

Western & Clark's Grebe Conservation and Management in California

**Annual Report for Year Three (2007)
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Compiled by

**Kristofer M. Robison, Renee E. Weems, and Daniel W. Anderson
University of California, Davis**

In Collaboration with

**Steve Hampton,
California Department of Fish and Game,
Office of Oil Spill Prevention and Response**

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Supplemental Files

- Summer 2007 Pictures
- 2000's GIS nest data
- 2007 GIS nest data
- Un-edited *Outdoor California* article
- *Outdoor California* cover letter
- 2007 Contacts
- 9 August Thermalito Afterbay survey map
- Informational brochure
- Boat ramp sign

I. Project Objectives for 2007

Management activities related to both closely-related species of California's breeding *Aechmophorus* grebes (Western Grebe, *A. occidentalis* and Clark's Grebe, *A. clarkia*) (hereafter called "grebes") were conducted at various lakes in California during the summer of 2007, emphasizing those nesting at the two largest colonies in the state at Clear Lake and Eagle Lake. Guidelines set forth by Ivey (2004) and developed in our previous activities were used as a reference for conservation and management activities carried out during this time. The following were our general objectives for the 2007 summer field season:

- (1) to survey grebe populations and nesting activity at historic sites in California, including Clear Lake and Eagle Lake; as well as to survey other potentially active and important breeding lakes to be found through interview, exploration, and literature review;
- (2) to conduct surveys of production and productivity (mainly through brood-size studies), document nesting activities and numbers, and conduct behavioral observations to determine population recruitment, breeding effort, and reactions to disturbance;
- (3) to particularly evaluate annual reproductive success at the highly important breeding sites at Clear Lake and Eagle Lake;
- (4) to find and map new grebe nesting locations; and,
- (5) to implement the following management activities:
 - a. install interpretive signs at various boat launches and other appropriate locations;
 - b. distribute informational brochures to stores, sport shops, marinas, and other potentially high-traffic areas where educational materials would be beneficial;
 - c. explore the feasibility of buoys at some nesting locations; and
 - d. continue agency cooperation for further outreach and management.

II. Results from 2007

A. Summary of Field Season

Surveys and data were collected from the period of 20 June – 20 September 2007 by Kristofer M. Robison, Renee E. Weems, and Daniel W. Anderson; also with field assistance from Frank Gress (California Institute of Environmental Studies) and Ryan Martin (California Department of Water Resources). Boat and ground-based surveys were used in combination to collect data. Data collection was concentrated at Clear Lake in Lake County and Eagle Lake in Lassen County, but was eventually expanded to a state-wide effort encompassing 25 lakes. The 2007 breeding season proved to be an anomalous year overall for breeding *Aechmophorus* grebes

because historically important breeding sites failed to produce significant numbers compared to previous years. In some cases, water level fluctuations exacerbated the large-scale reduction in statewide nesting efforts. In addition, grebes were found throughout the state with unprecedented degrees of plumage-staining in 2007, a phenomenon only rarely observed in all years previous. The source(s) of this staining, as well as its composition and chemical characteristics, remain unknown. Fouled plumages of this sort are typical, however, of lightly-oiled birds seen on the coast. Following is a more detailed summary of the 2007 grebe breeding season organized by north-latitude.

B. Survey results

1. Eagle Lake

a. Adult numbers— Two entire-lake surveys were conducted at Eagle Lake during 2007, yielding unusual results. Our first survey, conducted in mid-July, led to an estimation of approximately 2,200 adults. Our second survey, conducted on 22-24 August, documented a small increase in adult numbers, at about 3,400 individuals (Table 1). Overall adult numbers for 2007 at Eagle Lake were 22.1% of "expected" based on previous adult transect estimates of 15,400 adults in a highly productive year (2002, DWA, unpublished data). Alternatively, Ivey (2004) considered an adult population at Eagle Lake of 3,600, but based it solely on a doubling of 1,800 nests in 2003. However, DWA (field notes) also estimated the total adult population at Eagle Lake in 2003, based on transects. That estimated value was 10,200 adults. This would still make our 2007 numbers 33.3% of those seen in 2003. Regardless, our 2007 estimates certainly indicate a substantial reduction in numbers of adults present throughout the breeding season at Eagle Lake.

b. Nesting— Nesting surveys were not conducted at Eagle Lake because we found only very low numbers of young during both surveys. In addition, attempts to find conspicuous nesting colonies were made, but none were found. A few chicks were present during both surveys, indicating only a very low level of active nesting during 2007. Additionally, brood surveys were conducted in late-August, indicating that productivity was far below normal ($YY/AD = 0.04$, Table 1; versus a conservative 0.5 in a "normal" year, or a 92% reduction of productivity in 2007). Another anomalous finding at Eagle Lake was the previously un-observed behavior where nearly every brood seen was being attended by 6-12 adults, including multiple-adults feeding a single young. This behavior had never been previously recorded by us.

c. Stained plumages— In 2007, we found many grebes with orange/brown staining on their white ventral plumage (as seen on the grebe pictured on the front page of this report). It is thought that this staining may have been an indicator of oil exposure that grebes are often subjected to on the coast, where oil spills are frequent and unpredictable (Ivey 2004). Adult grebes with conspicuously stained ventral plumage were observed at Eagle Lake during both survey periods. In a sample from the mid-July survey, a rate of staining proportion was estimated at $1.5 \pm 1.1\%$ (95% CI) of the total numbers (Table 1). No plumage-staining data was collected on the second visit, but stained birds were still observed.

d. Observed disturbance— While surveying in 2007, there were no human-caused disturbance events documented. We note, however, that a limited amount of time was spent at this location, and therefore, an adequate sample of possible disturbance was not obtained. However, based upon personal observations and dialogue with local residents and fishermen, water levels at Eagle Lake were also low in comparison to previous years; a problem which, as we have seen (and reviewed in previous reports by us) can negatively impact nesting colonies.

2. Mountain Meadows Reservoir

During an initial survey of this reservoir, conducted on 20 July, we found 8 adult grebes and 2 chicks. Two of the adults displayed stained plumage (Table 1). This location, however, provides excellent nesting habitat and may be more important in more typical nesting seasons. A second visit to this lake allowed us to place information signs and further explore its shore. We determined that a more complete survey is warranted in 2008.

3. Lake Almanor

a. Adult population—Surveys were conducted from the Highway 36 causeway on the north side of the lake, looking south. This location was visited on both 15 July and 26 August; both dates producing very different observations. During the first survey, 250 adult grebes were observed in and around the nesting colony location just south of the causeway. Based on the number of nests observed on 26 August, the adult population was conservatively estimated to be at least 1,000+ individuals (Table 1).

b. Nesting—Fifty-two active nests were found during the first survey of this location on 15 July. In the interim, and based on correspondence with Ryan Martin (CADWR), it was indicated that nesting near the causeway had increased to about 375 nests. Unfortunately, water-level manipulation had occurred causing 125 of these nests to be stranded on land and/or in low water (see *Summer 2007 Pictures* in attached file). Our second survey on 26 August showed a recovery in nesting effort and water-level as 500 active nests were observed in this area (Table 1). A brood count was never obtained for this location, but based on the large number of nests observed, this could have been a productive colony in California in 2007.

c. Stained plumages— No stained-plumage data were collected at this location.

d. Observed disturbance—Water-level manipulation was the only form of disturbance that we can document at Lake Almanor. As stated above, correspondence with Ryan Martin revealed that a water-level decline had occurred between our two surveys, which resulted in the stranding of a large number of constructed nests (about 100 estimated). This type of disturbance is inevitable at reservoirs in California (often also important grebe nesting sites) which are used for water storage and use. However, the grebes apparently initiated a later nesting effort resulting in a larger

colony than present earlier. Water level variations, along with the known importance of many California (and western) reservoirs primarily for water storage, will inevitably be one of the major factors that will be necessary to reconcile in some way, if such reservoirs are to become important production areas for over-water nesting species such as the grebes. The apparent limited adaptability of grebes to such changes might also be "exploited" in such situations to enhance grebe production. We see responding to water-level variation as a major challenge in future grebe conservation.

4. Butt Valley Reservoir

This location was surveyed on 21 August. We estimated 50 adult grebes and zero chicks to be present. Submergent vegetation was observed, although no nesting was occurring at the time of our survey (Table 1 & *Summer 2007 Pictures*).

5. Thermalito Afterbay

a. Adult population—In a preliminary, partial ground survey conducted on 20 July, we found 71 adults staying close to an active nesting colony in Larkin Cove (see attached *Thermalito Afterbay Survey Map*). A comprehensive boat survey of this location was conducted on 9 August under the guidance of Ryan Martin (CADWR). Number of adult grebes on this body of water totaled about 330 (Table 1).

b. Nesting— In our preliminary survey of this location, we found an active nesting colony with 15 nests located in Larkin Cove. Correspondence with R. Martin indicated that around the time of this initial survey a nesting colony located in “Clay Bank Cove” (See attached *Thermalito Afterbay Survey Map*) was active and consisted of 18 nests. At the time of our second, more comprehensive survey, an active nesting colony in the “Ski Cove” arm was observed. This colony consisted of 9 nests, and an additional two nests adjacent to the southeastern-most levee were also observed (see map and Table 1). The two nesting colonies that were present during our initial survey were inactive at this time. No chicks were observed at any time, and further correspondence with R. Martin later in the season, led us to conclude that these nesting efforts had all failed in 2007, due to possible direct human disturbance, wind/wave action, and water-level variations.

c. Stained plumages— No birds were seen at this location with stained plumage (N = 326 examined through binoculars).

d. Observed disturbance— While conducting the late-June survey, several recreational boaters with personal watercraft were observed in the area causing a direct disturbance event with a group of adult grebes, causing the grebes to scatter and dive. This type of disturbance seems inevitable for a body of water so heavily used for recreation. The colony originally discovered on 20 July was completely inactive when we returned on 9 August, and may indicate that significant disturbance had occurred.

This heavily-used reservoir seems to be gaining in importance for nesting grebes (see previous reports) (perhaps in part due to the active protection given in recent years by CADWR), but it still presents a challenge for managers in coping with inevitable water-level variations along with nearby disturbances.

6. Clear Lake

a. Adult numbers— Initial surveys, conducted in June 2007, showed that the total number of adult grebes on the lake consisted of approximately 2,000 individuals. This number was much lower than comparable numbers from all previous years' counts for the month of June at Clear Lake. Through conversations with bass fisherman and a local Lakeport, CA outdoor columnist, Terry Knight, we learned that there had been a large thread-fin shad (*Dorosoma petenense*, an important part of grebes' diet at Clear Lake) die-off early in the year, followed by a massive exodus of grebes and other waterbirds out of the lake. This is consistent with accounts of "tens of thousands" of grebes observed along the coast between Golden Gate and Bolinas Bay in late-June (SH, personal observations). As the breeding season progressed, more grebes returned, and by the time of the final, complete survey in late-July, the adult numbers on the lake were estimated to be nearly 8,000 individuals (Table 1). Nearly all of the adults observed at this time displayed "winter" feeding behavior; foraging heavily in concentrated groups (called by us "flotillas"). Courtship behavior was observed, but at a frequency much lower than seen in previous years.

b. Nesting— Surveys conducted in both late-June and late-July yielded no active nesting on Clear Lake. In fact, large-scale colonial nesting was not initiated at any time or at any location during our 2007 surveys on this important body of water. A small (by previous "standards") nesting effort observed on the lake consisted of only about 10 nests located in Rodman Slough. We estimated that about 20 chicks were produced at Clear Lake in 2007, *en todo* (Tables 1 & 2). This was essentially a lake-wide breeding failure, and close nesting surveys were not conducted at this one site to avoid any possible disturbances of this meager nesting effort. The cause(s) of this nesting failure were not determined but indications are that it was a multi-factorial phenomenon involving: (1) short-term declines in food supply and/or availability on the breeding grounds; (2) long-term drought and low-water levels, (3) possibly also chronic pollution problems, at this time suspected to be oil-effects from the wintering grounds, and (4) chronic disturbances at this high-use lake (Gericke 2006, previous annual reports, Lake County 2007). All these factors likely combined to also result in our observations of unusual displays of behavior, as well as reduced, normal breeding behavior. Specifically at Clear Lake, possible factors might have been exacerbated by the documented thread-fin shad die-off, a region-wide drought and associated low water levels, and failure to migrate back to breeding grounds in time to breed in 2007 after a massive exodus out of the area in the winter of 2006-2007.

c. Stained plumages— Ratios of birds with stained plumage to those without were obtained during our July surveys; we estimated that $5.3 \pm 1.8\%$ (95% CI) of the adult grebes (N = 585, see Table 1) at Clear Lake at that time were stained (and potentially

oiled). This finding was unusual in that it was the first time since studies by DWA began in 1992 that such percentages were this high (previously no more than 1-2 stained birds were ever observed at this location). However, there were no reported major oil spills for the California coast during the winter of 2006-2007 (OSPR 2008a, IBRRC 2008). Unfortunately, no grebes were collected for feather analysis during the breeding season, and it remains unclear where the staining may have originated, and if indeed it was oil-related. If we continue to observe high percentages of stained plumages in 2008, we will collect samples (through the currently-permitted WFCB Museum at UC Davis) for the purposes of feather analysis and specimen archiving.

d. Observed disturbances— Several disturbance events were documented during the 2007 breeding season at Clear Lake. On two separate occasions, boats pulling wake boarders were seen driving directly through tight flotillas of grebes; causing the birds to scatter and dive. On another occasion, a personal-watercraft operator accompanied by two children maliciously pursued a raft of grebes, causing the birds to separate, dive, and likely experience stress. In addition, while performing a kayak survey in Rodman Slough, a single Western grebe was seen with a severely broken bill. The lower portion of the grebe's bill was seen hanging down from its mandible with blood staining the plumage surrounding its mouth. This bird was surely unable to forage effectively. Due to the severity of the injury it is thought that a boat collision was to blame. Our cover picture illustrates a dead, plumage-stained Clark's grebe found entangled in fishing line. The fishing hook was piercing its abdomen. Lastly, emergent vegetation in Rodman Slough and Anderson Marsh was seen trampled as if an airboat had run them over (presumably for *Hydrilla* control) (see *Summer 2007 Pictures-Clear Lake*). Because there was no large-scale nesting effort, measures were not taken to seek the cause of the vegetation damage; although this type of disturbance has been documented in past years of this study to cause colony failure. Since there was so little nesting observed at Clear Lake in 2007, we were unable to further document and quantitate the effects of such disturbances on nesting activities, one of the major objectives of this project.

7. Topaz Lake

This lake was surveyed by ground on 16 August. It was estimated that a total of 120 adult grebes were present (Table 1). No chicks or active nesting was observed, and no nesting vegetation could be seen (submergent or emergent). The lake appeared to be low though no data on historic water levels could be found.

8. Lake Berryessa

A comprehensive boat survey was conducted on 11 July. We estimated that 200 adult grebes were present at this time (Table 1). The majority of the grebes seen were gathered in a flotilla on the far northern end of the reservoir. No nesting habitat could be found and no chicks were present though this lake has supported grebe nesting in the past.

9. Bridgeport Reservoir

In a ground survey, conducted on 16 August, we found maximum adult numbers to be 100 individuals. There were no nests discovered but 10 chicks were estimated to have been produced on this lake. Additionally, another unusual occurrence was observed where nine adults were seen attending and feeding a single brood of 2 juveniles. This behavior was also observed at Eagle Lake earlier in the season. Adults with stained plumages were found at this location, and a group of 9 adults in close association with one-another contained one such individual (Table 1).

10. San Luis Creek (O'Neill Forebay)

This location was surveyed on 12 September just below the San Luis Dam. Fifteen adult grebes were observed and zero chicks were present. Nesting habitat does exist just past the outlet of the dam, and there has been a report of nesting in the 1990's (Ivey 2004), although no nesting was occurring at the time of our visit (Table 1).

11. Tinemaha Reservoir

This reservoir serves the purpose of providing short-term regulation of flow from the Owens River (Mono Basin EIR 1993). It was visited on 16 August while surveying eastern Sierra Nevada lakes for nesting activity. Seven active grebe nests were discovered at this site which was previously un-documented as a grebe nesting location (Table 1). These nests were constructed in submergent vegetation mats within 20 meters from the dam, located on the south end of the reservoir (see attached *Summer 2007 Pictures*). An account of adult population was not gathered. No plumage-stained birds were observed.

12. Mendota Wildlife Area

Through correspondence with Diana Humple (Point Reyes Bird Observatory) and Steve Brueggemann (California Department of Fish and Game), we learned of nesting activity at this location, although we did not survey this location ourselves in 2007. D. Humple reported active nesting from her survey of the location on 5 August, with 130 adults and 160 very young chicks mostly being back-brooded. In late September, S. Brueggemann found approximately 281 adults and 59 chicks (Table 1).

13. Buena Vista Recreation Area

This lake is a heavy-use recreation destination located in the southern portion of California's Central Valley. A partial ground survey was conducted at this location on 6 September and 150 adult grebes were found. There was no evidence of active nesting during our survey, but a single chick was heard making a begging call (Table 1). This is verification of a possible nesting effort that may have taken place earlier

in the season, though recreation is likely too heavy for a successful colony (KMR, personal experience). Sufficient emergent nesting habitat does exist at this location, and nesting may prove successful if disturbance is lessened. No plumage-stained birds were observed.

14. Palmdale Lake

This reservoir, located in southern California's Antelope Valley was visited on 12 September. Seventy-five adult grebes were estimated to be present, as well as 20 chicks. This is a private reservoir used for fishing and waterfowl hunting, and small boats (5mph or less) are permitted. Sufficient emergent nesting habitat exists on most of the shore, though private docks break up what would otherwise be continuous emergent nesting habitat. One large section of emergent habitat remains un-broken on the eastern side of the lake. This is where the grebes were presumed to be nesting. This location proved to yield one of the highest YY/AD ratios (0.27 YY/AD) of the season (Table 1). No plumage-stained birds were observed on Palmdale Lake.

15. Lake Perris

A ground survey of this reservoir was conducted on 11 September. While no chicks were observed, many adults were concentrated in several tight flotillas, feeding vigorously. It was our estimation that 300 adults were present at the time of survey (Table 1).

16. Lake Henshaw

A ground survey of this location was conducted on 11 September. We found 5 adult grebes inhabiting the entirety of the lake. There was very little nesting habitat present and no chicks were observed. Adults with stained plumage also were not observed (Table 1).

17. Lake Skinner

This reservoir, and accompanying treatment facility, is used for water storage and as a municipal water source for Riverside and San Diego counties. Boating and fishing recreation are two major uses of this reservoir (Metropolitan Water District 2007). Several areas along its shores were lined with sufficient nesting habitat consisting of emergent vegetation. While surveying on 8 September, 100 adults and 30 chicks were estimated to be present, indicating that active nesting had recently taken place; though no active colony was found during the survey. Of the lakes and reservoirs surveyed in 2007, Lake Skinner had among the highest YY/AD ratio with a value of 0.30 (Table 1). Likewise, this site is part of a recreation area and park with boating permitted without body contact (no personal watercraft/waterskiing) (Metropolitan Water District 2007), which may benefit grebe production. This site, along with

Tinemaha Reservoir, was previously un-documented as a grebe nesting location. No plumage-stained birds were observed.

18. Salton Sea

The south end of the sea was surveyed for grebes on 11 September, mainly looking for non-breeders as there was no nesting vegetation present. Two-hundred and twelve adults were observed in a tight flotilla near Red Hill Marina (Table 1).

19. Finney-Ramer Wildlife Area

This group of managed waterfowl ponds was surveyed on 11 September, while in the Salton Sea vicinity. Historically, this location has supported as many as 5 nests (Ivey 2004), although no nests or young were present at the time of survey. Only 3 adults were present (Table 1).

20. Lake Hodges

This San Diego County lake was partially surveyed on 9 September from various vantage points along its shore. It was estimated that the adult population was 500 individuals, with 40 accompanying chicks. Adult grebes were concentrated in tight "flotillas" consisting of many individuals, the majority of which were Western grebes. A YY/AD ratio was estimated to be 0.08 for this site (Table 1). This lake presumably had numerous non-breeders, as there were many more adults than chicks. No plumage-stained birds were observed.

Other lakes visited

Several other lakes were surveyed in 2007, which showed no nesting activity and few adult grebes. All lakes visited that had even a small number of adult grebes present are included in Table 1. Lakes visited which did not contain adult grebes were not included in Table 1. Those lakes were: Lake Miramar (San Diego County), Lake San Vicente (San Diego County), Lake El Capitan (San Diego County), Lake Jennings (San Diego County), Lake Cuyamaca (San Diego County), and Lake Morena (San Diego County).

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Table 1. Adult population and nesting survey data, summer 2007.

LAT/LONGI	DATE OF SURVEY	LOCATION	SURVEY TYPE	EST. ADULT POP.	EST. # CHICKS	YY/AD RATIO ¹	% OILED	SAMPLE SIZE (OILED)	REMARKS/OBSERVERS
40° 38.5' N 120° 44.2' W	16 — 19 July	Eagle Lake (Lassen County)	Boat	2,200	45	0.02	1.5%	455	Multiple adults tending broods. KMR, REW, DWA
	22-24 August	Eagle Lake	Boat	3,400	145	0.04	---	---	KMR, REW
40° 16.9' N 121° 01.3' W	20 July	Mountain Meadows Reservoir (Lassen County)	Ground	8	2	0.25	25%	8	Partial survey. Observed near dam. KMR, REW, DWA
40° 15.6' N 121° 13.2' W	15 July	Lake Almanor (Plumas County)	Ground	250	52n ²	?	---	---	Partial survey. KMR, REW, DWA
	26 August	Lake Almanor	Ground	1000	500n	?	---	---	Partial survey. Adult pop. from doubling nests. KMR, REW
40° 08.2' N 121° 10.2' W	21 August	Butt Valley Lake (Plumas County)	Ground	50	0	0	0	50	Submerg. veg. present but no nesting. KMR, REW
39° 28.1' N 121° 39.2' W	20 July	Thermalito Afterbay (Butte County)	Ground	71	15n	?	0	71	Partial survey. Larkin Cove sample. KMR, REW, DWA
	9 August	Thermalito Afterbay	Boat	330	11n	0	0	326	9 nests in "Ski Cove", 2 nests near southeast-most levee. KMR, REW, R. Martin
39° 01.8' N 122° 47.9' W	20 - 30 June 1 - 2 July	Clear Lake (Lake County)	Boat, Ground, Kayak	2,000	3n	?	---	---	Partial surveys. 3 nests inside Rodman Slough. KMR, REW
	25 July	Clear Lake	Kayak	---	8n	?	10.8%	120	Survey inside Rodman Slough. KMR, REW
	26 - 27 July	Clear Lake	Boat	8,000	0	0	5.3%	585	No nesting or chicks observed, KMR, REW, DWA, F. Gress
	14 September	Clear Lake	Boat	---	20	0.0026	12%	17	16 chicks observed, all 7/8 grown. YY/AD—Adult pop. from previous survey. KMR, REW
38° 40.6' N 119° 32.4' W	16 August	Topaz Lake (Mono County)	Ground	120	0	0	---	---	Partial survey. Water level is below any emergent veg. No visible nests/chicks. KMR

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Table 1. Adult population and nesting survey data, summer 2007 cont.

LAT/LONGI	DATE OF SURVEY	LOCATION	SURVEY TYPE	EST. ADULT POP.	EST. # CHICKS	YY/AD RATIO ¹	% OILED	SAMPLE SIZE (OILED)	REMARKS/OBSERVERS
38° 35.3' N 122° 13.6' W	11 July	Lake Berryessa (Napa County)	Boat	200	0	0	0	187	Water below potential nesting veg. KMR, REW, DWA
38° 16.8' N 119° 13.7' W	16 August	Bridgeport Reservoir (Mono County)	Ground	100	10	0.10	11%	9	Partial survey. Multiple adults tending brood. KMR
37° 04.2' N 121° 04.0' W	12 September	San Luis Creek (Merced County)	Ground	15	0	0	0	15	Nesting habitat exists. Located below San Luis Dam. KMR, REW
37° 03.3' N 118° 13.3' W	16 August	Tinemaha Reservoir ³ (Inyo County)	Ground	---	7n	?	---	---	Partial survey. 7 active nests on submergent veg.— South-end near dam. KMR
36°40.85 N 120°20.63 S	Late September	Mendota WA (Fresno County)	Ground	281	59	0.21	---	---	Partial survey conducted by S. Brueggemann (CDFG)
35° 13.5' N 119° 15.4' W	6 September	Buena Vista Rec. Area (Kern County)	Ground	150	1	0.007	0	88	Partial survey. Chick heard begging. Nesting habitat does exist. KMR, REW
34° 33.1' N 118° 07.4' W	12 September	Palmdale Lake (Los Angeles County)	Ground	75	20	0.27	---	---	Good habitat exists. Private Lake. KMR, REW
33° 51.7' N 117° 10.6' W	11 September	Lake Perris (Riverside County)	Ground	300	0	0	---	---	Partial survey. Large, tight rafts. KMR, REW
33° 14.1' N 116° 44.7' W	11 September	Lake Henshaw (San Diego County)	Ground	5	0	0	0	5	Very few grebes and little nesting habitat. KMR, REW
33° 35.3' N 117° 03.0' W	8 September	Lake Skinner ³ (Riverside County)	Ground	100	30	0.30	0	76	Good habitat exists. KMR, REW
33° 12.6' N 115° 37.5' W	11 September	Salton Sea (Imperial County)	Ground	212	0	0	---	---	Partial survey. Red Hill Marina sample, Tight raft, 60m from shore. KMR, REW
33° 04.8' N 115° 30.9' W	10 September	Finney-Ramer Waterfowl Area (Imperial County)	Ground	3	0	0	0	3	KMR, REW
33° 04.2' N 117° 06.8' W	9 September	Lake Hodges (San Diego County)	Ground	500	40	0.08	0	408	Partial survey. Adults in tight rafts. KMR, REW

¹ A question mark indicates lack of data to make a sufficient estimate.

² n: number of nests observed if chicks were not readily countable.

³ Previously un-documented nesting locations (highlighted).

---: No data collected

C. GIS maps of early 2000's nesting and new 2007 nest locations

The included GIS maps are a comparison of nesting location and density between the early 2000's and the 2007 breeding seasons. Data for the early 2000's map was taken from Ivey 2004 and DWA (unpublished data). Through a visual comparison, it can be seen that nesting effort was much lower in the 2007 breeding season than in prior years. These figures will be redone eventually to more accurately reflect the comparative nature of 2007 to our past experiences. In addition, Table 2 consists of a year to year comparison of nesting and productivity at Clear Lake, beginning in the year 2000.

Table 2. Nesting Activity and Productivity at Clear Lake in the 2000s.

YEAR	EST. # ACTIVE NESTS	SAMPLE-SIZE FOR PRODUCTIVITY	PRODUCTIVITY: (YY/AD ¹)	REMARKS
2000	2675	1,160	0.76	
2001	925	924	0.65	
2002	445	877 ²	>0.01	Very low #s of young were produced in 2002
2003	275	1,198	0.19 ³	Pop. Estimate is approximate
2004	700	2,380	0.16 ⁴	Pop. Estimate is approximate
2005	2300	988	0.82	Pop. Estimate from Gericke (2006)
2006	800	1,002	0.72	
2007	20	7,646 ⁵	0.0026	No large-colony nesting effort was initiated.

¹Young per adult ratio includes all adults within standard transects, with or without young. It represents surveys taken during the period after nesting for the season had been finished whilst also independent young were still distinguishable from adults.

²About 85% of these nests were directly trampled by air boat activities in the colony at peak-nesting (DWA field notes, page 3765). This required a re-initiation of agency coordination efforts.

³2002 and 2003 were also unusual years in that unprecedented high percentages of non-breeding Clark's Grebes were present on Clear Lake, and large numbers of *Aechmophorus* grebes (presumably non-breeders from other areas perhaps affected by an ongoing drought).

⁴In 2004, a major shift in the largest breeding colony location at Clear Lake occurred (to Long Tule Point), likely related to the development of a large marina and associated canal dredged directly through previously-held, traditional nesting habitat of the 1990s and 2000s (although Long Tule Point had been active in the late-1960s). Also, an early-nesting cohort became established at Clear Lake in 2004, in addition to a late-nesting cohort, which had exclusively dominated nesting phenology prior to 2004.

⁵This represents the maximum number of adults observed while surveying in 2007. Virtually all adults were non-breeders displaying winter-time feeding behavior; foraging vigorously in very tight "flotillas".

D. Boat-ramp signs and informational brochures

We distributed informational signs and brochures throughout the 2007 breeding season and targeted important breeding areas in California (Tables 3 & 4). These brochures and signs were used as an outreach tool to inform boaters, fisherman, and recreaters of the importance of avoiding grebe nesting colonies. PDF files of both the brochure and information sign are in the attached file.

Boat ramp signs were posted intensively at Clear Lake, Eagle Lake, and Mountain Meadows Reservoir. These signs were affixed to a permanent structure in plain view of those using the facility. At locations where a permanent structure was not available, 2” diameter steel posts were placed in the ground and secured with concrete. A total of 77 signs were posted between the three lakes mentioned above: 38 posted at Clear Lake, 36 at Eagle Lake, and 3 at Mountain Meadows. Although sign posting was concentrated at boat launching facilities, signs were also posted at other locations. Other sign locations included local businesses, chambers of commerce, campgrounds, and courthouses (Table 3).

Informational brochures were distributed to various locations with a goal of targeting areas that see a high traffic of lake users. A total of 7,330 brochures were handed out at numerous locations in 2007 (Table 4). Brochures were distributed to the same locations as signs were posted, when possible and further distribution included hotels, visitor centers, and people we met.

During the planning phase of 2007, we sized-down the boat-ramp-sign image and printed it on 8.5 x 11 inch paper; which was then laminated with a U.V. resistant plastic. This smaller sized sign allowed more locations to be targeted due to their ability to fit in areas that would otherwise not accommodate a larger sign. These proved valuable for small businesses which lacked wall or window space and bulletin boards. A total of 54 of these signs were distributed in 2007 (Table 3).

Pictures were taken of most all of the boat ramp sign placements. See the included file (*Summer 2007 Pictures*) for these pictures, which are labeled by location.

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Table 3. Sign placement and numbers distributed in California, summer 2007.

LAKE	LOCATION	CONTACT	SIGN MATERIAL		
			Lam ¹	Metal	Plastic
Eagle Lake	Aspen Campground	Eagle Lake Ranger Station	4		
	BLM North Campground	Bureau of Land Mgmt.	4		
	Christie Campground	Eagle Lake Ranger Station			1
	Eagle Campground	Eagle Lake Ranger Station	4		
	Eagle Lake Amphitheatre	Eagle Lake Ranger Station	1		
	Gallatin Marina	Sheriff & Store Staff		1	2
	Lahontan Heights	Ted Andresen		1	
	Lassen County Visitor Center	Staff	5		
	Mariner's Resort	Resort Staff	2		1
	Merrill Campground	Eagle Lake Ranger Station	3		
	Rocky Point Campground	Camp Host	3		
	Stone's Landing	Sheriff		1	
	Spaulding General Store	Store staff		1	
	Spaulding Marina	Pat Horan		2	
Mountain Meadows	Boat Ramp	Mark Sanford, PG&E		2	
	Water access north of boat ramp	Mark Sanford		1	
Clear Lake	Anderson Marsh State Park	Jay Sherman		1	
	Borenbega Boat Storage	Steve Gomez		1	
	Clear Lake Chamber of Commerce	Bob Aguirre	2		
	Clear Lake Drive, Lakeport	Doug Grider		1	
	Clearlake Oaks County Park	Kim Clymire		1	
	Crystal Lake Drive	Kim Clymire			1
	Clear Lake State Park	Jay Sherman	15	1	1
	Disney's Water Sport Rental	Roy & Charlotte Disney	1		
	Ferndale Resort & Marina	Bill (Co-owner)	2		1
	Glenhaven Beach Campground	Greg (Manager)			2
	Holiday Harbor R.V. Park	Joan (Manager)			1
	Indian Beach Resort	Anthony Benevento	2		1
	Keeling County Park	Kim Clymire		1	
	Konocti Vista Casino	Sarah Ryan		1	
	Lake County Courthouse	Debra Sommerfield	6		
	Lakeside County Park	Kim Clymire		2	
	Lucerne Harbor County Park	Kim Clymire			1
	M&M Campground	Percy Oved		1	
	Redbud Park	Julie Burrow		3	
	Rodman Slough	Kim Clymire		1	
	3 rd St., Lakeport, Boat Ramp	Doug Grider		1	
	5 th St., Lakeport, Boat Ramp	Doug Grider		1	

¹Laminated Sign

Table 4. Brochure placement and numbers distributed in California, summer 2007.

LAKE	LOCATION	CONTACT	# BROCHURES
Eagle Lake	Aspen Campground	Eagle Lake Ranger Station	250
	BLM North Campground	BLM Eagle Lake Office	50
	Christie Campground	Eagle Lake Ranger Station	250
	Eagle Campground	Eagle Lake Ranger Station	250
	Mariner's Resort	Office	250
	Merrill Campground	Eagle Lake Ranger Station	250
	Rocky Point		50
	Spaulding General Store	Store Staff	250
Almanor, Mountain Meadows	Lassen County Visitor Center	Staff	250
Clear Lake	Big Valley Rancheria	Sarah Ryan	50
	Borenbege Marina	Steve Gomez	100
	C.A. Tribal T.A.N.F	Staff	50
	Clear Lake Chamber of Commerce	Bob Aguirre	120
	Clear Lake City Hall	Julie Burrow	100
	Clear Lake State Park	Jay Sherman	400
	Disney's Water Sport Rental	Roy & Charlotte Disney	50
	Ferndale Resort	Bill (Co-owner)	100
	Konocti Harbor Resort & Spa	Reservations Center	100
	Lakeport Chamber of Commerce	Melissa Fulton	250
	Lake County Courthouse	Debra Sommerfield	250
	Lake County Public Services	Kim Clymire	100
	Lake County Visitor Center	Staff	300
	Mallard House Inn	Staff	50
	Redbud Audubon Society	Marilyn Waits	2,750
	The Deli	Morris O'Reilly	100
	Wyndham World Mark Resort	Front Desk	100
Buena Vista	Buena Vista Recreation Area	County of Kern	100
Palmdale Lake	Palmdale, Ca	Fin & Feather Club	50
Lake Skinner	Winchester, Ca	Riverside County Reg. Parks	200
Lake Hodges	Escondido, Ca	City of San Diego	150
Lake Morena	Campo, Ca	County of San Diego	10

E. Buoy placement at Clear Lake, Lake County, California

It was discovered in 2007 that placing buoys on the lake would be unfeasible. Buoys are seen mostly by agency personnel we contacted as a hazard to boaters, and are therefore held to a minimum. The original goal was to place buoys around active nesting colonies in order to protect nesting grebes from boating-related disturbances. During the 2007 breeding season this goal proved unnecessary due to a lack of a substantial breeding effort on Clear Lake. Lakebed Management in the city of Lakeport was found to be the agency which controls the placement of buoy markers. If significant nesting occurs buoy placement will be re-visited in 2008, funds permitting.

F. *Outdoor California* article submission

In an effort to make the problems that confront the grebes known and to make grebe conservation efforts more accessible to the public, it was determined that writing an article in an outdoor-type magazine would be an appropriate venue to accomplish both goals. This idea was realized, and an article entitled *Ecology, History, and Threats: California's Western and Clark's Grebes* was written by Renee Weems and Kris Robison, and submitted to the editorial office of the CDFG publication, *Outdoor California*. It was originally hoped that the article would be available to readers in the July/August 2008 issue of the publication to coincide with the peak of the grebe breeding season, but the earliest print date that could be accommodated will be sometime in September. Final approval for printing is still being anticipated. In the associated CD you will find a copy of the unedited version of the article along with a cover letter to the publication's editor, Troy Swauger.

III. Final Summary

Through our surveys in 2007, we documented severely decreased *Aechmophorus* grebe productivity and nesting effort, nearly statewide, but more severe in the north at more traditional, larger colonies (Clear Lake, Eagle Lake, and perhaps also places like Lake Almanor, Mountain Meadows Reservoir, and Thermalito Afterbay). In some small areas in the southern part of the state, productivity was slightly better, but still reduced. Low and fluctuating water-levels, along with persistent disturbance events observed around the state, plus an unusually high rate of birds with stained plumage raises further concern about the future conservation status for California's grebe population. It is unclear what the consequences of another, similar unproductive year will be (2008). If such a trend continues, the multiple-stress nature of decimating factors to the overall population might result in a large population decline from which it will be difficult to rapidly recover. More active conservation-action by more agencies may be necessary; along with further developments of effective management techniques that will be effective in an atmosphere of varying water levels, human disturbances, and other continuing perturbations. Like anything else in effective conservation, a suite of multiple-stressors must be dealt-with if we are to be effective for the long-term. Active conservation for *Aechmophorus* grebes will also impart ecological benefits for many other waterbirds that co-occupy these habitats.

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Another interesting finding from the 2007 breeding season that deserves further discussion was our discovery of previously undocumented nesting locations (Tinemaha Reservoir and Lake Skinner). Both Tinemaha Reservoir and Lake Skinner are water storage reservoirs that provide excellent habitat for nesting grebes. In addition they serve as popular fishing and recreational lakes which may prove to be a problem if grebes begin nesting in high numbers at these locations. Neither location produced more than 30 chicks, and is not at the present time, however, considered a “critical” location. But if properly managed for the multiple-uses that occur at such locations, they might be managed to enhance the wildlife experiences of the many users who frequent those places.

Lastly, the November 7th, 2007 *Cosco Busan* oil spill in the San Francisco Bay (occurring *after* our 2007 studies) caused over 500 *Aechmophorus* grebe casualties (OSPR 2008b), and it was likely that many more were involved but not recovered or documented. With so few potential recruits being produced on the breeding grounds in 2007, this and similar accidents potentially caused serious damage to an already suffering population. It is for this reason that we believe the future of grebe conservation efforts and monitoring activities must be expanded to not only target nesting locations but also encompass their wintering grounds along the California coast. Conservation of grebes on their wintering grounds must become an essential part of their overall conservation strategy.

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Personal Communications

- Diana Humple. Biologist. Point Reyes Bird Observatory, Conservation Science.
- Frank Gress. Director. California Institute of Environmental Studies.
- Ryan Martin. Staff Environmental Scientist. California Department of Water Resources.
- Steve Brueggemann. Associate Wildlife Biologist. Mendota Wildlife Area.
- Terry Knight. Outdoor Columnist. Lake County *Record Bee*.