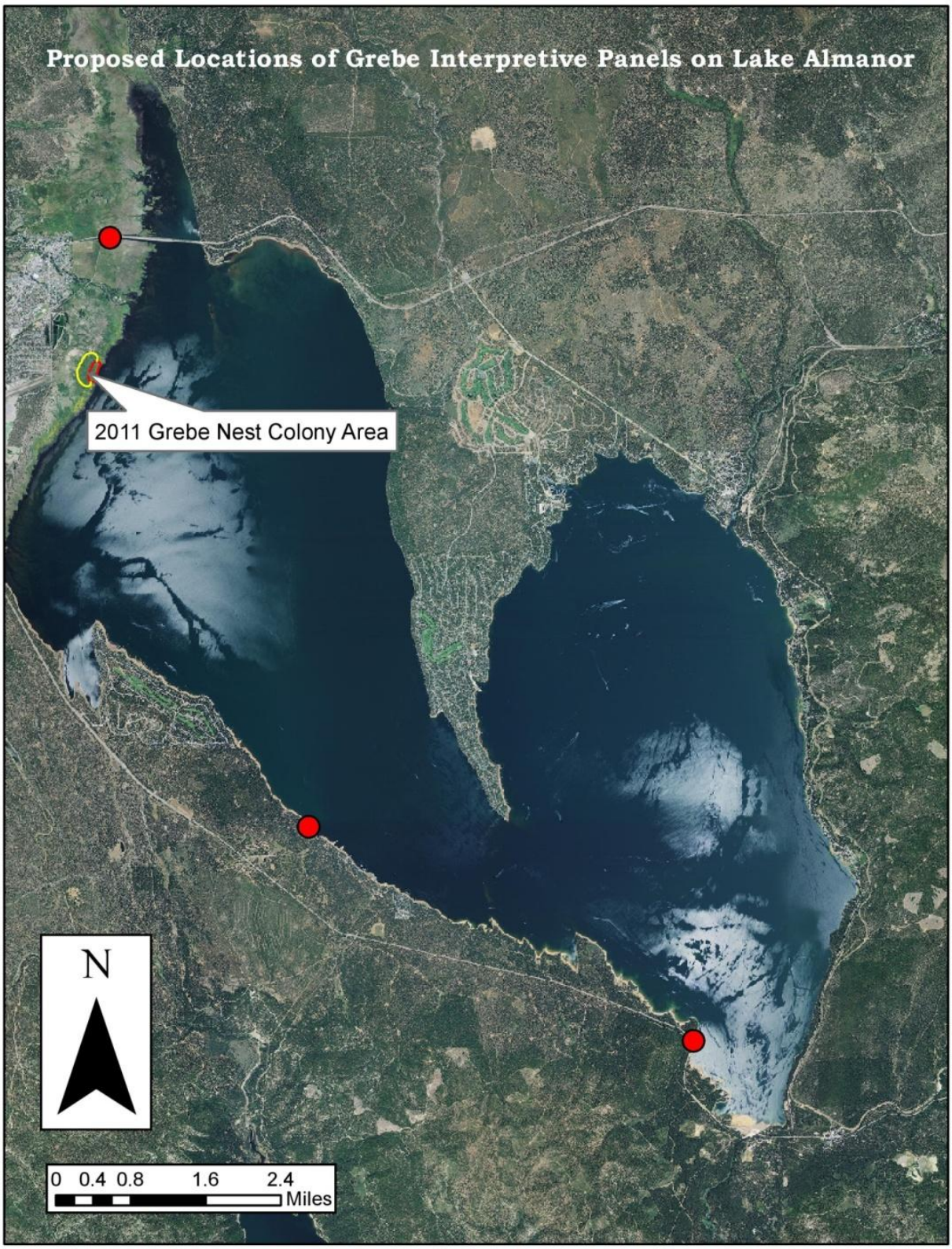
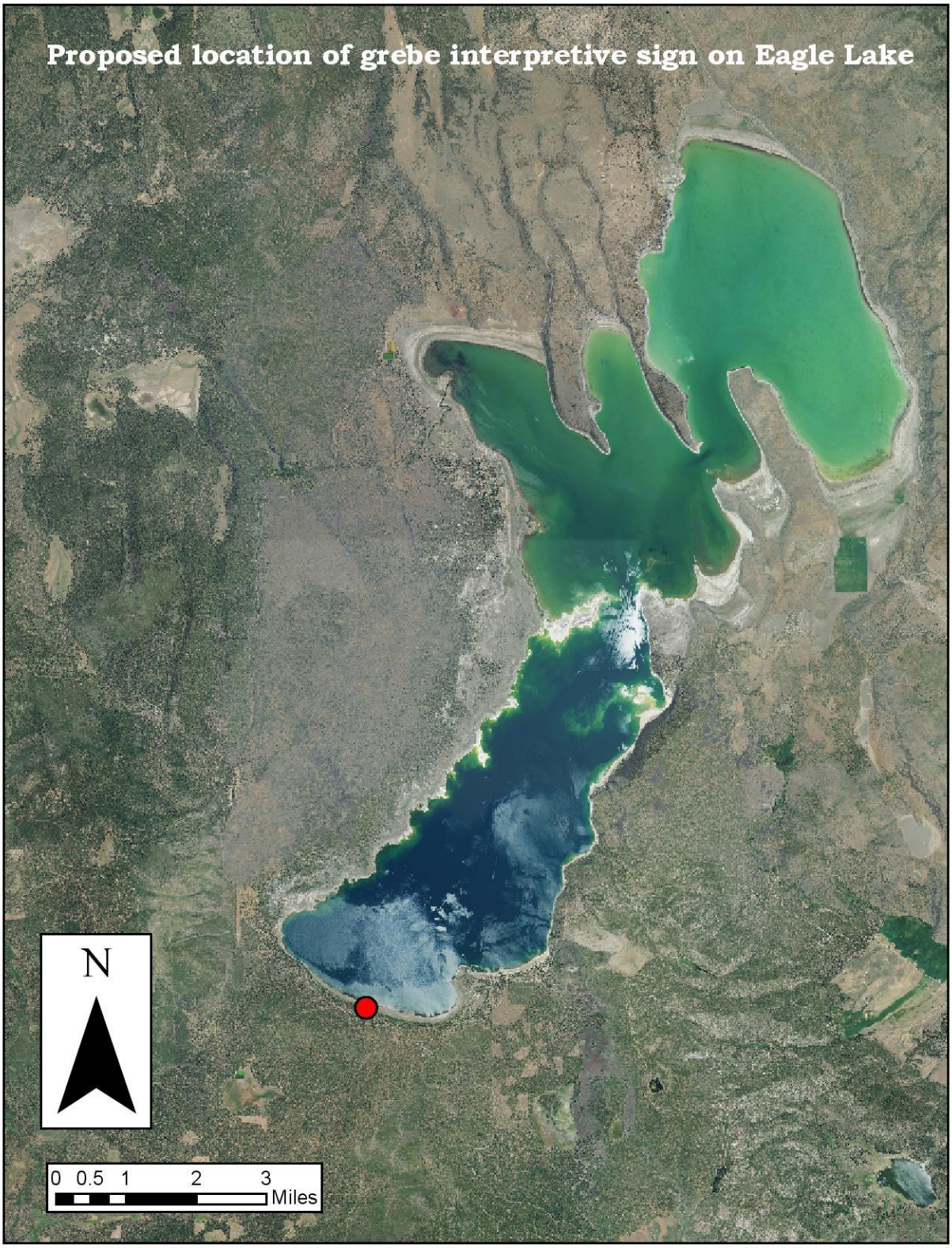


Figure 20. Proposed location of interpretive panel at Eagle Lake.



Nest Colony Warning Signs

During this quarter the nest colony warning signs that we designed and produced last year have been posted at strategic locations near nest colonies and we have received positive input about them by local recreationists. We removed these signs for the season on September 26th and will install them again next spring once the grebes return for the nesting season.

Grebe Art Program

We are initiating a new program that will connect with high school age students. This program will include classroom presentations to advanced art classes. The presentation will include elements of *Aechmophorus* grebe natural history, adaptations, and the impacts of oil spills. Numerous pictures of the grebes will be included in the presentation and these will be available to the students as subjects for their grebe art. During the fall semester the students will generate their own interpretations of *Aechmophorus* grebes and their works will be submitted into our Grebe Art competition. The classroom presentations for this project will expose approximately 300 students to *Aechmophorus* grebe natural history and conservation.

The goal of the Grebe Art program is to make local students aware of grebes and their unique natural history and to select an appropriate piece to use as the logo for the Audubon Grebe Conservation Project. In addition, we will use the grebe art to generate a line of merchandise that the Plumas Audubon Society will sell at local events to bring greater awareness to *Aechmophorus* grebes in our region. Proceeds from the sales of this merchandise will be used to create a college scholarship fund for local students.

Audubon Grebe Conservation Project Annual Conference

The Plumas Audubon Society hosted the Audubon Grebe Conservation Project annual conference in Chester from August 23-25. This event provided an opportunity for Audubon Grebe Conservation Project partners in northern California to discuss grebe conservation efforts including education and outreach strategies. This meeting was attended by the following people:

Jennifer Boyce (NOAA); Holly Gellerman, Laird Henkel, Julie Newman, and Dale Whitemore (CDFG); Keiller Kyle and Rodd Kelsey (Audubon California); David Arsenault, Bob Beckwith, Darla DeRuiter, David Hamilton, Ricky Haworth, Darrell Jury, Leslie Larson, Nils Lunder, Jerry Williams, and Terry Williams (Plumas Audubon Society); Bill Hass, Dawn Garcia, and Jennifer Patton (Altacal Audubon Society); Marilyn Waits, Robert Patton, Floyd Hayes, and Janet Swedberg (Redbud Audubon Society); and Ryan Martin (DWR).

Other Outreach and Education

During this quarter we launched our new redesigned website: www.plumasaudubon.org, which includes information on the grebe conservation project. We have also been maintaining our Facebook page in order to keep our friends up to date on the grebe project.

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