Western & Clark's Grebe Conservation and Management at Clear Lake, California

Annual Report for Year One
31 January 2006

Presented to the
American Trader Trustee Council
and
National Fish and Wildlife Foundation

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ANNUAL YEAR ONE REPORT TO THE AMERICAN TRADER TRUSTEE COUNCIL

Below is a brief summary of the general goals of the proposed project. The following annual report includes a summary of work completed and plans for the second year of the contract agreement based on the initial outlined objectives.

Objectives

The following objectives have been developed for management efforts to be carried out at Clear Lake nesting *Aechmophorus* grebe colonies using Ivey (2004) as an outline. These objectives are designed with the goals of enhanced productivity and reduced human disturbance in mind.

(1) Initiate management recommendations with concentration on the following activities:
   i. initiate agency coordination activities,
   ii. develop and distribute informational brochures,
   iii. develop and initiate interpretive programs for public awareness,
   iv. design and post interpretive signs and
   v. install buoys at nesting locations.

(2) Monitor grebe behavior and disturbances to nesting colonies. Surveys of time allocation, behavior, and disturbance events will be conducted at each chosen colony site to assess time allocation budgets and the effects of disturbance events. Additionally, nest and brood surveys will also be conducted to assess nest success and productivity.

(3) Evaluate effectiveness of management recommendations applied to breeding *Aechmophorus* grebes at selected nesting sites. Chosen sites are dependent on grebe activity and choice of nesting habitat. Potential colony sites at Clear Lake include: Long Tule Point, Rumsey Slough, Rattlesnake Island, McGough Slough, and Rodman Slough.

(4) Recommend and institutionalize future management actions and a framework that biologists and managers from groups such as various Joint Venture groups, North American Colonial Waterbird Conservation Plan, CDFG, or US Fish and Wildlife Service can utilize and modify to their specific objectives.

Also included per the scope of work:

(5) Updated bibliography of research applicable to *Aechmophorus* grebe status, monitoring, and management as well as information from scientific literature, unpublished reports, and surveys.

(6) Suggested adaptations or updates to Ivey (2004) if applicable or necessary.

[1-i] DESCRIPTION OF AGENCY COORDINATIONS AND LIST OF AGENCY CONTACTS

DESCRIPTION OF AGENCY COORDINATION

Primary agencies involved and respective responsibilities included:

- **UC Davis** – wrote proposal for conducting management at western and Clark's grebe nesting colonies at Clear Lake, CA, designed surveys and management aimed at reducing human disturbance at nesting grebe colonies, hired wildlife biologist to conduct surveys, make local contacts, and design interpretive brochures, signs, and programs, provided boat/motor/trailer and kayak for conducting surveys.

- **CDFG-OSPR** – assisted with proposal by providing feedback, secured matching funds for field vehicle use and gas for 2004 and 2005, helped established contacts in the Clear Lake vicinity.

- **Joint Venture groups** – provided funding for preliminary work in 2004, provided feedback on interpretive materials.

- **Lake County** – provided a forum for discussion of implementing buoys around nesting grebe colonies, provided maps and assistance with colony locations and history, provided advice on public outreach and strategy for buoy management.

- **Clear Lake State Park** – provided a campsite for the duration of the 2004 and 2005 field seasons, provided free launch site usage, provided feedback and opportunities for public outreach at the park through the Interpretive Association.

- **Redbud Audubon Society** – provided forum for public outreach and possible volunteer opportunities regarding interpretive brochure, sign, and program distribution and maintenance.

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* retired as of December 2005

[1-ii] COPY OF INFORMATIONAL BROCHURE AND DISTRIBUTION LIST

DISTRIBUTION LIST FOR INFORMATIONAL BROCHURES AND FLYERS

**Hard copy of Heron Days Festival Flyer attached to this report. Word and Publisher files of both brochures are included on CD.

Heron Days Festival Flyer

- Flyer was handed out to visitors to the festival on 23 April 2005, primarily to those who rode the pontoons out to see the grebe colonies.
- Flyer was later handed out at an Audubon meeting on 19 May 2005 where a video from the Festival was shown.
- Extra flyers were given to me to distribute. I distributed flyers to the County Offices in Lakeport and the Clear Lake Visitor Center.
- Additional flyers were given to Redbud Audubon members and were distributed throughout the community at various venues including boating/marine stores, public buildings, and locally owned venues like restaurants and bookstores.
- Plan for 2006 is to print and continue and expand distribution.

Informational/Interpretive Brochure

- Currently in draft format. Have received reviews from CDFG-OSPR and Joint Venture contacts, as well as from Redbud Audubon.
- Plan is to prepare final draft for printing and distribution in time for the 2006 field season at Clear Lake. Distribution will be similar but more extensive than was for the Heron Days Festival Flyer.

[1-iii] COPY OF INTERPRETIVE PROGRAM FOR PUBLIC AWARENESS AND PLANS FOR DISTRIBUTION AND AVAILABILITY

PLANS FOR DISTRIBUTION AND AVAILABILITY

- Currently in paper draft format only. Plan is to design a program that can be given with or without the aid of Power Point. Design of program is to educate the general public, including but not limited to lake users such as boaters and anglers, school-age children, community members, private lakeside land owners, bird watchers, and Lake County/Clear Lake visitors.
- Propose to create a CD of interpretive program (including an outline format in Word and optional slide show version in Power Point) that could be available for distribution to agencies and educational programs. Also propose that the program be made available online through Clear Lake State Park, Lake County, and Redbud Audubon websites.

INTERPRETIVE PROGRAM FOR PUBLIC AWARENESS – DRAFT

Western and Clark's Grebes - Saving the Last Dance

I. *Aechmophorous* Grebes – two closely related, conspicuous black and white waterbird species with nearly identical life histories.

II. Species Identification
    a. Western Grebes are distinguished from Clark's Grebes by having a black cap extending below the eye, dark sooty-colored flanks, and a yellowish-green bill. The Western Grebe's advertising call is a two note rolling *cree creet*.
    b. Clark's Grebes are identified by white extending above and surrounding the eye, light sooty-colored flanks, and a yellow-orange bill. The Clark's Grebe's advertising call is a single note *creet*.

III. Life History
    a. The Annual Cycle
        i. Most *Aechmophorous* grebes winter along the Pacific coast from Washington state south to southern Mexico.
        ii. In early spring (March-May) they begin migrating east and north to inland bodies of water to breed, nest, and rear their young.
        iii. Once at the breeding grounds the birds begin seeking out a mate and forming nesting colonies (April-June). Nests are built, eggs laid and incubated, and young reared (late April-late September).
        iv. When breeding has concluded, grebes prepare for migration back to the Pacific Ocean (mid October-November).

b. Habitat and Food
    i. Typical breeding habitat consists of large bodies of fresh water with extensive areas of open water bordered by emergent vegetation.
    ii. Important factors in determining good nesting/breeding habitat include extensive areas of emergent vegetation that are protected from wind and waves, depth of water and type of nesting substrate, as well as open areas for foraging and adequate and available prey.
    iii. Prey primarily consists of small fish and aquatic insects.
c. Breeding Phenology
    i. *Aechmophorus* grebes are colonial nesters. This means that they nest in small to large groups. Western and Clark's Grebes are typically found nesting together and may occasionally interbreed.
    ii. They have among the most complex and elaborate courtship rituals known in the avian world. Probably the most climatic and exciting of these is called "rushing," where a pair of courting grebes rush across the water's surface on their feet with their bodies up and out of the water, often ending with the pair diving head first into the water.
    iii. Western and Clark's Grebes build floating nest platforms from emergent and submergent vegetation. Nest is built by both the male and female and is maintained throughout the nesting period. Nest is typically anchored to emergent or floating vegetation. Final structure is a rather solid mound with a shallow depression for the eggs.
    iv. Eggs are laid within 1-3 days of nest completion. A clutch of 1-6 eggs is laid at 1-2 day intervals. Both pair members alternate incubating and defending nest for 22-24 days.
    v. Young are precocial at birth, meaning that they are fully feathered, eyes open, and are soon physically able to move about on their own. Soon after hatching a chick climbs beneath the back feathers of the parent. Hatched broods leave the nesting area on their parent's back. Back-brooding continues for 2-4 weeks post-hatching. At this time, larger broods are often divided between parents. Young are dependent upon parental care for 6-7 weeks, occasionally longer.

IV. History of Population Numbers and Trends
a. Largest number of *Aechmophorus* grebes reported during Audubon Christmas Bird Counts has numbered 118,000. Total North American population presumably higher.
b. In California, several key nesting sites reported thousands of nesting grebes in the early to mid 1900s.
c. Decreases in population numbers has been a combination of market hunting in the 1890s and habitat loss, especially in California where over 90% of the state's historic wetlands have lost, resulting in a reduction in available and effective breeding sites.

V. Recent Changes
a. There has been evidence of declines at some breeding areas, and some wintering populations have declined 5% per year over the past 20 years.
b. Pesticides such as DDD and DDT, and heavy metal contamination have impacted grebe productivity at some nesting sites, including Clear Lake, CA.

c. Drainage of lakes and wetlands for agricultural purposes has impacted availability and suitability of nesting habitat at historic breeding sites.
d. Adaptation to nesting at reservoirs where habitat is limited, water levels are not reliable, and boating recreation can also cause problems.
e. Wintering grebes along the Pacific Coast often exposed to contaminants are extremely vulnerable to oil spills.

VI. Trouble on Breeding Grounds
a. Activity in and near colonies, especially in the early stages of colony formation, can lead to nest abandonment, increased egg predation, and even entire colony failure.
b. Low-lying floating nest platforms are highly susceptible to destruction by boat wakes and wave action.
c. Changes in water level may cause nest abandonment if nests become stranded.
d. Grebes may become entangled in discarded fishing line and other trash.
e. Speeding boats may cause mortality of adults and chicks through boat and prop strikes. Additionally, back-brooding young can become separated from parents during a disturbance event; this may lead to chick mortality as the young grebes cannot yet maintain body temperature, dive, or swim for long on their own.

VII. How We can Help the Grebes
a. Avoid nesting areas during the sensitive and critical nesting period, typically between April and September.
b. Post "No Wake" zones 100m from colonies. Respect speed limits and posted buoy markers.
c. Stay at least 300 feet away from active colonies and avoid prolonged presence near nesting grebes.
d. Minimize boat wakes by moving slowly and quietly if near nesting areas.
e. Watch for grebes on open water to avoid striking grebes and their young.
f. Clean up old fishing line and other trash.
g. EDUCATE others about the importance of *Aechmophorus* grebes and protecting these birds and their habitat !!!

[1-iv] INTERPRETIVE SIGNS – PHOTOS AND INFORMATION ON PLACEMENT LOCATIONS AND MAINTENANCE PLANS

INTERPRETIVE SIGNS – DESIGN TEMPLATES AND MAINTENANCE PLANS

- Currently in computer draft only. Three template designs included on CD.
- Propose that sign placement occur at all State and County launch site facilities, as well as private marinas/launch sites where an owner/manager has agreed to posting and maintenance.
- Plans for 2006 include placing order for final draft of sign, contacting State, County, and private personnel regarding sign posting, installing signs at launch sites, and formalizing maintenance plans.
- Maintenance will be provided via funds from this proposal to supply the initial needed signs as well as additional signs for replacement (limited by budget). Suggest that additional funds be secured through ATTC, CDFG-OSPR, Joint Venture groups, Lake County, and potentially Redbud Audubon to continue long-term supply maintenance.
- Manual maintenance of signs and sign condition at State and County launches to be provided by appropriate officials; maintenance at private launches suggested via volunteer support through Lake County and Redbud Audubon and/or volunteers from UC Davis.

INTERPRETIVE SIGNS – PLACEMENT LOCATIONS

Public Boat Ramps

#11 - Clear Lake State Park
Swimming, camping, picnic, boat ramp/docks, fishing, hiking, birdwatching, visitor center, restrooms.
5300 Soda Bay Rd, Kelseyville, CA (707) 279-4293

#4 - Alpine County Park
Playground, lake swimming, fishing, unimproved boat launch, restrooms
5985 Hwy 20, Lucerne, CA (707) 262-1618

#6 - Clearlake Oaks Beach County Park
Picnic, lake swimming, beach, playground, fishing pier, boat launch facility
12684 Island Dr., Clearlake Oaks, CA (707) 262-4293

#2 - H.V. Keeling County Park
Playground, picnic, lake swimming, unimproved boat ramp, restrooms
1000 Lakeshore Blvd., Nice, CA (707) 262-1618

#12 - Lakeside County Park
53 Acres; picnic, playground, lake swimming, boat ramps, ball fields, fishing, horseshoe pits, restrooms
1985 Park Dr., Kelseyville, CA (707) 262-1618

#5 - Lucerne Harbor County Park
Picnic, playground, boat ramp, breakwater fishing pier, restrooms
6225 E. Hwy 20, Lucerne, CA (707) 262-1618

#1 - Rodman County Park
40 acres; natural setting for birdwatching, canoeing, picnic, fishing, hiking, unimproved boat ramp
Off Hwy 20 on the Nice-Lucerne cutoff (707) 262-1618

#14 - Library Park
Picnic, lake swimming, three boat ramps, docks, playground, restrooms
222 Park St., Lakeport, CA (707) 263-5615

#7 - Redbud City Park
Restrooms, boat launch, picnic, ball field, clubhouse, fishing pier, parking
14655 Lakeshore Dr., Clearlake, CA (707) 994-8201

Private Boat Launches

#9 - Braito's Buckingham Marina
Boat repair and maintenance, boat launch.
1555 Eastlake Drive, Kelseyville, CA 95451 (707) 279-4868

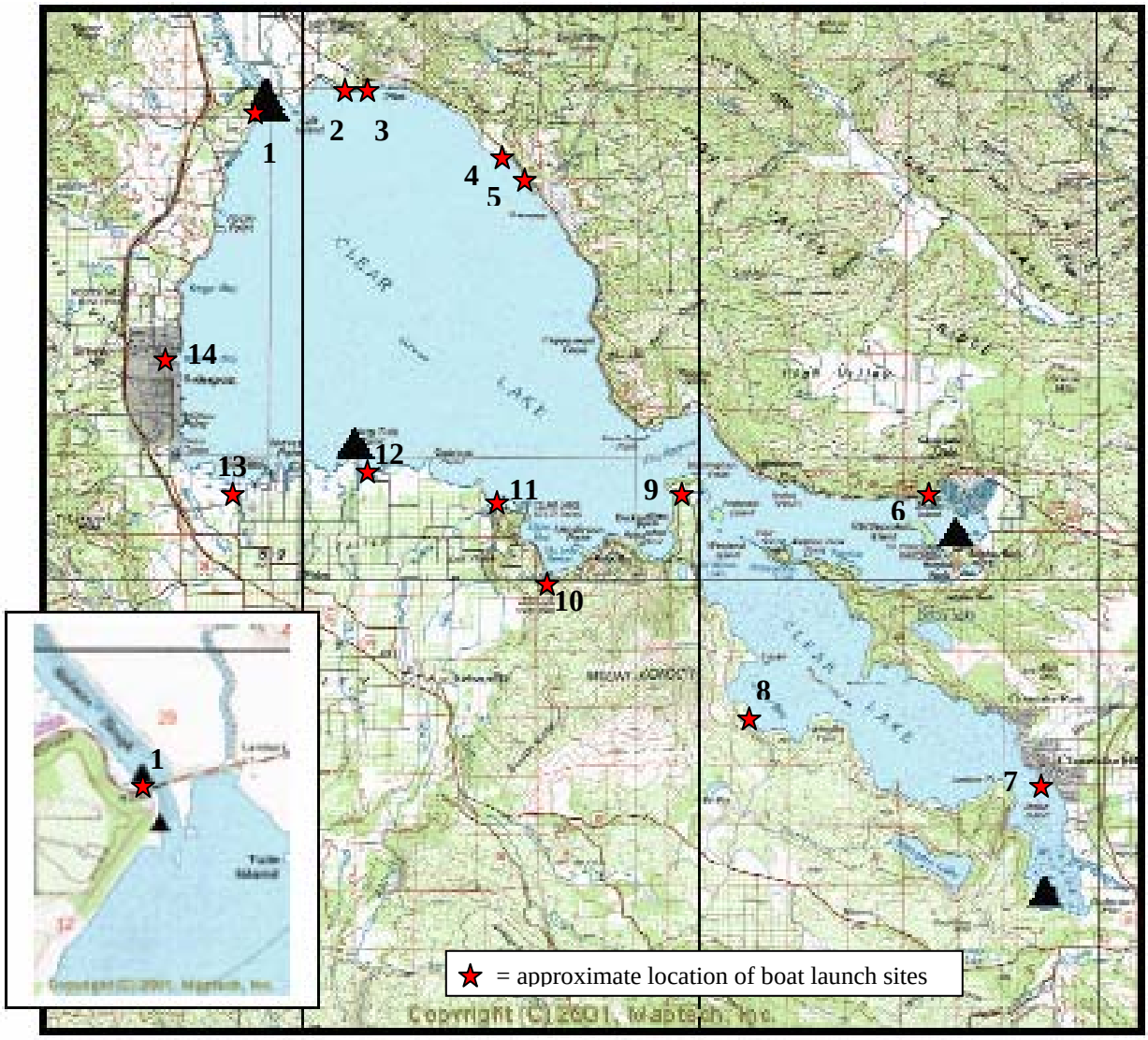
#10 - Ferndale Resort & Marina
Full-service marina, gas, boat ramp, boat slips, bait and tackle, boat rentals, motel units w/kitchens, cable TV.
6190 Soda Bay Rd., Kelseyville, CA 95451 (707) 279-4866

#3 - Holiday Harbor RV Park and Marina
Boat ramp, mooring slips, marine gas.
3605 Lakeshore Drive, Nice, CA 95464 (707) 274-1136

#8 - Konocti Harbor Resort and Spa
8727 Soda Bay Rd., Kelseyville, CA 95451 (707) 279-4281 or 800/660-LAKE

#13 - Konocti Vista Casino Resort and Marina
2755 Mission Rancheria Road, Lakeport, CA 95453 (707) 262-1900 or 800/FUN-1950

Map 1. Map of public and private boat launch sites on Clear Lake, CA.



[1-v] BUOY MARKERS – INFORMATION ON DESIGN, PLACEMENT LOCATIONS, AND SUMMARY OF CONTACTS, EFFORTS, AND APPROVALS

BUOY MARKERS - CONTACTS AND EFFORTS

- Primary contact for buoy markers is with Lake County. Contact regarding buoy maintenance is Skip Simpkins, Water Resources / Lakebed Management.
- Status of the buoy marker portion of the proposal was postponed in 2005 due to time and political constraints. Adequate time to prepare a proposal, get approval for permitting process, and get approval from the County Board of Supervisors was not available to permit installation of buoy markers at active nesting areas in sufficient and appropriate time as to provide colonies with adequate protection. It was also clear that there was opposition/hesitation from the angling contingent using Clear Lake.
- Further, each of the historical/potential nesting areas used by grebes currently has buoy ordinances in place. These ordinances are primarily "Fish Area <5mph" buoy markers, with a few areas posting "Slow No Wake" buoy markers.
- Upon further discussion of placing additional and/or different buoy markers, it became clear that there is currently disagreement of the interpretation and enforcement of the waterway regulations between the County and the local Sheriff Department.

BUOY MARKERS - DESIGN DESCRIPTION

- The figure at right is an example of what a typical buoy marker may look like. Alternate wording (such as the aforementioned Fish Area <5 mph) may be substituted.
- Discussion with CDFG-OSPR officials brought up concerns for not having buoy markers specifically addressing the nesting areas and their sensitivity. The conclusion was that such an effort may have to be primarily handled through CDFG-OSPR, including coordination with Lake County on placement and maintenance.

Figure 1. Slow No Wake buoy marker.

MAP OF CURRENT AND PROPOSED BUOY MARKER LOCATIONS

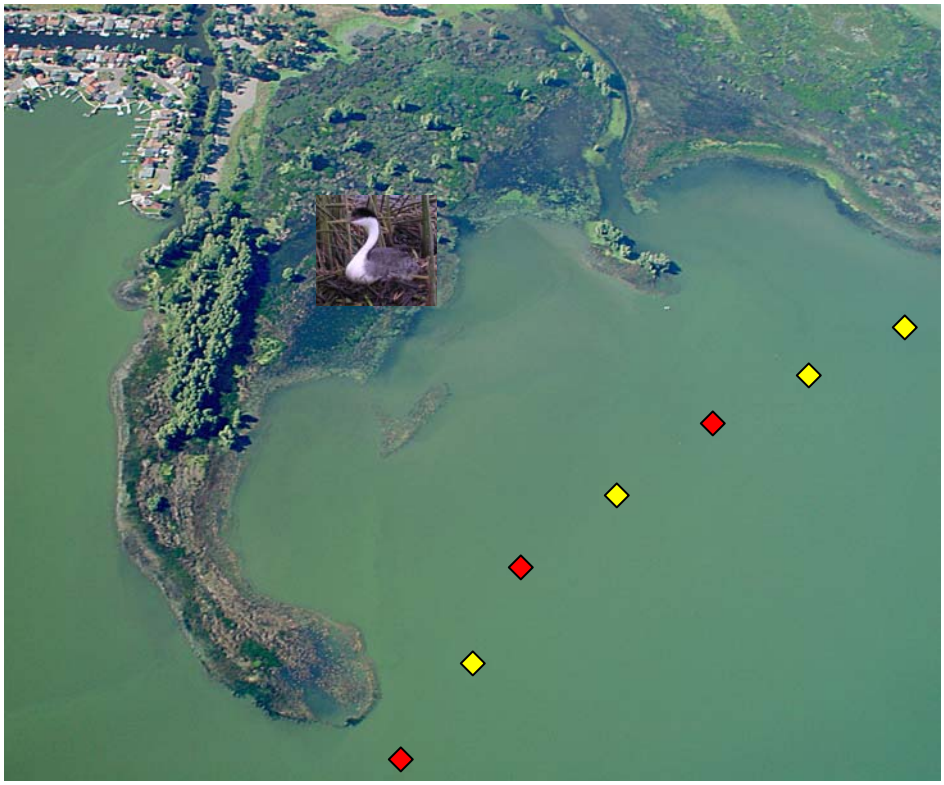
◆ = present buoy locations (primarily are Fish Area <5mph buoys)

◇ = proposed additional buoys

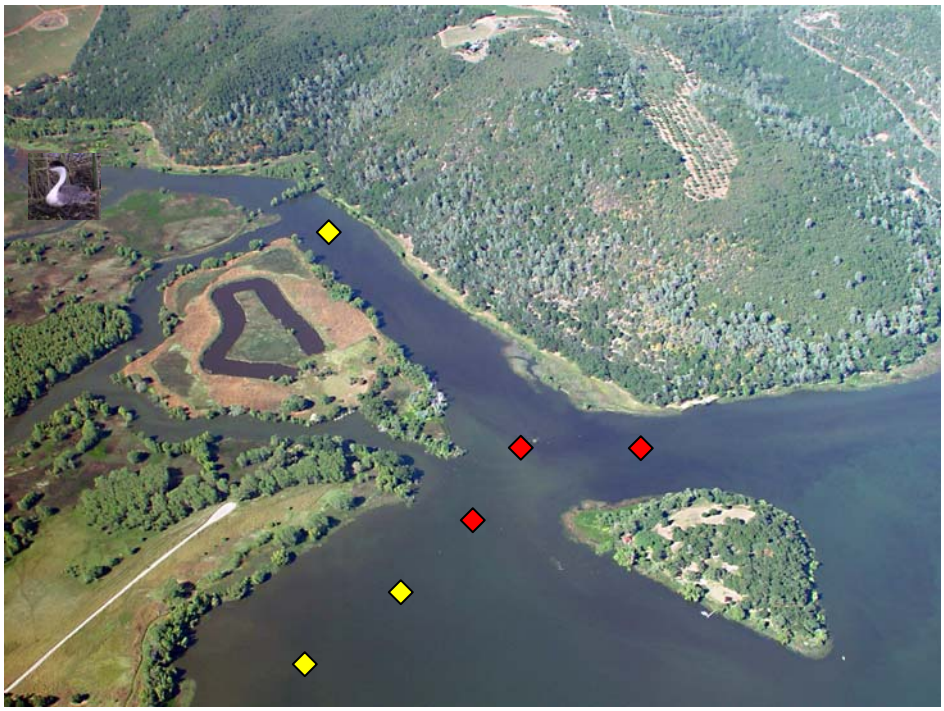
Rodman Slough

Rumsey Slough

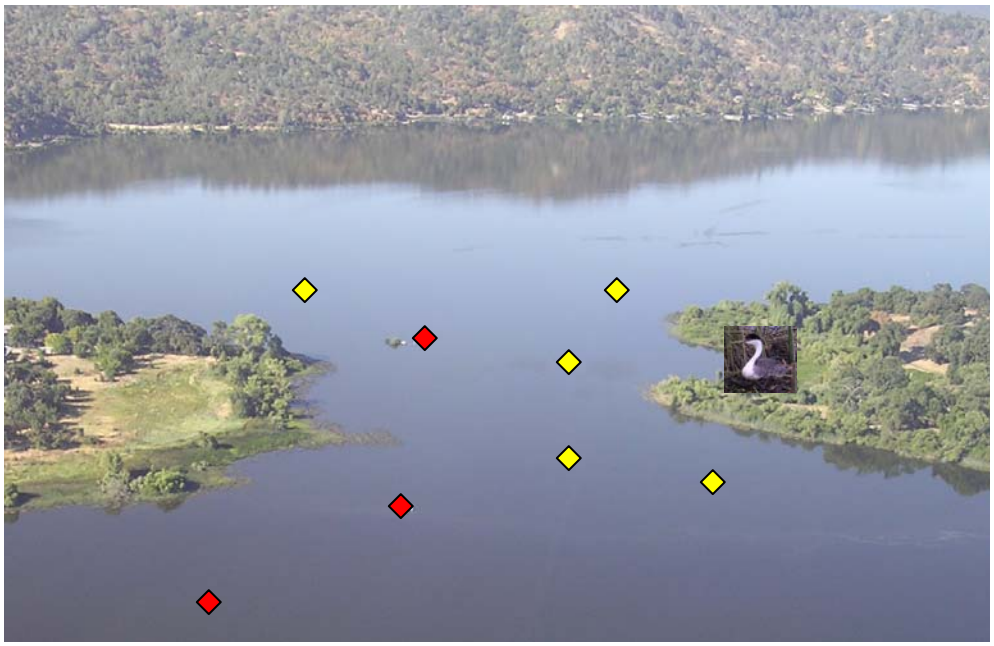
Long Tule Point and McGough Slough



Anderson Marsh



Rattlesnake Island



[2] RESULTS OF MONITORING GREBE BEHAVIOR AND DISTURBANCE EVENTS

**Raw data in the form of copied survey forms (Disturbance Index Surveys, Reproductive Surveys, and Aerial Surveys) (provided upon request) and Excel spreadsheets (Scan Surveys and Nest Surveys) (included on CD). Analyzed and summarized data is not yet completed. Results will be made available in a subsequent report.

SCAN SAMPLES

- Surveys were conducted regularly at the three active nesting colonies (Anderson Marsh, Long Tule Point, and Rodman Slough) between 11 May – 28 June 2005 and between 16 August – 15 September 2005 (interruption due to stolen boat motor).
- Surveys were conducted at least once at historic/previous nesting sites (Rattlesnake Island, McGough Slough, Rumsey Slough, and Manning Creek).
- Tabulated data in Excel included on CD (2005 Data).

DISTURBANCE INDEX SURVEYS

- Disturbance Index Surveys were conducted during Scan Sample Surveys at similar frequencies and durations.
- Data not yet in computer format. Copies of survey forms available upon request.

NEST SURVEYS

- Nest Surveys commenced on 14 June 2005 at the three active nesting colonies.
- Surveys continued until conclusion of nesting period which varied among colonies (Anderson Marsh: 8 September, Long Tule Point: 16 September, and Rodman Slough: 24 August).
- Transects were used for surveys at Anderson Marsh and Long Tule Point due to their large size. All nests were surveyed at Rodman Slough.
- Tabulated data in Excel included on CD (2005 Data).

REPRODUCTIVE (BROOD) SURVEYS

- Brood Surveys were conducted twice during the breeding season (8 July and 18 August 2005) following protocol used in previous brood surveys at Clear Lake (per Dan Anderson).
- Data not yet in computer format. Copies of survey forms as scanned documents on CD (2005 Data).

AERIAL SURVEYS

- Aerial Surveys were conducted on three occasions to get estimates of grebe numbers and active nesting areas.
- Initial flight was on 6 April 2005, and noted the following: 100+ grebes in the Anderson Marsh vicinity, 1150+ grebes in the Long Tule Point area, and 50+ grebes in the Rodman Slough region, with additional grebes seen staging in open areas. Active nesting was not visible, though birds did appear to be staging heavily in previous nesting areas, indicating a potential early nesting effort as observed in 2004.
- Second flight occurred on 3 May 2005. Two observers and pilot were in aircraft while one observer was stationed at the Long Tule Point nesting colony. Purpose of flight was to observe reactions of grebes to low flying aircraft. Active nesting grebes did not appear to respond significantly to the aircraft. Conversely, grebes staging in open water areas near the colony appeared to become more alert and/or respond in some form to the presence of the aircraft.
- Third flight occurred on 27 June 2005. Observed 200-300+ grebes in the Anderson Marsh colony and an additional 200-250 birds near Indian Island, 25-50 grebes in the Rattlesnake Island area, 150+ grebes south of the Rodman Slough bridge, 600-1000 grebes in the open water NE of Rodman Slough, majority of birds observed at Long Tule Point still greater than 1000 with an additional 200-300 in adjacent open water. May have also observed a very small possible nesting effort in the Quercus Point area.
- Additional field notes (Daniel W. Anderson, UC Davis) available upon request.

[3] EVALUATION OF EFFECTIVENESS OF MONITORING AND MANAGEMENT EFFORTS

Analysis and comparisons with other data is not yet completed. Currently, results of 2005 surveys are being prepared for analysis. Once analysis is completed, comparisons will be made to previously collected data and effectiveness of management and survey efforts will be evaluated, as appropriate. Expected time of completion is 1 June 2006.

[4] WORKING TOWARD LONG-TERM MONITORING

AGENCY AND ORGANIZATION CONTACTS FOR MONITORING EFFORTS

The following agencies or organizations are contacts that may be able to provide monitoring assistance during the long-term efforts of this project.

- **CDFG** – intern/temporary field assistant positions
- **Lake County** – buoy and sign maintenance
- **Redbud Audubon** – volunteer efforts
- **UC Davis** – internships for undergraduate students, research assistantships

MONITORING PROTOCOLS

All surveys are conducted from a small motor-powered boat, kayak/canoe, or small fixed-wing aircraft.

Health and Safety Safety guidelines and boating regulations should be carefully followed. Be sure boat or kayak/canoe meets standard regulations and all persons traveling in watercraft have a personal floatation device readily available in case of emergency. Person(s) operating the watercraft are responsible for the safety of themselves and those riding in the watercraft with them; they are also responsible for knowing the current boating rules and regulations and for maintaining the watercraft in a safe operating condition. If hired or working under contract at UC Davis, all boat operators are required to complete a boat safety certification course through the university as well as complete and follow IIPP guidelines established by UC Davis.

The following pages include protocols for the surveys listed below:

- **Behavioral Surveys**
  - **Scan Sample Surveys**
  - **Focal Sample Surveys** (optional)
- **Disturbance Surveys**
- **Nest Surveys**
- **Reproductive (Brood) Surveys**
- **Aerial Surveys**

SCAN SAMPLE SURVEYS

PURPOSE: To observe and record instantaneous behavior of a large group of birds by scanning the flock and recording each individual's behavior according to pre-determined behavioral categories. Result is a representation of the distribution of behavior at a particular time, often expressed in proportions.

Survey Season: Scan Surveys should be conducted weekly at each colony, alternating between morning and afternoon observations. Surveys should commence when birds have started nesting and conclude at the end of the nesting season.

Time required to complete survey: Allow approximately one hour, not including travel to and from colony. Keep in mind that each colony often has more than one observation point, thus allow at least one hour PER OBSERVATION POINT to complete a full survey. Typically, a full morning or afternoon should be devoted to completing all surveys for a colony. A minimum of 30 birds should be present at a given observation point.

Personnel/Observers Needed: A minimum of one observer or maximum of one observer and one recorder. Observer and recorder must have bird identification experience, be able to differentiate between similar bird behaviors, be proficient at using/operating binoculars, and be able to accurately record verbal data.

Equipment Needed:

- 15' motor-powered boat (bimini shade recommended) and adequate safety equipment
- Scan Survey data forms
- Clipboard
- Pencils
- Binoculars
- Voice recorder (for single or inexperienced observers), spare tapes and AA batteries

Site Assessment: Colony site should be visited and assessed prior to conducting Scan Surveys. Size/shape and accessibility of colony will determine the number of observations points for surveys. Often, colonies are too large to be able to scan from a single location. In these cases, it is suggested that multiple (typically two or three) locations are chosen in order to sample as many of the birds as possible, while also reducing the chance of re-sampling birds (i.e., reducing overlap between observation points).

Survey Procedure:

1. Arrive at observation point. Drop anchor to keep boat in place.
2. Wait for a period of 5-10 minutes to let birds become accustomed to boat/observer presence. During this time, fill out data forms and prepare voice recorder, if necessary.
    - Single Observer – In this case, the observer has to be both the observer and recorder. Use the voice recorder to record your verbal call-outs.
    - Two Observers – In this case, one person is the Observer and the other the Recorder. The Observer will scan the group of birds while the Recorder writes down each verbal call-out.
3. Begin at chosen Start Time by scanning the group of birds from left to right (or right to left), calling out each individual bird's behavior. Each Scan Survey consists of 5 scans of the group, where scans are spaced at 10-minute intervals (i.e., observer needs to begin a scan every 10 minutes, repeating a total of 5 times).
   Tip: Occasionally, the group of birds is too large to scan within the 10-minute time interval. In these cases, it is suggested that the observer does one of the following, depending on experience and comfort with estimating numbers of individuals: (1) randomly pick and chose as many individuals as is comfortable or (2) estimate and group larger numbers of birds behaving similarly (i.e., 10 sleeping, 20 swimming, 2 courting, etc.).
4. Once Scan Survey is complete, complete survey form (voice recorded data may need to be translated at a later time), pull up anchor, and move to next observation point. Repeat Scan Survey at each observation point for a given colony until all locations have been surveyed.

FOCAL SAMPLE SURVEYS

PURPOSE: To observe and record instantaneous behavior of a randomly-selected individual bird by watching and recording the individual's behavior according to pre-determined behavioral categories. Result is a continuous representation of the behavior during the recording period and allows for the calculation of frequency and duration of each behavior.

Survey Season: Focal Surveys should be conducted weekly at each colony, alternating between morning and afternoon observations. Surveys should commence when birds have started nesting and conclude at the end of the nesting season.

Time required to complete survey: Allow 5 minutes per focal observation, not including travel to and from colony. Typically, a focal observation is conducted prior to or after a Scan Survey.

Personnel/Observers Needed: A minimum of one observer or maximum of one observer and one recorder. Observer and recorder must have bird identification experience, be able to differentiate between similar bird behaviors, be proficient at using/operating binoculars, and be able to accurately record verbal data.

Equipment Needed:

- 15' motor-powered boat (bimini shade recommended) and adequate safety equipment
- Focal Survey data forms
- Clipboard
- Pencils
- Binoculars
- Voice recorder (for single or inexperienced observers), spare tapes and AA batteries
- Stop Watch or Timer

Site Assessment: Colony site should be visited and assessed prior to conducting Focal Surveys. Size/shape and accessibility of colony will determine the number of observations points for surveys. It is suggested that Focal Surveys be conducted from the same pre-determined observation points that are used for Scan Surveys.

Survey Procedure:

1. Arrive at observation point. Drop anchor to keep boat in place.
2. Wait for a period of 5-10 minutes to let birds become accustomed to boat/observer presence. During this time, fill out data forms and prepare voice recorder, if necessary. Set Stop Watch for 5 minutes.
    a. Single Observer – In this case, the observer has to be both the observer and recorder. Use the voice recorder to record your verbal call-outs.
    b. Two Observers – In this case, one person is the Observer and the other the Recorder. The Observer will observe the focal animal while the Recorder writes down each verbal call-out.
3. Begin by randomly choosing an individual bird (this can be done in a number of ways: random numbers table, rolling a die, flipping a coin, etc.). Once bird is chosen, start Stop Watch (and voice recorder, if applicable) and call out the bird's initial behavior. Each time the bird changes behavior, call out the change. Continue the process continuously for the 5 minute period until the timer marks the end of the survey period.
4. Once Focal Survey is complete, complete survey form (voice recorded data may need to be translated at a later time), pull up anchor, and move to next observation point. Repeat Focal Survey at each observation point for a given colony until all locations have been surveyed.

DISTURBANCE INDEX SURVEYS

PURPOSE: To observe and record human activity in and around nesting grebe colonies. The result is a representation of the level of activity, or disturbance, in and around a nesting colony, and the proportional reaction of the birds to the disturbance event(s).

Survey Season: Disturbance Index Surveys should be conducted weekly at each colony, alternating between morning and afternoon observations. Surveys should commence when birds have started nesting and conclude at the end of the nesting season.

Time required to complete survey: Allow approximately one hour, not including travel to and from colony. Disturbance Index Surveys can be conducted in conjunction with, or separate from, Scan and Focal Surveys, as long as the Observer(s) can accurately record disturbance events when they occur. Typically, a full morning or afternoon should be devoted to completing all surveys for a colony. A minimum of 30 birds should be present at a given observation point.

Personnel/Observers Needed: A minimum of one observer or maximum of one observer and one recorder. Observer and recorder must have bird identification experience, be able to differentiate between similar bird behaviors, be able to identify different forms of vehicular water traffic as well as watercraft direction, distance, and speed, be proficient at using/operating binoculars, and be able to accurately record verbal data.

Equipment Needed:

- 15' motor-powered boat (bimini shade recommended) and adequate safety equipment
- Disturbance Index Survey data forms
- Clipboard
- Pencils
- Binoculars
- Camera (to document disturbance events as needed)

Site Assessment: Colony site should be visited and assessed prior to conducting Disturbance Index Surveys. Care should be taken to select observation points where the study boat will not interfere with normal water traffic. Similarly, study boat should not be located where it will interfere with grebe colony activities.

Survey Procedure:

1. Arrive at observation point. Drop anchor to keep boat in place.
2. Wait for a period of 5-10 minutes to let birds become accustomed to boat/observer presence. During this time fill out data forms.
    - Single Observer – In this case, the observer has to be both the observer and recorder.
    - Two Observers – In this case, one person is the Observer and the other the Recorder. The Observer will watch for disturbance events while the Recorder writes down observations.
3. Begin at chosen Start Time. Watch for and record water and air traffic caused by humans, as well as any events that are non-human (such as predatory birds flying overhead) that may result in reaction from the colony. Watch for a reaction (alertness, evasive swimming/diving, or flushing by multiple birds) and record according to data form.
4. Once Disturbance Index Survey is complete, complete survey, pull up anchor, and move to next observation point. Repeat Disturbance Index Survey at each observation point for a given colony until all locations have been surveyed.

NEST SURVEYS

PURPOSE: To observe and record active nests at a colony in order to determine nesting success of the colony location. Nest success can be compared to Behavioral Surveys and Disturbance Index Surveys to evaluate whether there is correlation between nest success and behavioral time budgets and/or disturbance levels. Once nest success for a colony has been established and appropriate and/or necessary protection measures are in place, these surveys will not be required.

Survey Season: Nest Surveys should be conducted every 7-10 days. Surveys should commence when birds have started nesting and conclude at the end of the nesting season.

Time required to complete survey: Allow at least one, maybe two, full days to set up initial survey. Subsequent surveys may take anywhere from a couple hours to a full day depending on size of colony, time of season, number of observers, distance to colony, and weather.

Personnel/Observers Needed: A minimum of one observer, though at least two observers is *strongly* recommended in order to reduce work load. Observer(s) must have bird identification experience, be able to mark and relocate nests, be a meticulous recorder, be observant to detail, and be comfortable working for several hours from a kayak or canoe (kayak recommended).

Equipment Needed:

- Kayak, paddle, and PDF
- Tool to measure water depth (1-2" PVC piping works well)
- Flagging (yellow works well) – bring at least 2 rolls/survey
- Sharpie pen (several)
- Field Notebook (waterproof strongly suggested)
- Pencils
- Compass (for colonies where transects are appropriate)
- Binoculars and Camera
- GPS (optional – to record nest locations)
- WATER and food !!!
- Hat, long sleeve shirt/pants, and sunscreen are also strongly suggested

Site Assessment: Colony site should be visited and assessed prior to conducting Nest Surveys. Size/shape and accessibility of colony will determine whether a full colony Nest Survey is appropriate or if transects are needed. Smaller colonies (<100 nests) should utilize a complete nest count survey, while larger colonies (>100-200 nests) should utilize randomly-spaced transects for surveying nests.

Survey Procedure:

1. Arrive at colony. If colony location is distant from nearest boat or other suitable launching site, kayak can be loaded in motor-powered boat, driven out to colony, and loaded from there. If this method is used, take care to either (1) have someone drop you off and arrange for pick up later or (2) anchor motor boat in a somewhat secluded location while conducting nest survey.
2. If conducting a **complete** nest survey, begin at one edge of colony and work way through colony searching for and marking nests. If conducting a **transect** nest survey, first decide how many transects are appropriate for the colony. Secondly, randomly select general locations for each transect, with all transects running parallel to one another (use compass to keep on track). Then, start each transect from an outside edge of the colony, marking all nests 5m to either side of transect.

a. Single Observer – In this case, there is only a single person conducting the nest survey. This is appropriate for smaller colonies or later in the season when the number of active nests decreases.
b. Two (or more) Observers – This is appropriate for small and larger colonies, but is especially suggested for larger colonies where a single nests survey can take many hours. In this case, Observers should divide up work load and communicate progress along the way.

3. Nests should be marked using flagging with a pre-determined alpha, numeric, or alpha-numeric combination code. Flagging should be attached to nearby vegetation (usually tule) about 1m (3 ft) above water, but not directly over nest. Flagging should have enough 'tail' so as to be readily visible to observer for subsequent visits.
4. Other data to be recorded includes:
    a. **Species** – if possible, determine what species (Western or Clark's Grebe) the nest belongs to. Often, this is easiest by trying to observe nest from a distance before approaching to record data. At very least, make sure it is *Aechmophorus*.
    b. **Number of eggs** – Record the number of eggs present in the nest bowl. Slightly blue or very white eggs typically signify fresh eggs (<2 days old), whereas darker or brownish eggs (stained from being rolled in nesting material) are typically older eggs. **Tip:** Chicks will occasionally "call" from eggs 1-2 days before hatching, and often carefully rolling/rocking eggs can induce them to "call," which can help make hatching fates easier to determine.
    c. **Water Depth (cm)** – using a measured PVC pipe or some other measuring tool, record the depth of the water below the nest.
    d. **Nearest Neighbor (cm)** – using measured PVC pipe, record the distance to the next nearest nest.
    e. **Vegetation Type** – record primary nesting material used.
    f. **Fate** – Often the most difficult parameter to determine. Look for evidence of **hatching** (shell fragments or pieces in nest bowl; may also be buried in nesting material so dig away!), **predation** (holes punctured in eggshells, yolk/blood presence, dead chicks, observation of predation), **abandonment** (eggs that are cool to the touch or remain white for several visits), **inundation** (nest bowl filling with water or falling apart), or some **other** consequence.
5. Once Nest Survey is complete, make sure to go back through notes and fill out any missing information.

REPRODUCTIVE (BROOD) SURVEYS

PURPOSE: To obtain an index of annual productivity through estimates of the ratio of adults to young of the year and brood sizes (these are the most frequently used measures in the grebe literature, so we have tried to obtain data comparable to what has been published). We do this by observing and recording the number of young per brood, their age-structure, and number of adults with and without young in order to assess overall reproductive success of the breeding site (i.e., Clear Lake).

Survey Season: Early-season reconnaissance surveys should be made approximately monthly from about May-on. Once activity has been confirmed, brood surveys should be conducted at least once, preferably twice or more frequently, during the breeding season. The degree of breeding synchrony will determine how many surveys are required to obtain a representative sample. Surveys should be scheduled approximately 2-3 weeks after the first young are observed. Subsequent Brood Surveys should be conducted every 4-6 weeks after the initial survey.

Time required to complete survey: Typically, a full morning, and likely a full day, should be devoted to completing a Brood Survey. Often, more time is required depending on abundance of birds present. Weather often determines whether a survey can be conducted as foul weather can make observations more difficult. It is recommended to conduct Brood Surveys on clear, calm days with little or no wind forecasted when the birds are dispersed onto the lake.

Personnel/Observers Needed: A minimum of one observer and one recorder (preferably two more to cover both sides of the boat) are required. It is often helpful if a third person is available to operate and navigate the boat, as well as a fourth person acting as the official data recorder, and to help confirm observations. Observers and recorder must have bird identification experience, be able to differentiate between Western and Clark's Grebes, be proficient at using/operating binoculars, be able to accurately estimate distances, and be able to accurately call-out and record verbal data.

Equipment Needed:

- 15' motor-powered boat (bimini shade recommended) and adequate safety equipment
- Brood Survey data forms
- Clipboard
- Pencils
- Map of breeding site (i.e., Clear Lake)
- Binoculars
- WATER and food !!!
- Hat, long sleeve shirt/pants, and sunscreen are also strongly suggested

Site Assessment: If conducting a Brood Survey at a location where surveys have been conducted in the past, it is recommended that the same route(s) be used for consistency of data collection. At sites that have no survey history, it is recommended that a survey route be selected prior to start of survey. A route that is appropriate would include transects covering open water areas where adults and broods are known to disperse and feed.

Survey Procedure: The survey is essentially a fixed-width line transect and all birds within either a 200m or 100m zone on each side of the boat are surveyed. Data recorded include: species ID (CLGR, WEGR, or UNK), sizes and ages (1/4, 1/3 , 1/2, 2/3, 7/8, or full) of all broods, an accounting for all single birds (both adults and young), weather conditions, and other standard data (see the data form for more detail, original ATTC proposal). Numbers are tallied for each transect and summed for the entire lake on the summary sheet (example attached).

In summary, the procedure is as follows:

1. Start at pre-determined starting point. Mark location on survey map and GPS location and transects if possible.

2. Drive boat at 5-10 mph along survey route, varying speed as needed depending on number of birds to be observed and recorded.
3. Record birds by the following guidelines stated above and as shown on data sheet.
4. Once Brood Survey is complete, complete survey form and sill out summary sheet.

AERIAL SURVEYS

**Aerial surveys are also conducted if survey planes are available. In the past, they have been available annually through California Department of Fish and Game.

PURPOSE: To estimate and record the number of birds present at a breeding site (i.e., Clear Lake). Also, to document areas of active nesting and estimate the number of nests.

Survey Season: Aerial Surveys should be conducted at least twice during the breeding season. Initial visit should be early in the season in order to locate active nesting areas for monitoring purposes. Within a week of Aerial Surveys, ground surveys by boat should be conducted to confirm numbers and nesting activity. Subsequent Aerial Surveys should be conducted every 6-8 weeks after the initial survey to confirm numbers and timing of nesting activity.

Time required to complete survey: Typically, a full morning or afternoon should be devoted to completing survey, including travel time to and from breeding site. Weather often determines whether a survey can be conducted. It is recommended to conduct Aerial Surveys on clear, calm days with little or no wind forecasted.

Personnel/Observers Needed: A minimum of one observer should ride with the pilot. It is often helpful if a second person is available to observe from the opposite side of the plane. Observers must have bird identification experience, be able to estimate large numbers of birds or nests from the air, be able to accurately record observations, and be comfortable riding in small aircrafts.

Equipment Needed:

- Survey plane and certified pilot (i.e., CDFG)
- Field Notebook
- Pencils
- Map of breeding site (i.e., Clear Lake)
- Camera and Binoculars

Site Assessment: Aerial Survey is typically used as the first initial site assessment of the breeding area.

Survey Procedure:

1. Fly to a pre-determined starting point.
2. Fly plane at approximately 500 ft altitude over land/water. Work way along shoreline of breeding location, carefully watching for birds congregating on the open water and in shoreline vegetation. When nesting activity is located, the plane should be circled at 300-500 ft altitude in order to accurately estimate birds and/or nests.
3. Estimate and record numbers of birds and nests. Identify active nesting areas for further monitoring. Photograph active nesting areas completely for documentation and confirmation of visual estimates.
4. Once Aerial Survey is complete, write down additional information and cross check numbers with other observers.

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[6] SUGGESTED ADAPTATIONS OR UPDATES TO IVEY (2004)

Once a protection program has been established, detailed monitoring (as outlined in this report) can be replaced by broad surveys of the breeding site including mapping and periodic monitoring of the active nesting sites and other important activity areas.

Periodic detailed investigation (as outlined in report) and surveillance should be conducted in order to make needed/necessary adjustments of buoy marker placement, sign locations, and other outreach activities.

For the future, it would be appropriate to monitor distribution and health of tule and bulrush habitat in order to maintain (and possibly increase by planting) adequate grebe and other wildlife habitat. This is of concern at Clear Lake because of the increase in lakeshore development and the demand for lakeside property.