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ECOLOGICAL CONSULTANTS

BIOTIC CHARACTERIZATION OF CLARK SLOUGH AND "BALLOON TRACT"

Prepared by

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INFORMATION ABOUT EXPERTS

Scott B. Terrill, Ph.D., Principal-in-charge, Wildlife Ecology

I am a Vice President and Senior Ornithologist for H. T. Harvey and Associates, an ecological consulting firm in business since 1970. I have been with the company since 1990. I am also an Adjunct Professor at San Jose State University. I was an Assistant Professor at Siena College and am Adjunct Professor at the State University of New York in the late 1980's. I am an Alexander von Humboldt Research Fellow and I spent 1987-88 conducting research on avian behavioral ecology at the Max-Planck-Institute in Germany. I have served 4 elected terms (12 years) on the California Bird Records Committee and I am a Northern California Regional Editor for the journal North American Birds. I was the Research Director for Coyote Creek Riparian Station from 1991-95 and served as Chair of the Scientific Advisory Committee of the San Francisco Bay Bird Observatory from 2003-05. I have more than 40 years of experience with avian identification, distribution, ecology and behavior, as well as a strong background in vertebrate community ecology and population biology. I have published over 30 scientific papers and articles and contributed to several books on birds. I have been active in the field in California for over 25 years. I also have a strong background in vertebrate ecology and behavior and have taught ecology, evolution, vertebrate biology, and field biology, among other relevant courses, at Siena College and the State University of New at Albany.

I provided an expert report and expert testimony in front of the State Water Resources Control Board in 1995 on minimizing and mitigating impacts of selenium in agricultural drainwater to birds. I produced an expert report in 1998 and was deposed in a case involving avian use of a controversial "wetland" site in the South San Francisco Bay. In 2001, I provided an expert report and provided expert testimony on an NES review regarding avian issues and evaporation basins in Arizona. Finally, in 2006, I provided expert review and a report regarding avian issues with respect to the San Jose Water Company Non Industrial Timber Management Plan.

I have not been deposed or provided expert testimony in the past four years. My curriculum vitae are attached in Exhibit A. My billing rate is $205 per hour (rates doubled during testimony and deposition), as shown in the attached rate sheet.

Sharon H. Kramer, Ph.D., Project Manager, Fish Ecology

I am a Senior Fisheries Ecologist at H. T. Harvey & Associates. As shown in my attached resume (Exhibit A), I have a doctorate in Marine Biology, specializing in the ecology of nearshore flatfishes, and a postdoctorate evaluating ecology of commercially valuable fish on the Great Barrier Reef. I am a member of the American Fisheries Society and the American Institute of Fisheries Research Biologists. I was the principal investigator for the Napa River Fisheries Monitoring Program to evaluate use of restored river and estuarine habitats by native and introduced fishes.

I am a member of the Advisory Team for the Humboldt Bay Ecosystem Based Management Program and a member of the Science and Technology Alliance for North Coast Estuaries. I have facilitated and/or participated in the organization of the following Humboldt Bay forums:

Current perspectives on the physical and biological processes of Humboldt Bay, March 15, 2004, Eureka CA.

A regional perspective to restoring physical and ecological processes in Humboldt Bay March 14-15, 2005 Humboldt State University, Arcata CA.

I was principal author and project manager for developing guidelines to evaluate, modify and develop estuarine restoration projects for tidewater goby habitat for the US Fish and Wildlife Service in 2006. I have over 30 years of experience in fish ecology and marine biology in research, management, regulation, and restoration, with numerous publications and presentations.

I have not been deposed or provided expert testimony in the past four years. My curriculum vitae are attached in Exhibit A. My billing rate is $185 per hour (rates doubled during testimony and deposition), as shown in the attached rate sheet.

Brian J. Cleary, M.S., Plant Ecology

I am a plant ecologist with H. T. Harvey & Associates. I am responsible primarily for conducting wetland delineations in many different habitat types throughout California including freshwater emergent wetlands, tidal marshes and various types of seasonal wetlands. I have over 20 years of experience performing comprehensive floristic and vegetation studies and have conducted botanical investigations throughout the U.S., with particular emphasis on the flora and terrestrial ecosystems of California. Over the course of my 20-year career as a professional plant ecologist, I have conducted several hundred wetland delineations throughout California.

I have not been deposed or provided expert testimony in the past four years. My curriculum vitae are attached in Exhibit A. My billing rate is $125 per hour (rates doubled during testimony and deposition), as shown in the attached rate sheet.

Lorrie Bott, B.A., Invertebrate Biologist

I have over 30 years of experience as a marine biologist and marine invertebrate taxonomist working in a variety of marine habitats along the northern California coast. My experience covers all aspects of biological work including collection of intertidal and subtidal samples, sample analysis, data analysis, and report preparation. I have also participated in surveys of marine fish, stomach content analysis of fish, collection of samples for sediment and water quality analysis, and analysis of water and sediment samples. Lorrie has not testified in any other cases in the past 4 years.

I have not been deposed or provided expert testimony in the past four years. My curriculum vitae are attached in Exhibit A. My billing rate is $125 per hour (rates doubled during testimony and deposition), as shown in the attached rate sheet.

INTRODUCTION

This report was prepared on behalf of the plaintiffs after plaintiffs' counsel contacted H. T. Harvey & Associates to provide a characterization of the species and biotic communities that occur or may occur on terrestrial and aquatic habitats of the "Balloon Tract", including Clark Slough, Humboldt County, California. The report summarizes biological survey information conducted at the site for bird and fish species, as well as providing information on other species that may be using these habitats but were not observed during surveys. It also presents basic descriptions of habitats found on the site, including overviews of the plant (habitat indicators) and animal species that are associated with those habitats. In addition to providing example species associated with habitats present on site, basic ecological relationships between those species are outlined as well.

Information on aquatic invertebrates was provided by Ms. Lorrie Bott, a marine biologist with taxonomic expertise familiar with invertebrates in Humboldt Bay. Fish in Clark Slough were surveyed and evaluated by Dr. Sharon Kramer, a fish ecologist with expertise in marine, estuarine and freshwater fishes of California and the west coast. Birds were surveyed and evaluated by Dr. Scott Terrill, an ornithologist and wildlife biologist with over 25 years of experience in the field in California. Wetland functions and values were assessed by Brian Cleary, a Plant Ecologist with over 20 years of experience with California ecosystems and hundreds of verified wetland delineations.

This report is based upon the individual preparers' professional experience and observations, cited references and exhibits, and personal communications with the plaintiff's experts, consultants, and counsel. All figures, tables, photos, and other exhibits contained in this report may be used as exhibits to summarize or support opinions expressed.

SETTING

The former Southern Pacific Transportation Company Railroad Yard, also known as the "Balloon Tract" is located in the northwest portion of the City of Eureka adjacent to Humboldt Bay. The Balloon Tract is east of Waterfront Drive, north of Washington Street, south of Commercial Street, and west of several small businesses along Broadway/Highway 101. The Eureka Small Boat Basin and Wharfinger building are across Waterfront Drive from the site. Clark Slough is channelized, from Humboldt Bay and it runs into a rip-rap lined channel, through a tide gate under Waterfront Drive, and then parallels Waterfront drive until it goes under the old tracks where it turns north-south and runs across the southern portion of the site.

HABITATS AND ECOLOGICAL RELATIONSHIPS OF CLARK SLOUGH AND THE BALLOON TRACK

BIOTIC HABITATS

Basic habitat descriptions of the biotic habitats present on the site are presented below. These habitat descriptions were drafted by Brian Cleary (plants), Dr. Scott Terrill (wildlife) and Dr. Sharon Kramer (fish). Habitat types identified within the project site include disturbed upland grassland, seasonal wetland, freshwater emergent wetland and brackish marsh. The habitats were categorized by Brian Cleary based upon dominant plant species considered indicators of the various habitats on site. All plant species encountered on site were taxonomically identified based on visual observation and with the use of *The Jepson Manual: Higher Plants of California* (Hickman 1993). Dr. Terrill and Dr. Kramer added wildlife and fish components to the habitat characterizations. These components were added based upon direct site visits, experience in the field, and upon cited literature. References used to support these characterizations are presented in the "Documents Used to Prepare Report" Section.

Disturbed Upland Grassland

The majority of the site comprises disturbed upland grassland that is mowed periodically. Mounds of cut and mowed vegetation and debris occur scattered in upland grassland areas around the site. Non-native annual grasses and forbs dominate this habitat type including sweet vernal grass (*Anthoxanthum odoratum*), rip-gut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*) wild oats (*Avena barbata*), quaking grass (*Briza maxima*), wild fennel, rough cat's ear (*Hypochaeris radicata*), geranium (*Geranium molle*), white clover (*Trifolium repens*), wild radish (*Raphanus sativus*) and black mustard (*Brassica nigra*). Several large cement pads that represent remnant building structures occur in the eastern central portion of the site. The cement foundations also support a small number of disturbance-oriented upland plant species.

These plants species, in turn, provide food sources for the California vole (*Microtus californicus*), which feed on tender shoots, stems and leaves of grasses and forbs on the site (Jameson and Peeters 1988). These voles also consume fresh seeds. Other species of rodents have been identified in this habitat on site, including the introduced, old world Norway rat (*Rattus norvegicus*) and house mouse (*Mus musculus*) (Winzler and Kelly 1995). These rodents, in turn, provide prey for various raptors, such as Red-tailed Hawks and Barn Owls, both of which occur in the area (Hunter et al. 2005). Large ardeids, such as the Great Blue Heron, also forage on rodents, including the California vole, in grassy habitats.

In addition to voles, other vertebrates feed on seeds on site. While voles prefer fresh seeds, species such as sparrows and doves feed on dry seeds throughout the year. These species then provide prey for various mammalian and avian predators. Avian predators include the accipters (Cooper's and Sharp-shinned hawks), buteos (e.g., Red-tailed and Red-shouldered hawks) and falcons (the state Endangered Peregrine Falcon and the American Kestrel). Rock Pigeons were observed foraging on the site and a Peregrine Falcon was observed chasing the pigeons. Peregrines are well known consumers of Rock Pigeons, as well as many other species of birds.

Several herptiles may occur in this habitat on the site. Such These species include gopher snakes (*Pituophis catenifer*) and western fence lizards (*Sceloporus occidentalis).* Raccoons have been observed on the site (pers comm.) and a dead Virginia opossum (*Didelphis virginiana*) was photographed in an open area of the site during the 10 January 2008 site visit (Photo 13, Appendix C).

Seasonal Wetland

Numerous large and small patches of seasonal wetlands occur scattered throughout the project area. The wetlands occupy shallow topographic depressions around the site that hold seasonal ponded water during the winter rainfall period. Characteristic annual and perennial plant species in this habitat type include hyssop loosestrife (*Lythrum hyssopifolium*), tall umbrella sedge (*Cyperus eragrostis*), pennyroyal (*Mentha pulegium*), curly dock (*Rumex crispus*), bird's foot trefoil (*Lotus corniculatus*), Italian ryegrass (*Lolium multiflorum*), rabbit's foot grass (*Polypogon monspeliensis*) and toad rush (*Juncus bufonius*).

Seasonal wetlands provide freshwater sources for birds that forage in salt water in adjacent Humboldt Bay. Seasonal wetlands also provide habitat for invertebrate productivity. These invertebrates provide food for vertebrate predators including amphibians and birds. In addition, birds, including as a number of species of gulls and shorebirds, use seasonal wetlands for drinking, bathing, and loafing. Shorebirds will often utilize seasonal wetlands adjacent to tidal areas a high-tide "retreats" when foraging substrate is inundated by water associated with high tides. These birds will often drink and rest (and forage if food is available), in seasonal wetlands during high tides. Waterfowl will also opportunistically use seasonal wetlands, the extent to which is typically related to the size of the seasonal wetland, with larger wetlands receiving more species diversity and use. Other waterbirds, such as Pied-billed Grebes (*Podilymbus podiceps*) and American Coots (*Fulica americana*), opportunistically use season wetlands as well. In addition to these species, birds such as herons and egrets will prey on amphibians, such as the Pacific tree frog (*Pseudacris regilla*), as will various mammalian species such as raccoons (*Procyon lotor*). The Pacific tree frog has been documented on the site during previous surveys (e.g., see Winzler and Kelly 1995), the species was photographed on the site on 10 January 2008 (Photo 14, Appendix C) and I heard this species on the site (from outside the site) on 24 January 2008.

Freshwater Emergent Wetland

Areas of low ground including several drainage ditches in the southern portion of the property retain water long enough to support freshwater emergent wetland plant species. These wetland areas comprise dense stands of mowed vegetation dominated by perennial wetland plant species including cattail (*Typha domingensis*), Himalayan blackberry (*Rubus discolor*), common threesquare (*Scirpus pungens*), water smartweed (*Polypogon amphibium* ssp. *emersum*), spikerush (*Eleocharis macrostachya*), dense sedge (*Carex densa*), common rush (*Juncus effuses* var. *brunneus*), iris-leaved rush (*Juncus xiphioides*), giant horsetail (*Equisetum telmateia* ssp. *braunii*), water parsley (*Oenanthe sarmentosa*), and creeping buttercup (*Ranunculus repens*). Giant reed (*Phragmites australis*), an introduced noxious weed, has invaded large areas of freshwater emergent wetland in the southwest corner of the study area.

The emergent freshwater wetland supports avian species associated with dense emergent vegetation, including the Song Sparrow, the Common Yellowthroat and the Marsh Wren. All these species consume insects (especially during the breeding season), but the sparrow also consumes seeds during the nonreproductive period of the year. Areas of open water within the emergent vegetation could support Pied-billed Grebes, and American Coots and migrant rails may occur in these habitats during migration or winter. Pacific tree frogs were observed on site (see above) and other herptiles, such as garter snakes (*Thamnophis* spp.) may occur in this habitat on site as well.

Brackish Marsh and Slough

Several small remnant stands of brackish marsh community occur as narrow bands of vegetation along the opposing banks of Clark Slough in the southwest section of the site. The dominant perennial plant species in this habitat type include bulrush (*Scirpus maritimus*), cord grass (*Spartina densiflora*), arrow grass (*Triglochin maritima*), and brass buttons (*Cotula coronopifolia*). The bed and lower banks of Clark Slough also support muted tidal aquatic mudflat habitat that is primarily devoid of vegetation.

Amphipods/isopods and other small crustaceans including copepods and mysids are consumed by all fish species found in the slough as well as juvenile Dungeness crab. Polychaete worms are eaten by saddleback gunnel, starry flounder, staghorn sculpin, and juvenile Dungeness crab. Molluscs are prey of juvenile Dungeness crab, saddleback gunnel, starry flounder, and potentially eaten by prickly and coastrange sculpin. Juvenile Dungeness crab are eaten by staghorn sculpin and starry flounder. Staghorn sculpin are likely the top fish predator, also feeding on juvenile fish. Dungeness crabs are also consumed by herons and egrets, including the Great Blue Heron and Black-crowned Night Heron. These species also consume fish associated with the slough. In addition to the ardeids, raccoons and river otters (*Lutra canadensis*) feed on the fish and crabs in the slough. Shorebirds forage on the channel bottom and muddy banks when these areas are exposed by retreating tidewaters (as do herons and any rails that might visit the site). A number of piscivorous birds forage at and near the mouth of the slough at its juncture with Humboldt Bay. These birds include the Endangered Brown Pelican, a number of terns, Common Murres, several species of cormorants and other avian species. In addition, predatory fish would prey on smaller fish in this area as well.

CLARK SLOUGH INVERTEBRATE CHARACTERIZATION

This invertebrate characterization for Clark Slough is based on the professional knowledge and experience of Lorrie Bott, and personal communications with Dr. Sharon Kramer regarding the biotic and abiotic characteristics of the site. Humboldt Bay supports a large number of invertebrate species (Barnhart et al. 1992). Invertebrates are an important food source for birds and aquatic vertebrates that move in to feed at various tide heights (Barnhart et al 1992).

Clark Slough site has not been sampled specifically for intertidal invertebrates. A list of species possibly present at the site was compiled based on data from several slough sites in Arcata Bay and South Bay (Boyd 2002, Bott unpublished data). A number of salt-marsh species were included in the list based on the presence of patches of pickleweed (*Salicornia* sp.) at the site. Based on general characteristics of the slough habitat, 38 species that may be present at the Clark Slough site were identified (Table 1). Some or all of these species may actually be present at the site and other species not listed may also be present. It is my opinion that the intertidal fauna of Clark Slough resembles faunas of similar habitats along the margins of Arcata Bay and South Bay. Clark Slough has a number of characteristics that could influence species composition at the site. These characteristics include the presence of a tide gate, the salinity regime (based on preliminary data), and the location of the site in the narrow portion of Humboldt Bay adjacent to dredged channels. The species composition of the invertebrate fauna in Clark Slough may be similar to comparable habitats at similar tidal levels in North and South Bay, or the species composition may comprise species from the adjacent, low, intertidal habitats, which are able to tolerate conditions in the slough. Dr. Kramer noted that she observed eelgrass (*Zostera marina*) growing in Clark Slough, although it is typically found in Humboldt Bay in low intertidal/shallow subtidal habitats adjacent to channels. Species typically associated with *Zostera marina* may be present in the slough.

Additional information on Dungeness crab in Clark Slough is discussed in the fish characterization section below.

Table 1. Partial List of Intertidal Invertebrate Species that May Be Present at the Clark Slough Site*

Crustaceans
Amphipods:
Americorophium spinicorne
Eogammarus confervicolus
Grandiderella japonica
Melita nitida
Monocorophium ascherusicum
Monocorophium insidiosum
Paracorophium nr. lucasi
Traskorchestia traskiana
Isopods:
Gnorimosphaeroma oregonense
Gnorimosphaeroma lutea

Sphaeroma quoyanum
Cumaceans:
Cumella vulgaris
Tanaids:
Leptochelia savignyi
Sinelobus stanfordi
Zeuxo normani
Decapods:
Cancer magister (juveniles) **
Hemigrapsis oregonensis

Molluscs
Gastropods:
Alderia modesta
Assiminea californica
Littorina scutulata
Ovatella myosotis
Bivalves:
Gemma gemma
Laternula marilina
Mya arenaria
Nutricola tantilla
Anthozoans:
Diadumene lineate
Nematostella vectensis

Polychaetes
Capitella capitata
Dipolydora socialis
Exogone lourei
Heteromastus fililformis
Neanthes brandti
Nereis vexillosa
Polydora sp.
Pseudopolydora kempi
Pseudopolydora paucibranchiata
Pygospio elegans
Streblospio benedecti

* Based on unpublished data and the listed references
** Observed at the site

FISH CHARACTERIZATION

INTRODUCTION

This fish characterization for Clark Slough is based on the professional knowledge, experience, observations, and personal communications with the plaintiffs, experts, consultants, and counsel by Dr. Sharon Kramer, and is supported by field surveys as described below. A fish survey was conducted in Clark Slough, Humboldt Bay CA, on 31 July 2007 for the purpose of evaluating presence of federally listed tidewater goby (*Eucyclogobius newberryi*) using the U.S. Fish and Wildlife Service (USFWS) survey protocol, as described below. Surveyors were Steve Kramer (USFWS Recovery Permit number TE128256-1) and Dr. Sharon Kramer. We briefly visited the site on 30 July 2007 for the purpose of viewing Clark Slough to determine the appropriate sampling method to meet the USFWS protocol. Information contained in the fish species descriptions found in Appendix A was compiled from the following references: Barnhart et al. 1992, Cole 2004, Jensen 1995, Mad River Biologists 2002, Moyle 2002, Pinnix et al. 2002, Stillwater Sciences 2006, Tabor et al. 2007, USFWS 2005 and 2006, Wild et al. 1983, and http://www.answers.com/topic/saddleback-gunnel?cat=technology.

In a secondary field effort to collect specimens for laboratory analysis, on 10 January 2008 four small mesh traps were set in Clark Slough. This report provides the results of both the tidewater goby survey as well as the trap collections, and provides background information on the ecology of the tidewater goby and other fish and invertebrate species found during the surveys in Appendix A. In addition, the fish that could potentially use Clark Slough, but were not found during the surveys, are also provided.

Although the USFWS survey protocol is designed to examine the presence of tidewater goby, several other species of fish and invertebrates were also sampled, providing information on their utilization of Clark Slough. Due to lack of access, this survey was not designed to be a comprehensive survey of all fish and invertebrate species that could occur in Clark Slough throughout the year, but rather provides a snapshot of the species that could be sampled using the protocol methods. For example, the survey was conducted at low tide, so species that may utilize the slough at high tide were not surveyed. Additionally, egg and larval stages of fish and invertebrates that have poor swimming capability were also not surveyed, as the type of gear that would need to be used to capture extremely small life stages was not used.

CLARK SLOUGH TIDEWATER GOBY SURVEY

On 31 July 2007, a survey of Clark Slough, Humboldt Bay, was conducted for tidewater gobies. The USFWS Tidewater Goby Survey Protocol (provided in Appendix F of the Tidewater Goby Recovery Plan) was followed. Based on the protocol and a brief site visit on 30 July 2007, Clark Slough was determined to be a small water body, requiring 15 beach seine hauls plus 5 minutes of dip netting, or 60 minutes of dip netting if dip netting is the sole sampling method used. We observed that the banks of Clark Slough are rocked, and much of the bottom is deep soft mud, making it difficult or impossible to haul out a beach seine. Therefore, dip netting was determined to be the best method for sampling tidewater gobies.

Methods

Sampling with dip nets (Photo 1, Appendix B) was initiated at 07:40 AM (approximately low tide [-0.95 ft]) at the lowest point in the slough where water exits the slough through the culvert under Waterfront Drive before passing through the tide gate into Humboldt Bay. The entire channel was sampled up to the gravel road box culvert inside the Balloon Tract. Above the culvert, spot samples were taken at several locations due to difficult access and very soft, muddy substrate in the reach. Sampling ended at 09:24 AM. Total sample time was 1 hour 44 minutes, which exceeded the protocol requirements. All specimens were released alive back into the water.

Water temperature and salinity was measured using a handheld Yellow Springs Instrument (YSI) model 30 meter. Before and after field use, the salinity was calibrated by comparing meter readings to specific reference standards.

Results

The slough channel along Waterfront Drive had slight changes in gradient marked by patches of eelgrass at the gradient breaks. No tidewater gobies were captured (n=0). Other species that were captured included the following:

- threespine stickleback (*Gasterosteus aculeatus*) (n=117) (Photo 2, Appendix B),
- starry flounder (*Platichthys stellatus*) (n=3) (Photo 3, Appendix B),
- staghorn sculpin (*Leptocottus armatus*) (n=14) (Photo 4, Appendix B),
- coastrange sculpin (*Cottus aleuticus*) (n=3) (Note: Some of the fish, identified in this survey as coastrange sculpin, may have been prickly sculpin (*Cottus asper*) which are similar in appearance and occupy similar habitat) (Photo 5, Appendix B),
- saddleback gunnel (*Pholis ornata*) (n=2) (Photo 6, Appendix B), and
- juvenile Dungeness crab (*Cancer magister*) (n=243) (Photo 7, Appendix B).

All of these species were captured in the units below the road culvert in the portion of the slough adjacent to Waterfront Drive. Only juvenile threespine stickleback were captured in the portion of the slough sampled above the road box culvert. This portion of the slough lacked eelgrass but had *Phragmites* along the levee and adjacent to the channel.

Water temperature was 16.7ºC and salinity was 10.0 ppt at the start of sampling above the tide gate culvert (Point 1 on Figure 1). When sampling ended at the upper most point (approximately 300 meters from the start point), water temperature was 17.6ºC and salinity was 8.0 ppt (Point 13 on Figure 1). Two small seeps were observed where soil contacted the cement box culvert at the gravel road crossing over the slough, water was observed trickling into the slough. Water collected in a cup at the seep at Point 16 was relatively fresh (1.9 ppt). Salinity calibrations of the YSI meter indicated that the meter measured within 2% of reference standards.

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Clark Slough: Locations of temperature and salinity point measurements; 31 July 2007

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Table 2. Temperature and Salinity at Various Points in Clark Slough on 31 July 2008.

Location	Water Temperature (°C)	Salinity (ppt)
Point 1 (upstream of waterfront drive crossing)	16.7	10.0
Point 8	16.8	13.6
Point 11	17.3	10.9
Point 13	17.6	8.0
Point 14 (from small pool out from bank seep at Point 15)	16.3	7.9
Point 15 (bank seep, east end of road box culvert)	15.9	7.1
Point 16 (bank seep emerging from wall)	17.2	1.9
Point 17 (mid-channel out from bank seep 16)	17.7	9.1

Substrate was soft mud in the lower units and just above the road culvert. At the last sample points (above Point 13), the substrate was sand/gravel in the uppermost reach.

Habitat within the slough was tidal although there is a tide gate on the Humboldt Bay side of the slough. At –0.95 low tide, water depths were less than 1 ft in the slough where sampling occurred. Habitat for tidewater goby was given a score of "1" (habitat limited in area and quality) because of the extremely soft substrate and tidal influence as indicated by presence of eelgrass, as well as presence of trash including broken fluorescent light bulbs, shopping carts, cigarette butts and other assorted items. In addition, no actual lagoon-type or ponded habitat formed in the slough during low tide, which is important for tidewater goby survival. Instead, at low tide the slough flowed downstream through the tide gate and into Humboldt Bay, without ponding up.

I observed patches of eelgrass in the portion of the slough adjacent to Waterfront Drive. Above the crossing where the slough turns, no eelgrass was observed. Juvenile Dungeness crab were captured only in the portion of the slough adjacent to Waterfront Drive; however, they may have been concentrated during the low tide in that portion of the slough, and could use the upper portion of the slough above the crossing at higher tides. Juvenile Dungeness crab were the most abundant species captured during the survey, which is not surprising as sloughs are known to be important nursery habitats for juvenile Dungeness crab in Humboldt Bay (pers. comm. M. Wallace).

Greg Goldsmith, USFWS Arcata, was contacted the day of the tidewater goby survey to provide a brief overview of findings (pers. comm.). Based on the intensity of the survey, Greg Goldsmith indicated that it may not be necessary to conduct a second survey to demonstrate tidewater goby absence, even though the protocol calls for two surveys conducted more than 30 days apart between July 1 and October 31 (when tidewater goby are considered to be in highest abundance). Due to lack of access, only one survey was conducted, although the protocol calls for two surveys conducted a minimum of 30 days apart between July 1 and October 31.

Conclusions

I believe it is unlikely that tidewater goby would utilize Clark Slough in its current condition based on:

- the current distribution of tidewater goby in Humboldt Bay with populations located primarily in Arcata Bay,
- the poor condition of habitat in Clark Slough (soft substrate, lack of ponding), and
- no observation of gobies based on this survey.

However, salinities and temperatures are well within tolerances for tidewater goby; if in the future the slough was restored to create high marsh habitat more typical of where gobies are found in Arcata Bay, it is possible that gobies would use Clark Slough. For example, Rocky Gulch, located between Arcata and Eureka, did not support tidewater gobies until a recent restoration project realigned 4,000 ft of stream channel and provided a muted tidal regime with a "fish friendly" tide gate (Wallace 2007).

TRAPPING SURVEY

Trapping was conducted to collect specimens for laboratory analysis on 10 January 2008 in Clark Slough by Dr. Peter Nelson and Dr. Sharon Kramer. Four small mesh fish traps (Figure 2) baited with frozen salmon were set in the slough on the bottom from near the tide gate upstream to just below the road crossing, spaced roughly evenly through the reach.

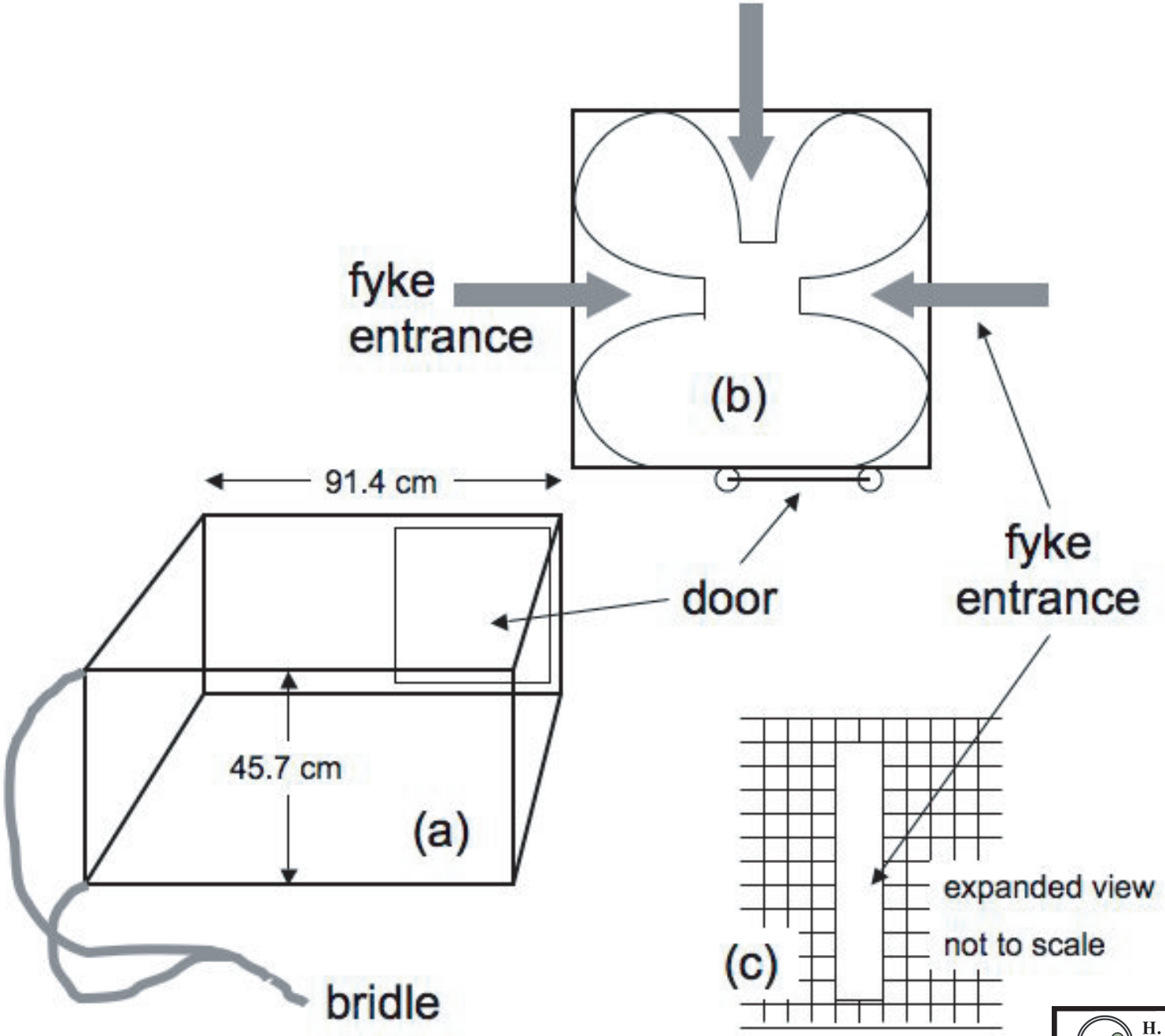
Traps were initially set between 1007 and 1026 hrs, and retrieved between 1350 and 1415 hrs. Traps were immediately reset at the same sites between 1356 and 1417 hrs, and retrieved again between 1615 and 1628 hrs. Water temperature and salinity were measured at the lowermost (tide gate) and uppermost (road crossing) traps when set and retrieved using a handheld Yellow Springs Instrument (YSI) model 30 meter. Before and after field use, the salinity was calibrated by comparing meter readings to specific reference standards.

Results

Juvenile Dungeness crab and three fish species (Table 3) were captured. All species had also been captured in the previous 31 July 2007 tidewater goby survey. All specimens were frozen on dry ice and sent to TestAmerica, Inc. in Sacramento.

Table 3. Fish and Invertebrate Species and Sizes Captured on 10 January 2008 in Clark Slough

Species	Number Trapped	Total Lengths (mm)
Prickly sculpin, *Cottus asper*	2	135, 164
Staghorn sculpin, *Leptocottus armatus*	3	132, 130, 125
Threespine stickleback, *Gasterosteus aculeatus*	3	63, 62, 61
Dungeness crab, *Cancer magister*	3	Juvenile, not measured



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Clark Slough: Trap Design

Proj No. **2818-01**	Date **Jan. 2008**	Figure **2**
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The tides for Eureka on 10 January were low at 0636 hrs (3.4 ft), and high at 1240 hrs (7.8 ft). Evening low tide was at 1927 hrs (-0.7 ft). Traps were set during the morning flood tide, and retrieved during ebb tide after the mid-day high. Variation in temperature and salinity were likely associated with tidal flows, however salinity was always lower at the uppermost trap site and higher at the site closest to the tide gate and Humboldt Bay (Table 4).

Table 4. Temperature and Salinity Measured at Upstream-Most and Downstream-Most Fish Traps in Clark Slough on 10 January 2008

Time of Day	Location	Temperature (°C)	Salinity (ppt)
1027 hrs	Upstream site	9.2	4.3
1023 hrs	Downstream site	9.1	8.6
1350 hrs	Upstream site	9.4	3.5
1413 hrs	Downstream site	10.2	6.7
1615 hrs	Upstream site	9.9	2.8
1627 hrs	Downstream site	10.3	5.5

Conclusions

Although fish traps were only set for a relatively short time, no different fish or invertebrate species were captured when compared to the more intensive sampling effort in July. In my opinion, this suggests that the assemblage of species is relatively constant within the slough.

OTHER FISH SPECIES THAT COULD POTENTIALLY USE CLARK SLOUGH

It is my opinion that other fish species that are known to occur in Humboldt Bay, and that may also use Clark Slough, include arrow goby (*Clevelandia ios*), bay goby (*Lepidogobius lepidus*), jacksmelt (*Atherinopsis californiensis*), topsmelt (*Atherinops affinis*), bay pipefish (*Syngnathus leptorhynchus*), shiner surf perch (*Cymatogaster aggregata*), white surfperch (*Phanerodon furcatus*), striped surfperch (*Embiotoca lateralis*), buffalo sculpin (*Enophrys bison*), Pacific herring (*Clupea pallasi*), juvenile sardines (*Sardinops sagax*), and anchovies (*Engraulis mordax*). These species may temporarily use Clark Slough at various times of year, and during higher tides. It is my opinion that, because of the tide gate and the habitat conditions in the slough (rip-rapped banks, soft mud bottom, intertidal conditions, and long, narrow channel), it is unlikely that very many of these other species would use Clark Slough for any extended period of time.

AVIAN CHARACTERIZATION

INTRODUCTION

This avian characterization for Clark Slough is based on Scott Terrill's professional knowledge and experience, the relevant literature, personal communications with the plaintiffs' experts, consultants, and counsel and is supported by field surveys as described below. The following avian characterization presents an overview of avian species associated with Clark Slough and the parcel through which the slough passes near its outflow point on Humboldt Bay known as the "Balloon Tract". This characterization is based on a site visit conducted by me on 30 July 2007 and a visit was conducted from outside the site, but looking onto the site on 24 January 2008, and upon knowledge of the ecology and distribution of the birds of California and Humboldt County.

The site comprises primarily disturbed, ruderal grassland with several types of wetlands: seasonal wetlands; freshwater emergent wetlands and Clark Slough, which is classified as muted tidal above the tide gate at, or near, the project boundary and tidal below the tide gate. The parcel, including the muted tidal portion of Clark Slough (i.e., the Balloon Tract) will be characterized first. The characterization of the tidal portion of the slough and the water of adjacent Humboldt Bay follows the discussion of the Balloon Tract. The relationship between the two areas involves exchange of water and inorganic and organic materials upstream of the tide gate and downstream of the tide gate.

The Balloon Tract

The following avian species were observed on the Balloon tract during the 30 July 2007 site visit between 08:44 and 09:56: The designation "fo" indicates that the bird(s) was (were) flying over the site and not observed utilizing habitats on the site during the actual observation. Species observed foraging aerially over the site (e.g., swallows) were considered as foragers associated with the site because aerial insects are often associated with substrates (terrestrial and aquatic) over which the birds are observed foraging. It is my opinion that the avian diversity and abundance at the site is relatively low due to the management of the site (mowing) that was apparent to me during my visits. For example, if Blackberry and willow were allowed to grow, I believe the site would support greater species richness and abundance

Semipalmated Plover	(*Chradrius semipalmatus*)	1 fo
Killdeer	(*C. vociferus*)	2
California Gull	(*Larus californicus*)	1 fo
Western Gull	(*L. occidentalis*)	1 fo
Caspian Tern	(*Hydroprogne caspia*)	2 fo
Rock Pigeon	(*Columbia livia*)	16 fo
Common Raven	(*Corvus corax*)	1 fo
Tree Swallow	(*Tachycineta bicolor*)	6
Barn Swallow	(*Hirundo rustica*)	4
Song Sparrow	(*Melospiza melodia*)	4 (2 singing)
White-crowned Sparrow	(*Zonotrichia leucophrys*)	1 (singing)

House Finch	(*Carpodacus mexicanus*)	9
House Sparrow	(*Passer domesticus*)	1

Special-status Avian Species

It is my opinion that several special-status species may forage on the site. . The Peregrine Falcon (*Falco peregrinus*), a species recently delisted from the federal endangered species list, but still listed as Endangered under the California Endangered Species Act (CESA), was observed foraging on pigeons over the site during the site visit (pers. comm. B. Cleary). In addition, a Peregrine Falcon was photographed during the site visit on 31 July 2007, Photos 11 and 12. This species is found on all continents except Antarctica (Cade et al. 1988) and is widespread in the state, especially in migration and winter when migrants augment the resident population. California Department of Fish and Game (CDFG) raptors of special concern or fully protected status that may occur on the site as foragers, primarily during migration or winter, include: The Northern Harrier (*Circus cyaneus*), and White-tailed Kite (*Elanus leucurus*). Both these species are widespread in California and both forage in open habitats such as those associated with this site. Although there was no potential breeding habitat for the Northern Harrier when I visited the site, it is my opinion that this species could potentially breed there if tall grass or extensive emergent vegetation were allowed to grow. Similarly, although the site does not support extensive marsh or grasslands that Short-eared Owls (*Asio flammeus*) typically forage in, this species may forage at the site in winter or migration. Another possible species of special status that may rarely occur on site is the Loggerhead Shrike (*Lanius ludovicianus*), a casual winter visitor to the region. Loggerhead Shrikes occur in ruderal habitats similar to that on site elsewhere in the state.

It is also my opinion that that an occasional migrant Willow Flycatcher (*Empidonax traillii*), of which all taxa occurring in California are listed as Endangered under CESA, may occur in fennel (*Foeniculum vulgare*) on the site as well. Willow Flycatchers are observed in fennel on the central California Coastal region where their status as migrants is similar to their status in Humboldt County. In fall, many passerine migrants forage in fennel, especially at coastal locations. Migrants likely to forage in fennel on the site include the Yellow Warbler (*Dendroica petechia;* of which *D. p. brewsteri* is a CDFG taxon of special concern). Yellow Warblers are common migrants on the California coast, especially in fall, although taxa other than *brewsteri* likely make up the bulk of these birds. These and other migrant species are likely to occur on the site, but I have not visited the site during the appropriate time of year (fall migration period) to confirm this.

Raptorial Species

In addition to the raptors included in the section on special-status species above, it is my opinion that other species of raptors likely occur on the site as well. For example, Cooper's (*Accipiter cooperii*) and Sharp-shinned (*A .striatus*) hawks forage widely for avian prey during the nonreproductive period and are fairly common in the region. Both of these species occur in a variety of wooded and open habitats in northwestern California. Barn Owls are common in the area and often forage over areas such as the Balloon Track. The American Kestrel, another widespread, common species in open areas throughout much of the state, are likely to forage on the site as well.

Other Species

In addition to the species observed and discussed above, it is my opinion that a number of other common waterbird species likely occur on the Balloon Tract. Such species include a number of dabbling ducks when the seasonal wetlands contain water, e.g., Mallard (*A. platyrhynchos*), Northern Pintail (*A. acuta*) and Northern Shoveler (*A. clypeata*). Likewise, a number of ardeids likely forage on site in flooded wetlands and even on small mammals in the ruderal portions of the site. These species include the Great Blue Heron (*Ardea Herodias*), Great Egret (*Egretta alba*) and Snowy Egret (*E. thula*).

Additional landbirds that occur in the general vicinity of the site that are likely to occur on the site, especially if vegetation is allowed to grow, include species associated with ruderal brushy habitats and seasonal wetlands in the area. Such species include Marsh (*Cistothorus palustris*), House (*Troglodytes aedon*) and Bewick's (*Thryomanes bewickii*) wrens, Ruby-crowned Kinglet (*Regulus calendula*), American Pipit (*Anthus rubescens*), Orange-crowned (*Vermivora celata*), Yellow-rumped (*Dendroica coronata*) and Wilson's (*Wilsonia pusilla*) warblers, Common Yellowthroat (*Geothlypis trichas*), and Lincoln's (*M. lincolnii*) and Golden-crowned (*Z. atricapilla*) sparrows.

THE TIDAL PORTION OF CLARK SLOUGH AND ADJACENT HUMBOLDT BAY WATERS

Birds observed along the tidal portion of Clark Slough and just outside the slough mouth below the tide gate from 8:20–08:35 during low tide on the 30 July 2007 site visit were:

Brown Pelican	(*Pelecanus occidentalis*) 7 plunge diving just outside the slough mouth
Double-crested Cormorant	(*Phalacrocorax auratus*) 4 foraging just outside the mouth of the slough
Great Blue Heron	1 foraging at mouth of slough
Black-crowned Night Heron	(*Nycticorax nycticorax*) several on boats outside the slough mouth
California Gull	1
Western Gull	6 including 2 on slough mudflat
Elegant Tern	(*Thalasseus elegans*) 3 just outside the slough mouth

Birds observed in the Clark Slough channel and just outside (within approximately 100 meters) the channel mouth during an incoming tide (that inundated the mudflats comprising the bottom of the slough) from 11:00–11:30 were:

Brown Pelican	12 actively foraging just outside the mouth
Double-crested Cormorant	4 foraging plus 12 other birds noted
Black Turnstone	(*Arenaria melanocephala*) 4 flying by
Heermann's Gull	(*L. heermannii*) 4
California Gull	1
Western Gull	6, plus 1 Western x Glaucous-winged (*L. glaucescens*) Gull
Caspian Tern	2

Elegant Tern	2- foraging
Common Murre	(*Uria aalge*) bathing and foraging 27 (within approximately 100 meters of slough channel) plus an additional 132 birds in the vicinity of the slough mouth, but further out; includes HY birds.

These species were seen during relatively brief periods on a single date. It is my opinion that many additional species surely occur on the site and in the tidal portion of the slough (and adjacent waters). Although the ruderal habitat on site is relatively limited with respect to the diversity of avian species it potentially supports, the location near Humboldt Bay increases the potential number of species that might use it. For example, shorebirds might use the site as high-tide refugia during extreme high tides due to the proximity of the site to the Bay. Various species of gulls may roost on open areas of the site. In addition, a rich assemblage of shorebirds and waterbirds are undoubtedly associated with the tidal portions of the slough and adjacent bay waters based on knowledge of bird use of the bay and adjacent habitats.

The tidal portion of Clark Slough and the adjacent waters of Humboldt Bay provide habitat for species of special status. The California Brown Pelican, a taxon listed as Endangered under both the Federal Endangered Species Act (FESA) and CESA, was observed foraging just outside the mouth of the slough (see Appendix C), Double-crested Cormorants Elegant Terns, both CDFG species of special concern (nesting colonies), were also observed foraging at the mouth of the slough, as indicated in the list of species observed presented above. These species are all piscivorous and occur along the northern California coast and forage in tidal habitats such as the mouth of Clark Slough and adjacent waters.

SPECIES OBSERVED ON SITE FROM OUTSIDE THE SITE ON 24 JANUARY 2008

On 24 January, I observed birds in a seasonal wetland in the southeast corner of the site on the south side of Clark Slough. These observations were made from W. Waterfront Drive and from Broadway between 13:12 and 13:28. The gulls were bathing, drinking and loafing and there was some turnover even during the brief period of observation. The sandpipers were actively foraging in the ponded area.

Canada Goose 2
Ring-billed Gull 12
California Gull 6
Western Gull 17
Glaucous-winged Gull 4
(likely) Glaucous-winged X Western Gull hybrids 2
Least Sandpiper 22

WETLAND ASSESSMENT

INTRODUCTION

For the Balloon Tract project, Brian Cleary conducted a wetland assessment on the property including peer review of prior mapping of wetland areas and upland areas. Additionally, all areas on site (except for Clark Slough) supporting various depths of standing water as a result of incident rainfall and a shallow localized groundwater were mapped with a Global Positioning System (GPS) unit to document locations with prolonged inundation and soil saturation. Habitat types on site were identified and described in support of the biotic habitats characterization, sediment sample and water sample analyses conducted for the project. Presented below are the findings and conclusions as a result of the site visits to assess wetlands on 30 and 31 July 2007 and 10 January 2008, and review of two prior wetland delineation reports prepared by Zentner and Zentner, and Huffman-Broadway Group, Inc.

WETLANDS ASSESSMENT

Methods

In delineating the occurrence and extent of wetlands within the Coastal Zone, the California Coastal Commission (CCC) uses the wetland definition provided by the U.S. Fish and Wildlife Service (USFWS). Under this definition, wetlands are areas subject to periods of prolonged inundation and saturation. The CCC has interpreted the USFWS approach as the presence of a "single-parameter" indicator that is only one of three wetland parameters (*i.e.*, vegetation, hydrology and soils) typically required for the CCC to claim an area as a jurisdictional wetland. For the purposes of identifying and mapping the initial wetland boundaries, all three wetland parameters were evaluated during the site assessment following guidelines outlined in the 1987 "Routine Determination Method," Corps of Engineers Wetlands Delineation Manual.

I conducted reconnaissance-level wetland assessment field surveys on July 30th and 31st, 2007 and January 10th 2008. Site topography for the Balloon Tract property is primarily level with an elevation close to sea level. The project site occurs within the Eureka USGS 7.5-minute quadrangle map. A portion of the historical channel of Clark Slough, once a large tidal channel, drains the southwestern section of the site. Review of historical aerial photographs reveals that the majority of the site once supported estuarine wetlands dominated by pickleweed (*Salicornia virginica*) (Appendix D). Annual precipitation is approximately 38 inches of rainfall per year with the majority of precipitation falling from October to April (California Department of Water Resources 2008). The Natural Resource Conservation Service (NRCS) has not formally mapped the soils on site, however, the majority of these soils comprise historic hydric soils dredged from the Humboldt Bay and imported onto the site as fill material to dewater the property (Huffman-Broadway Group, Inc., 2006).

I excavated eighteen soil sample points during my two site visits in July 2007. Dominant plant species, hydrology, and soil characteristics were noted within the immediate vicinity of each sample point. Areas dominated by wetland plant species within topographic depressions not previously mapped by Zentner and Zentner, and Huffman-Broadway Group Inc. were delineated

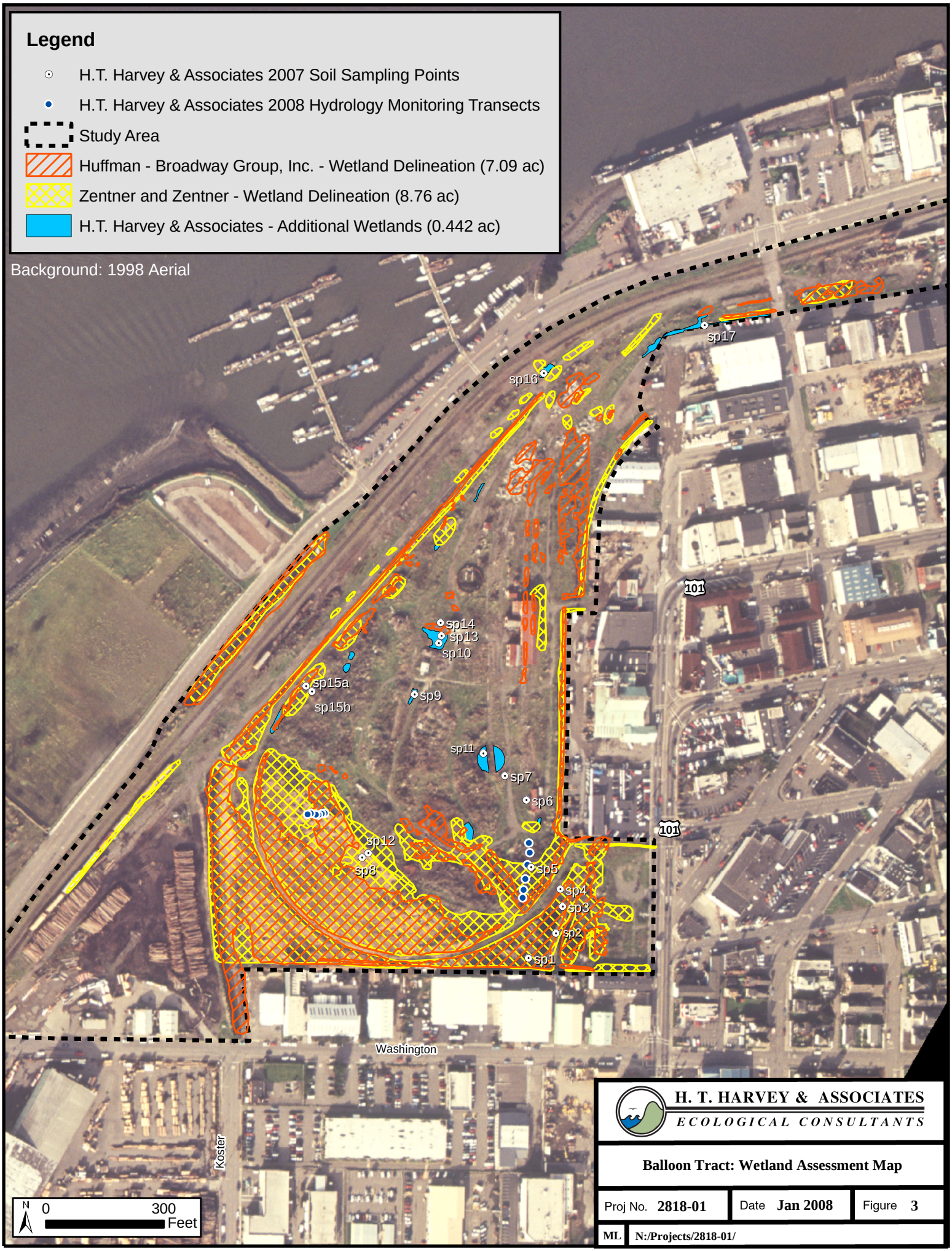
by myself as polygons with a GPS unit. Areas dominated by upland vegetation within each sample point adjacent to topographic depressions supporting hydrophytes were also noted, but not delineated. Although emphasis was placed primarily on the presence of hydrophytic vegetation and hydrology of the site, hydric soil features (both recent and relictual) including redoximorphic features such as reduced, low chroma soils, presence/absence of mottles in the upper portion of the soil profile, and oxidized rhizospheres (root channels) were also recorded. However, of the three wetland parameters observed, I considered soils to be of least importance based on the presence of historic imported fill material from Humboldt Bay. Information obtained from the soil sample points was compiled on U. S. Army Corps of Engineers (USACE) three-parameter Routine Wetland Determination data forms included in Appendix E.

I hand excavated two separate hydrology monitoring transects each comprised of 6 soil sample pits on January 10th 2008, to examine potential primary hydrology including soil moisture content, water infiltration rates and localized subsurface hydrology in the southern portion of the Balloon Tract Property. Each of the soil sample pits was excavated to a depth of 24 inches below the soil surface and observations were recorded with regards to the depth and degree of soil moisture saturation and inundation (*i.e.*, standing water) within the soil profile for the purpose of identifying hydrologic zones related to presence/absence of potential wetlands on the property. Secondary hydrologic indicators including oxidized root channels in the upper 12 inches of the soil profile, and drainage patterns in wetlands were also noted. As stated above, a GPS unit was used to document all areas of standing water on site as a result of incident rainfall and surface, or subsurface, localized groundwater tables (pers. comm. B. Ross).

Results

Results of the reconnaissance-level wetland assessment survey are shown in Figure 3. A total of 18 wetland delineation data forms are presented in Appendix E based on my July 2007 site visits. The general location of wetlands mapped by Zentner and Zentner, and Huffman-Broadway Group, Inc., as well as additional wetlands I identified in July 2007 are also provided in Figure 3. Further, Figure 3 includes my two hydrology monitoring transects excavated in the southern portion of the site in January 2008. Photographs of the hydrology monitoring transects are provided in Appendix F. A total of approximately 8.76 acres of wetlands were mapped by Zentner and Zentner in March 2007, and approximately 7.09 acres of wetlands were mapped by Huffman-Broadway Group, Inc. in October 2006. Wetlands dominated by hydrophytic vegetation were identified throughout the majority of the south and southwest sections of the property by both Zentner and Zentner, and Huffman-Broadway Group, Inc. As a result of my wetland assessment work in January 2008, and one of the soil sample points excavated in July 2007 (i.e., Soil Sample Point 1), I concluded that freshwater emergent wetlands and muted tidal wetlands including brackish marsh habitat associated with the remnant channel of Clark Slough are supported by a combination of incident rainfall and a shallow, localized groundwater table (pers. comm. B. Ross).

Based on my July 2007 wetland assessment, I mapped additional wetlands not delineated by Zentner and Zentner and Huffman-Broadway Group Inc. These include wetlands associated with the "turntable" area in the south central section of the site (Sample Point 11; Appendix E), and additional scattered patches of wetlands located in the central and northern portions of the



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Balloon Tract: Wetland Assessment Map

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site (Figure 3 and Sample Points 9, 10, 13, 16 and 17; Appendix E). The turntable area was not mapped as a wetland by Huffman-Broadway Group, Inc., in 2006 because it was occupied as a homeless camp at that time (pers. comm. Huffman-Broadway Group, Inc.).

Hydrophytic vegetation, seasonal hydrology and hydric soils were identified in each of these additional wetland areas. Common wetland plant species include primarily obligate and facultative-wetland hydrophytes such as nutsedge (*Cyperus eragrostis*), spreading rush (*Juncus effusus*), iris-leaved rush (*Juncus xiphioides*), toad rush (*Juncus bufonius*), broad-leaved cattail (*Typha latifolia*), common threesquare (*Scirpus pungens*), yellow monkeyflower (*Mimulus guttatus*), giant horsetail (*Equisetum telmateia* ssp. *braunii*), pennyroyal (*Mentha pelugium*) and hyssop loosestrife (*Lythrum hyssopifolium*).

With regards to hydrology, the majority of the additional wetland areas described above are comprised of seasonal wetlands situated in small, shallow, topographic depressions that become inundated and saturated with water for prolonged periods during the fall, winter and spring rainfall months (Photographs 1 and 3, Appendix F).

The locations and results of my hydrology monitoring transects excavated on January 10th 2008 are also shown in Photographs 4-6; Appendix F, respectively. As stated above, two separate hydrology monitoring transects, each comprised of 6 soil sample pits, were excavated in the southern portion of the Balloon Tract property to a depth of 24 inches in order to examine evidence of potential hydrology including soil moisture content, soil infiltration rates, and presence/absence of a localized, subsurface groundwater table (Photograph 4, Appendix F). The presence of water beneath the soil surface including direct observation of soil saturation and inundation (*i.e.*, standing water) was detected at various depths in each of the 12 soil pits (Photograph 5, Appendix F). Localized ground water was intercepted within each pit between approximately 16 to 24 inches below the soil surface including Soil Sample Point 1 recorded July 2007. The water level within each of the 2008 soil pits rose to a height of between 3 to 16 inches from the soil surface approximately 15 minutes following excavation of each pit (*e.g.*, Photograph 6, Appendix F). Figure 4 shows the annual rainfall history for Eureka, California from 1 January 2007 to 10 January 2008. Daily rainfall for January 2008 is provided in Figure 5.

Figure 4. Monthly Precipitation Totals for Eureka, California, 1 January 2007 to 10 January 2008.

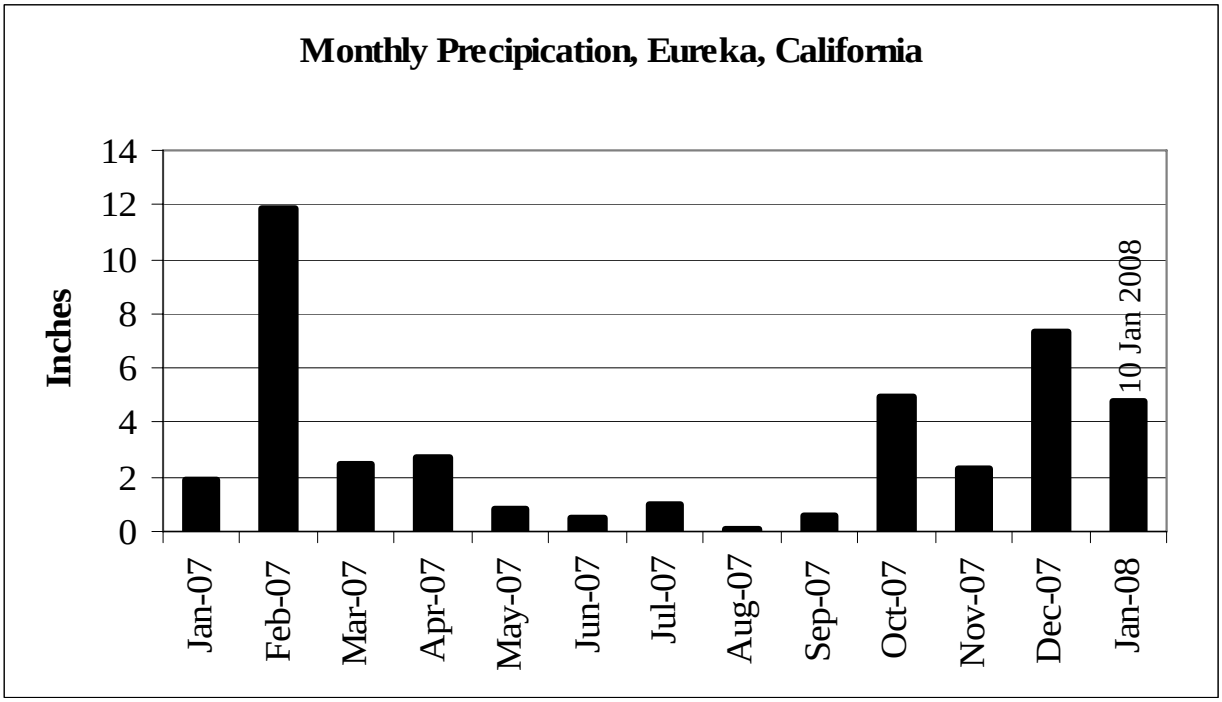
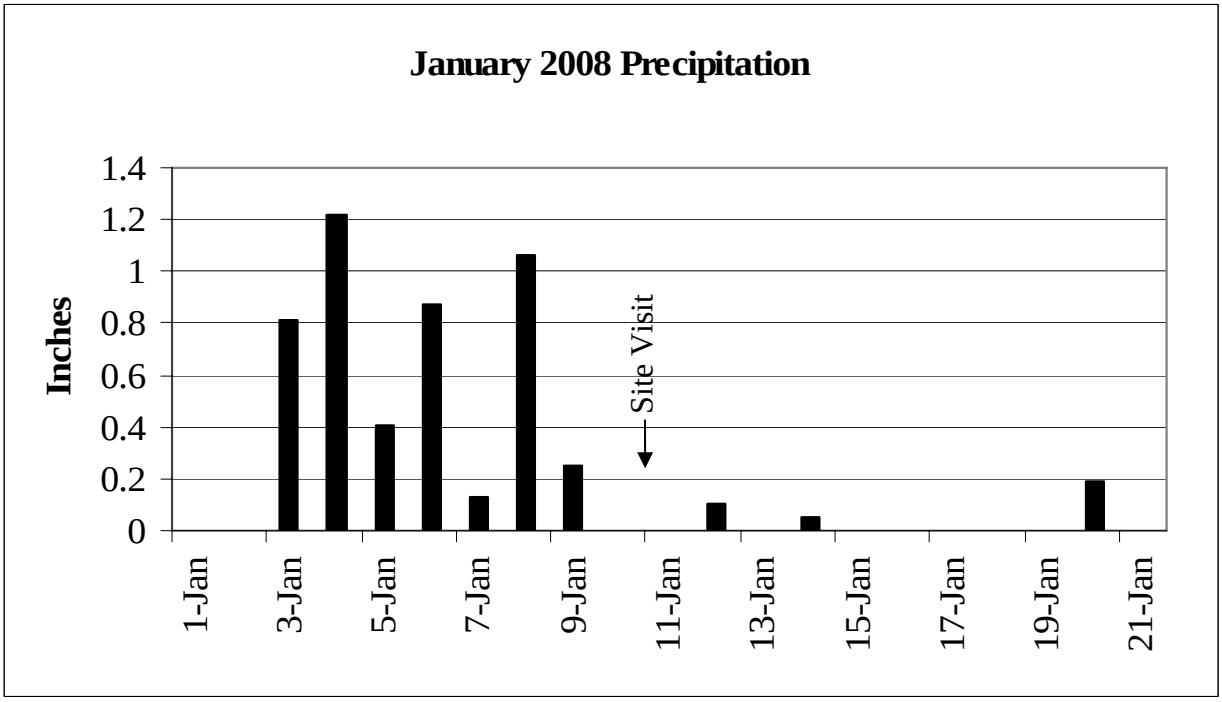


Figure 5. Daily Precipitation Totals for Eureka, California, 1-21 January 2008.



Average precipitation for this part of Northern California is approximately 38 inches per year with the majority of the rainfall occurring from October to April (California Data Exchange

Center, Eureka Woodley Island Station Metadata 2008). The National Weather Service daily temperature and rainfall records indicate that Eureka, California, received a total of 20.95 inches of rainfall this season as of 10 January, with 17.86 inches of rainfall as average for this time in previous years, indicating that the City of Eureka was slightly above (3.09 inches) normal rainfall (NWS Forecast Office, Eureka, California, ASOS Daily Summary, accessed 22 January 2008). The receipt of approximately 20 inches to date of the average total of 38 inches of rainfall on site, correlated with the presence of standing water at 24 inches or less beneath the soil surface in each of the 12 soil pits in the southern portion of the Balloon Tract indicates that some of the wetlands located in this section of the site are also supported by substantial subsurface ground water hydrology (pers. comm. B. Ross)

Although of potentially lesser importance due to the documented history of imported soils from Humboldt Bay, hydric soil indicators identified in the upper soil profile included reduced soils of low chroma (10 YR 2/1, 10 YR 3/1 and 10 YR 3/2), and other redoximorphic features such as mottles, an aquic moisture regime, oxidized rhizospheres on living roots and water stained leaves (Sample Points 9, 10, 11, 13, 16 and 17; Appendix E).

Upland areas on site supported a predominance of facultative and facultative wetland, disturbance-oriented grassland plant species including wide-leaved plantain (*Plantago major*), bristly ox-tongue (*Picris echioides*), fennel (*Foeniculum vulgare*), velvet grass (*Holcus lanatus*), yellow dock (*Rumex crispus*), sweet vernal grass (*Anthoxanthum odoratum*), and Himalayan blackberry (*Rubus discolor*). These areas are largely situated in slightly elevated topographic positions that probably do not provide adequate hydrology to support more moisture-loving plant species. Upland soils generally included soils of slightly higher chroma (10 YR 5/6, 10 YR 4/3, 5 Y 3/2 and 10 YR 3/2) that lacked strong indicators of primary and/or secondary hydric or redoximorphic soil features.

Conclusions

As a part of the Balloon Tract property wetland assessment, I confirmed wetland areas on site mapped by Zentner and Zentner in March 2007, and by Huffman-Broadway Group, Inc. in October 2006. I also delineated additional wetlands on site not mapped by Zentner and Zentner and the Huffman-Broadway Group, Inc. including the turntable area in the southeast section of the site. As a result of my work I identified the presence of several different wetland habitat types on site including freshwater emergent wetlands, brackish marsh wetlands, transitional wetlands between freshwater emergent wetlands and brackish marsh wetlands and seasonal wetlands identified by Huffman-Broadway Group, Inc. as palustrine emergent wetland and estuarine emergent wetland.

CHARACTERIZATION OF BIOTIC HABITATS FOR THE SAMPLE POINT ANALYSIS

Methods

For the characterization of biotic habitats in support of the sample point analysis, I described a total of four habitats on site including disturbed upland grassland, freshwater emergent wetland brackish marsh wetland and seasonal wetland. Transitional habitat between freshwater emergent

wetland and brackish marsh wetland was also identified. As a part of the habitat analysis, I reviewed the wetland delineation report for the project site produced by Huffman-Broadway Group, Inc. October 2006, entitled: *Determination of Wetlands Subject to Regulation under the California Coastal Act, Balloon Tract Property, Eureka, Humboldt County, California*

I developed a written description of each biotic habitat as a result of my site visits to assess wetland and upland habitats on 30 and 31 July 2007 and 10 January 2008, and review of the wetland delineation report by Huffman-Broadway Group, Inc. As a part of my work, all of the plant species encountered on site were taxonomically identified based on visual observations and with the use of the *Jepson Manual: Higher Plants of California* (Hickman, 1993). Additionally, to assist in identifying the biotic habitats, I overlaid the July 2007 and January 2008 Sample Point locations onto the Balloon Tract wetland assessment map (Figure 3) that included the general locations of wetland and upland habitats mapped by Zentner and Zentner and Huffman-Broadway Group, Inc. A combination of UTM coordinates derived from a GPS unit during field surveys, and information contained in hand-written field notes during the surveys were used to locate each of the sample points on site (pers. comm. M. Hagemann).

Results

Huffman-Broadway Group identified two separate types of wetlands on the property based on the U.S. Fish and Wildlife's Service's "Classification System for Wetland and Deepwater Habitats" (Cowardin *et al*. 1979). These include: 1) palustrine emergent wetland and, 2) estuarine emergent wetland. Briefly, palustrine emergent wetlands include most freshwater wetlands and open water bodies of less than 20 acres in which water is less than 6 feet deep such as marshes and swamps, ponds, wet meadows and some seasonal wetlands. Estuarine emergent wetlands include tidal wetlands or muted tidal wetlands in low wave energy environments where the salinity of the water is greater than 0.5 parts per thousand and is variable owing to evaporation and the mixing of seasonal water and freshwater such as tidal wetlands of coastal rivers and embayments (e.g., Humboldt Bay), salty tidal flats, and brackish marsh habitats.

The 14 sample points including July 2007 sediment samples (*i.e*., S-1, S-4, S-5, S-6 and S-7), and January 2008 sediment samples and water samples (i.e., SED 1, SED 2, SED 3, SED 4, WTR 1, WTR 2, WTR 3, WTR 4 and WTR 5) were recorded within three different wetland habitat types including: 1) freshwater emergent wetland, 2) brackish marsh wetland, 3) transitional habitat between freshwater emergent wetland and brackish marsh wetland, and 4) seasonal wetland. The locations of each sample point in wetlands are shown in Figure 6.

Sediment samples S-1, S-4, S-6, S-7, sediment sample SED 4, and water samples WTR 1, WTR 2 and WTR 4 were recorded in freshwater emergent wetland habitat found in several drainage ditches on the property that retain water long enough to support emergent wetland plant species. Wetlands are comprised of dense stands of mowed vegetation dominated by perennial "water-loving" plants including cattail (*Typha domingensis*), Himalayan blackberry (*Rubus discolor*), common threesquare (*Scirpus pungens*), water smartweed (*Polypogon amphibium* ssp. *emersum*), spikerush (*Eleocharis macrostachya*), dense sedge (*Carex densa*), common rush (*Juncus effuses* var. *brunneus*), iris-leaved rush (*Juncus xiphioides*), giant horsetail (*Equisetum telmateia* ssp. *braunii*), water parsley (*Oenanthe sarmentosa*), and creeping buttercup (*Ranunculus repens*). Giant reed (*Phragmites australis*), an introduced noxious weed, has

invaded portions of the drainage ditches on site. The sample points I identified in freshwater emergent wetland habitat were identified as palustrine emergent wetland habitat by the Huffman-Broadway Group, Inc. in October, 2006.

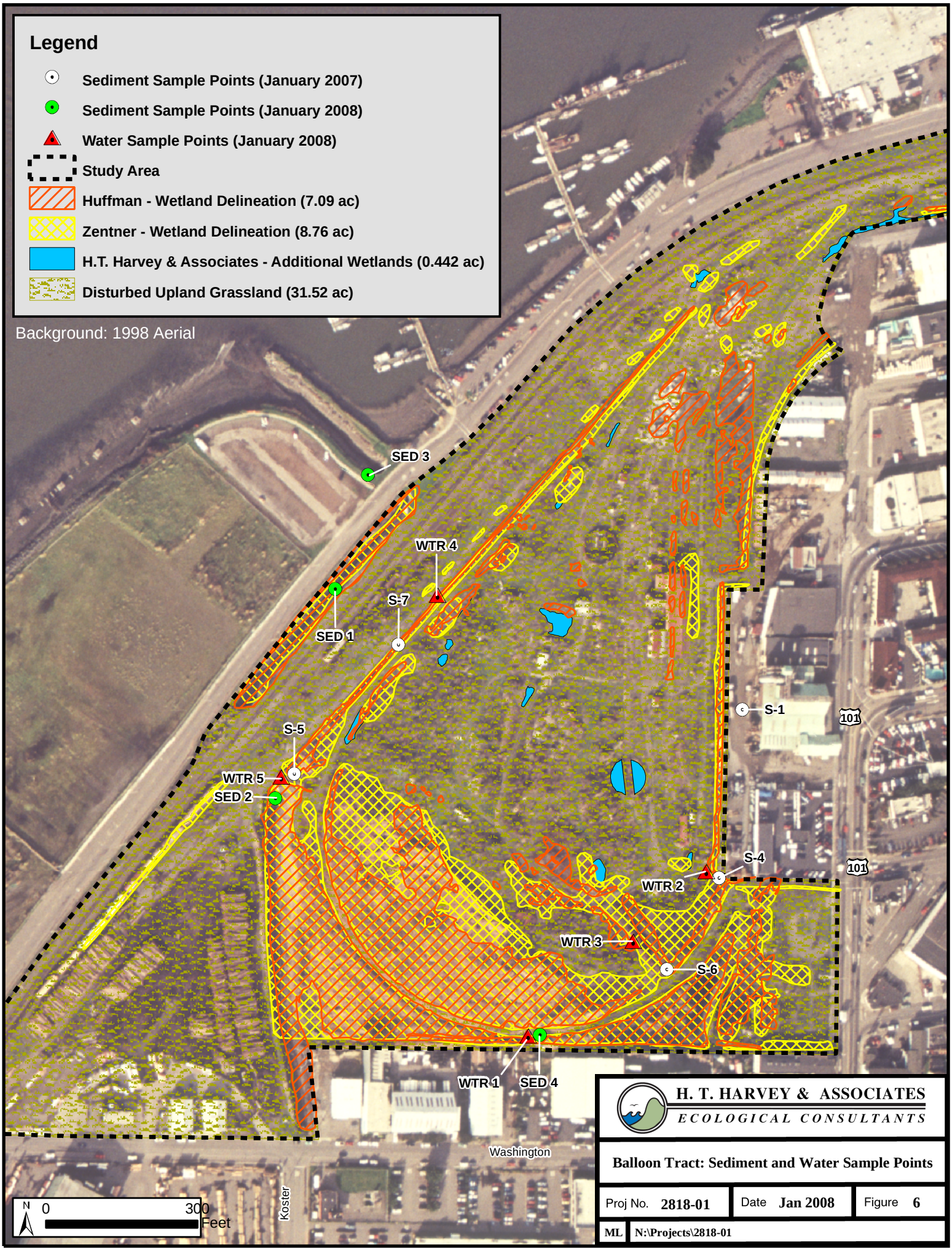
Sediment sample S-5 and water sample WTR 5 were recorded in transitional habitat between freshwater emergent wetland and brackish marsh wetland located in the southernmost portion of a drainage ditch directly adjacent to the northeast side of Clark Slough. Several remnant stands of brackish marsh wetland habitat occur as narrow bands of vegetation along the opposing banks of Clark Slough in the southwest section of the site, and transitional habitat between the two occurs in the southernmost portion of the ditch where soil/sediment sample S-5 and water sample WTR 5 were recorded. The dominant perennial plant species in brackish marsh habitat include bulrush (*Scirpus maritimus*), cordgrass (*Spartina densiflora*), arrow grass (*Triglochin maritima*) and brass buttons (*Cotula coronopifolia*). An approximate 18-inch diameter concrete culvert periodically conveys muted tidal waters from Clark Slough into the southernmost portion of the drainage ditch adjacent to the slough during a high tide event (pers. comm. M. Hagemann). The sample points I identified in transitional habitat between freshwater emergent wetland and brackish marsh wetland were identified as palustrine emergent wetland habitat by the Huffman-Broadway Group, Inc. in October, 2006. Additional sediment samples SED 1 and SED 2 are located in muted tidal aquatic mud flat habitat within brackish marsh in the bed of Clark Slough, and sediment sample SED 3 is located outside of the tide gates and represents sediment from Humboldt Bay.

Sample WTR 3 is located in seasonal wetland habitat. Numerous large and small patches of seasonal wetlands occur scattered throughout the project area. The wetlands occupy shallow topographic depressions around the site that hold seasonal ponded water during the winter rainfall period. Characteristic annual and perennial plant species in this habitat type include hyssop loosestrife (*Lythrum hyssopifolium*), tall umbrella sedge (*Cyperus eragrostis*), pennyroyal (*Mentha pulegium*), curly dock (*Rumex crispus*), bird's foot trefoil (*Lotus corniculatus*), Italian ryegrass (*Lolium multiflorum*), rabbit's foot grass (*Polypogon monspeliensis*) and toad rush (*Juncus bufonius*). The sample point I identified as occurring in seasonal wetland habitat may be identified as upland habitat by the Huffman-Broadway Group, Inc. in October, 2006. A crosswalk table of the wetland habitat types where sample points were recorded on the Balloon Tract property as defined by H. T. Harvey & Associates and Huffman-Broadway Group, Inc., is provided in Table 5.

Table 5. Crosswalk Table of Wetland Habitat Types/Sample Points on the Balloon Tract Property, Eureka, California.

Sample Point	H. T. Harvey & Associates Wetland Habitat Type			Huffman-Broadway Group, Inc. Habitat Type	
	Freshwater Emergent Wetland	Brackish Marsh Wetland	Seasonal Wetland	Palustrine Emergent Wetland	Estuarine Emergent Wetland
S-1	X			X	
S-4	X			X	
S-5	X	X		X	
S-6	X			X	
S-7	X			X	

Sample Point	H. T. Harvey & Associates Wetland Habitat Type			Huffman-Broadway Group, Inc. Habitat Type	
	Freshwater Emergent Wetland	Brackish Marsh Wetland	Seasonal Wetland	Palustrine Emergent Wetland	Estuarine Emergent Wetland
SED 1		X			X
SED 2		X			X
SED 3					
SED 4	X			X	
WTR 1	X			X	
WTR 2	X			X	
WTR 3			X		
WTR 4	X			X	
WTR 5	X	X		X	



H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Balloon Tract: Sediment and Water Sample Points

Proj No. 2818-01	Date Jan 2008	Figure 6
ML	N:\Projects\2818-01	

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EXHIBIT A.
STAFF QUALIFICATIONS

Scott B. Terrill, Ph.D.

VP & Principal, Wildlife Ecology

Areas of Expertise

- Ecology of birds
- Endangered Species Act consultation/compliance
- Environmental impact assessment (NEPA/CEQA)
- Regulatory permitting/compliance

Education

- Ph.D. Biology/Ecology, State Univ. of New York, 1986
- M.S. Zoology, Arizona State Univ., 1981
- B.S. Zoology, Arizona State Univ., 1978

Prior Professional Experience

- Associate Adjunct Professor, San Jose State University 1995 - Present
- Research Director, Coyote Creek Riparian Station 1991 - 1995
- Adjunct Professor, State University of New York 1988 - 90
- Assistant Professor, Siena College, New York 1988-90
- Alexander von Humboldt Research Fellow, Max-Planck-Institut, Germany, current
- Chair, Scientific Advisory Committee, San Francisco Bay Bird Observatory, current

Key Projects

- San Jose WPCP opportunities & constraints analysis
- Yolo County HCP
- NOAA marine sanctuaries management plan
- San Joaquin Riv. improvement project biotic study

Publications

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Professional Profile

Scott is a vice president and principal, roles which have him overseeing operations in our Fresno-based San Joaquin Valley office and our north coast office based in Arcata. Scott also directs our fim's research activities.

Scott is an internationally recognized ornithologist with extensive experience in avian ecology and behavior, as well as a strong background in vertebrate community ecology and population biology. He directs the company's wildlife division projects, which range from special-status species investigations to the completion of biological sections of EIRs and EISs. In his 17 years with the company, he has successfully mangaed more than 1000 projects; his expertise spreads across all major habitats in western North America, including oceanic and estuarine.

Scott has lent his expertise to an array of projects including a number of large-scale EIRs, Natural Environment Studies, constraints analyses, environmental risk assessments, hazardous-waste clean ups, and ESA consultations. In addition, he and the ornithologists he leads here have conducted over 500 Burrowing Owl projects and provide expertise in raptor issues. Scott has been working with special-status species, habitat analyses, biotic inventories, and EISs since 1974.

Scott has overseen numerous large-scale projects in California, including the assessment and mitigation of cumulative impacts of selenium in agricultural drain water on wildlife; more than seven years of monitoring bird use and risk at agricultural drain water basins and associated mitigation habitats in California's San Joaquin Valley; monitoring potential effects of oceanic dumping of dredge spoils on marine birds and mammals; restoration projects involving over 2000 acres of wetlands in the San Joaquin Valley; biological characterization, risk assessment and long-term monitoring of endangered species in remediated wetlands at Concord Naval Weapons Station; biotic characterizations of Fallon and Lemoore Naval Air Stations; and the wildlife components of the Measure A+B transportation upgrades under the Santa Clara Valley Transportation Authority in Santa Clara County, including a successful implementation of measures to avoid take of protected species while construction took place on the multibillion dollar projects. Currently, he is Principal-in-charge of a Caltrans on-call environmental services contract involving over 15 transportation projects. He is also Project Manager on the Yolo County Habitat Conservation Plan.

Scott has also published over 30 scientific papers, and was the primary contributing author to the 3-volume advanced field guide, the Audubon Society Master Guide to Birding. He is a regional editor for North American Birds and has served 12 years on the California Bird Records Committee. Scott has worked on riparian ecosystems for over 3 decades and served as Research Director for Coyote Creek Riparian Station. He is a previous Chair of the Scientific Advisory Committee of the San Francisco Bay Bird Observatory. Scott has also lead marine bird trips and surveys for over 10 years.

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Able, K.P., W.F. Gergits, J.D. Cherry and S.B. Terrill. 1984. Homing behavior of Wood Thrushes (Hylocichla mustelina). Behav. Ecol. Sociobio. 15:39-41.

Terrill, S.B. and R.D. Ohmart. Facultative extension of fall migration by Yellow-rumped Warblers (Dendroica coronata). The Auk 101:427-438.

Terrill, S.B. 1983. The major contributing author to The Audubon Society Master Guide to Birding (three volumes). Alfred A. Knopf, New York, NY.

Able, K.P., S.B. Terrill and J.D. Cherry. 1982. Not by mirrors. Nature. 298:510.

Terrill, S.B. 1981. Notes on the avifauna of two riparian sites in northern Sonora, Mexico. Continental Birdlife 2:144-149.

Terrill, S.B. and L.S. Terrill. 1981. On the field identification of Yellow-green, Red-eyed, Philadelphia and Warbling Vireos. Continental Birdlife 2:144-149.

Terrill, S.B. and S. Burge. 1976. Identification of Bendire's and Curve-billed Thrashers. Roadrunner 14:8-9.

Terrill, S.B. 1975. Brief summary of field identification of female Black-chinned and Costa's Hummingbirds. Roadrunner 13:4.

Terrill, S.B. 1975. Field identification of the Chimney Swift. Roadrunner 13:6-7.

PAPERS DELIVERED AT PROFESSIONAL MEETINGS, SYMPOSIA, AND SEMINARS

Terrill, S.B. 2004. Minimization of exposure to agricultural drainwater selenium and mitigation for residual impacts on wildlife in the San Joaquin Valley: A decade of results. (Invited) Presented to U.C. Salinity/Drainage Annual Meeting.

Terrill, S.B. Bird use of an Evaporation Basin and a Mitigation Wetland (with A. G. Gordus and J. Seay. (Invited) Presented to the North American Water and Environment Congress 1996.

Terrill, S.B. Relative Roles of endogenous and exogenous factors in avian migratory behavior. (Invited) Presented to the San Francisco State Avian Study Group (1994).

Terrill, S.B. Migratory behavior of Passerines. (Invited) Presented to the Western Field Ornithologists (1994).

PAPERS DELIVERED AT PROFESSIONAL MEETINGS, SYMPOSIA, AND SEMINARS, CONTINUED

Terrill, S.B. Migratory behavior of Passerines. (Invited) Presented to the Western Field Ornithologists (1994).

Terrill, S.B. "Relocation of burrowing owls during the courtship period" (with P. Delevoryas). Presented to the Raptor Research Foundation (1992).

Terrill, S.B. "Habitat use by the Endangered California Clapper Rail in south San Francisco Bay." Presented to the Wildlife Society, San Diego, California (1992).

Terrill, S.B. Developing and implementing Wildlife Monitoring Plans for Riparian Systems. (Invited) Presented to the Riparian Revegetation Study Group (1992).

Terrill, S.B. "Behavioral ecology of bird migration." (Invited) Presented at the Distinguished Biologists Lecture Series, Hartwick College, New York (1990).

Bauer, G. and S.B. Terrill. 1988. "Spischen", eine wirksame Methode zur Anlockung von Singvogeln. Die Vogelwelt 109:25-31.

Berthold, P. and S.B. Terrill. 1988. Migratory behavior, ecophysiology and population growth of Blackcaps wintering in Britain and Ireland: some hypotheses. Ringing and Migration 9:153-159.

Terrill, S.B. "Food availability, migratory behavior and population dynamics of terrestrial migrant birds during the nonreproductive season." (Invited) Presented at the Food Exploitation by Terrestrial Birds symposium, 1988 (California).

Terrill, S.B. "Migratory behavior and population dynamics of migrant birds during the nonreproductive season." (Invited) Humboldt State University, 1988, California.

Terrill, S.B. "The regulation of migratory behavior: interactions between exogenous and endogenous factors." Presented at the International Centennial Meeting of the Deutsche Ornithological-Gesellschaft, 1988, Bonn, Germany.

Terrill, S.B. "Ecophysiological aspects of movement by migrants within the winter quarters." (Invited) Presented at the International symposium on Physiological and Ecophysiological Aspects of Bird Migration in October 1988 (Germany).

Terrill, S.B. "Behavioral ecology of avian migration systems." (Invited) University of Frankfurt, Germany, 1987.

Terrill, S.B. "The role of proximate factors in bird migration." (Invited) Presented at the XIX Congressus Internationalis Ornithologicus in 1986 (Canada).

Terrill, S.B. "The role of social dominance in bird migration." Presented at the International Behavioral Ecology Meetings (1986) in New York.

Terrill, S.B. "Relationship between social dominance, food distribution and Zugunruhe and body weight in Dark-eyed Juncos (Junco hyemalis)." Presented to the A.O.U. in 1985.

Terrill, S.B. "The relative roles of endogenous and exogenous factors in bird migrations." (Invited) Presented to the Animal Behavior Society Northeast Regional Meetings in 1985.

Terrill, S.B. "The role of social and ecological factors in bird migration." (Invited) State Museum of New York, 1985.

Terrill, S.B. 1984. A sight record of the Crescent-chested Warbler (Parula superciliosa) from lowland Sonora, Mexico. Amer. Birds 39:11.

Terrill, S.B. "Effects of social environment upon Zugunruhe in male Dark-eyes Juncos (Junco hyemalis)." Presented to the A.O.U. in 1984.

Terrill, S.B. and R.D. Ohmart. 1984. Facultative extension of fall migration of Yellow-rumped Warblers (Dendroica coronata). Auk 101:427-438.

Terrill, S.B. 1982. "The relationship between a facultative extension of the fall migration and varying suitability of winter habitat for Yellow-rumped Warblers (Dendroica coronata)." Presented to the A.O.U.

OTHER TESTIMONY

Scott has not testified in any other cases in the last four years.

COMPENSATION

Patrick Boursier, Ph.D.

Principal, Plant Ecology

Areas of Expertise

- Ecology of plants
- Ecology of freshwater wetlands
- Wetland delineation/assessment
- Environmental impact assessment (NEPA/CEQA)
- Permitting/compliance

Education

- Ph.D. Plant Physiology, UC Davis, 1987
- M.S. Agronomy and Range Science, UC Davis, 1982
- B.S. Biological Sciences, UC Davis, 1979

Prior Professional Experience

- Postdoctoral researcher, salt marsh ecophysiology, Univ. Sussex, Brighton, England 1989-1990
- Postdoctoral researcher, soil/plant relations, UC Davis 1988-1989
- Postdoctoral researcher, nitrogen biochemistry, Oregon State Univ., Corvallis 1987-1988
- Biological Technician, Interior Dept., Bureau of Land Management, Susanville 1978-1980

Key Projects

- So. CA Edison Antelope Valley transmission line EIR
- Napa/Sonoma Marsh resource agency permits
- Haystack/Burns Wetland delineation/rare plant studies
- VTA Measure B projects environmental studies/resource agency permits

Publications

Boursier, P., T. J. Flowers and A. R. Yeo. 1991. Heterogeneity in the distribution of membrane potential, turgor pressure, the uptake of sodium and of chloride ions along the root axis of the halophyte *Suaeda maritima* (L.) Dum. Planta.

Boursier, P., C. A. Raguse and K. L. Taggard. 1989. Growth & nitrogen-fixing responses of subterranean clover to application and subsequent removal of ammonium nitrate. Crop Sci. 29:758-763.

Boursier, P. & A. Lauchli. 1989. Mechanisms of chloride partitioning in leaves of salt-stressed Sorghum bicolor. Physiol. Plant. 77:537-544.

Professional Profile

Patrick is a Principal and head of our Plant Ecology group, a role in which he provides direction, training, and oversight on technical studies related to environmental documents, wetland delineations/assessments, quantitative sampling, rare plant studies, and resource agency permit preparation and processing. He is also responsible for providing senior management across a broad spectrum of projects.

Prior to joining HTH, Patrick was involved in monitoring and assessing the effects of environmental stresses on individual plant vigor and composition in Great Britain's coastal salt marsh communities. He has over 20 years of experience initiating, planning, and executing both basic and applied research from the whole plant to the biochemical level; in ecological and managed ecosystems; and under field, greenhouse, and laboratory conditions. His technical expertise includes scanning and transmission electron microscopy, electron x-ray microanalysis, micro-turgor pressure probes, radioactive isotopes, enzyme isolation, plant tissue element analysis, and soil physical and chemical properties. Pat's field experience includes mapping over 1 million acres of plant communities in desert and forest ecosystems over a 3-year period for the Bureau of Land Management.

With over 15 years of direct consulting experience, Dr. Boursier has managed several hundred projects including EIRs, constraints analyses, impact assessments, resource agency permit submittals, as well as mitigation and monitoring studies. He has mapped biotic habitats, conducted special-status plant surveys, and performed wetland delineations in a wide variety of plant communities throughout the Bay Area and in the Central and San Joaquin Valleys. Over the past 15 years, he has developed expertise specifically related to the preparation of resource agency permits, including endangered species consultations.

With HTH, Pat has overseen numerous large-scale projects. Recently, these have included the preparation of environmental documentation and acquisition of resource agency permits for 9 Santa Clara County Transportation Authority highway and rail projects; wetland delineation and resource agency permit preparation for a 6000-acre salt marsh along the Napa River, wetland delineation and rare plant surveys on over 1800 acres of vernal pool habitat in California's Central Valley for the U.S. Army Corps of Engineers, Sacramento District; long-term marsh vegetation monitoring of over 1500 acres in South San Francisco Bay; and preparation of a Habitat Conservation Plan for 400 acres of serpentine habitat located in the Santa Clara County.

PUBLICATIONS, CONTINUED

Boursier, P., J. Lynch, A. Lauchli and E. Epstein. 1987. Chloride partitioning in leaves of salt-stressed sorghum, maize, wheat and barley. Aust. J. Plant Physiol. 14:463-473.

Boursier, P., F. J. Hanus, H. Papen, M. Becker, S. A. Russell and H. J. Evans. 1988. Selenium increases hydrogenase expression in autotrophically cultured Bradyrhizobium japonicum and is a constituent of the purified enzyme. J. Bacteriol. 170:5594-5600.

Boursier, P. and A. Lauchli. 1990. Growth response and mineral nutrient relations of salt-stressed sorghum. Crop Sci. 30:1226-1233.

Evans, H. J., S. A. Russell, F. J. Hanus, H. Papen, L. S. Soto, M. Zuber and P. Boursier. 1988. Hydrogenase and nitrogenase relationships in Rhizobium: Some recent developments. In: Proc. 7th Inter. Conf. Nitrog. Fix., H. Bothe, F. J. de Bruijn and W. E. Newton (eds.). Gustav Fischer, Stuttgart, New York.

Lauchli, A. and P. Boursier. 1989. Compartment in root cells and tissues: X-ray microanalysis for the study of specific ions. Meth. Enzymol. 174: 267-277.

Yeo, A. R. K. S. Lee, P. Izard, P. J. Boursier and T. J. Flowers. 1991. Short and long term effects of salinity on leaf growth in rice (Oryza sativa L.). J. Exp. Bot. 42:881.

OTHER TESTIMONY

Pat has not testified in any other cases in the last four years.

COMPENSATION

Sharon H. Kramer, Ph.D.

Senior Associate Fisheries Ecologist

Areas of Expertise

- Ecology of fish
- Coastal and estuarine ecosystems
- Habitat conservation planning
- Cumulative watershed effects
- Endangered Species Act consultation/compliance
- FERC relicensing

Education

- Ph.D. Marine Biology, UC San Diego, Scripps Institution of Oceanography, 1990
- M.S. Zoology Univ. of Hawaii, Manoa, 1983
- B.A. Aquatic Biology, UC Santa Barbara 1979

Prior Professional Experience

- Senior Aquatic Ecologist & Principal, Stillwater Sciences, Arcata CA, 2000-2007
- Regional Science Coordinator, Nat. Marine Fisheries Service, Arcata, CA 1997-2000
- Resource Specialist, Metrop. Water District of Southern California, Sacramento, 1996
- Fish/Wildlife Biologist, USFWS Pacific HCP, Olympia, WA, 1994-1995
- Science Associate, CA Sea Grant College Research Program, La Jolla, 1993-1994
- Postdoctoral Researcher, Australian Institute of Marine Science, Townsville, 1991-1993

Publications

Stillwater Sciences. 2006. Guidelines to evaluate, modify, & develop estuarine restoration projects for tidewater goby habitat. Report to USFWS. Stillwater Sciences, Arcata, CA. S.Kramer, Project Manager.

Kramer, S.H., M. Trso, and N. Hume. 2001. Timber harvest and sediment loads in nine northern California watersheds based on recent Total Maximum Daily Load (TMDL) studies. Watershed Management Council Networker Volume 10 no.1.

Professional Profile

Sharon is an experienced fisheries ecologist who heads up our new fisheries ecology division and North Coast office, operating out of Arcata, CA.

With over 20 years of experience in aquatic ecology and fisheries biology in the Pacific Northwest, Central California, Australia, and Hawaii, Sharon's expertise in fisheries ecology is vast. Her academic research included studies of nearshore flatfishes to determine distribution patterns in shallow water marine and estuarine habitats, as well as work on the Great Barrier Reef, highlighting fish use of shallow-water eelgrass, mud-, and sand flat habitat as nursery habitat for juveniles. In the 20 years since, she has parlayed this rigorous marine biology training from the prestigious Scripps Institution of Oceanography into a highly regarded professional career as a consultant and fisheries ecologist.

Sharon's recent professional research and work has focused on integrating watershed processes and the freshwater and estuarine ecology of salmonids and tidewater goby. Before joining HTH, she opened and managed the Arcata, CA office of a North Coast consulting firm. In her role as a principal there, she managed a team of nearly 20 scientists, and was extensively involves in the FERC Relicensing process, guiding dozens of projects through the process. She also was a member of the scientific review panel for the White Seabass Fishery Management Plan for the state of California and was the principal investigator for the Napa River Estuary Fisheries Monitoring Program for the Army Corps of Engineers. She provided oversight and management for habitat conservation planning; watershed, riverine, and estuarine assessment; and population modeling; monitoring; and restoration for clients ranging from federal agencies and laboratories, state agencies, and local municipalities, to privately owned and public hydroelectric projects and utilities, NGOs, private timber companies, and universities.

In the late 1990s, Sharon worked for the National Marine Fisheries Service as a regional science coordinator and fisheries biologist. Here she coordinated and developed aquatic conservation strategies for salmonids in multi-species HCPs including the Pacific Lumber Company Headwaters HCP. In addition, she provided scientific guidance to NMFS on regional planning strategies for salmonid recovery, including the development of guidelines for forest practices. She also conducted research related to the development of aquatic conservation strategies on non-federal lands and assessed and developed ESA policy relating to salmonid conservation.

Prior to this, Sharon worked at USFWS, where she coordinated the development and directed implementation of aquatic HCPs on non-federal lands under the ESA. She oversaw the development of appropriate planning elements for aquatic resources (primarily salmonids) in multi-species HCPs for applicants including water diverters, hydropower, and timber industry. She also served as the USFWS lead on a non-federal lands initiative with NMFS and the EPA to establish scientifically sound guidelines for watershed management to promote recovery of salmonids on private lands.

Sharon's work for our firm is already underway, as she develops the fisheries portions of several key projects while we look to expand our practice into the Pacific Northwest Region and grow our budding fisheries ecology division.

PUBLICATIONS, CONTINUED

Bell, E., S.H. Kramer, D.Zajanc, J. Aspittle. In press. Salmonid Fry Stranding Mortality Associated with Daily Water Level Fluctuations in Trail Bridge Reservoir, Oregon. N. Am. J. Fish. Mgmt.

Porter, D., V. Gizinski, R. Hartley, and S.H. Kramer. 2007 .Restoring complexity to industrially managed timberlands: the Mill Creek interim management recommendations and early restoration thinning treatments. USDA Forest Service Gen. Tech. Rep. PSW-GTR-194, pp. 283-294

Kramer, S.H., S.H. Kramer, and S.J. Newman. 1994. New deep-water fish records from the Great Barrier Reef, Australia. Pac. Sci. 48:70-79.

Kramer, S.H., S.H. Kramer, and S.J. Newman. 1993. A potential deep reef slope fishery resource off the Great Barrier Reef. Australian Fisheries 52(1):18-21.

Kramer, S.H., and J. Sunada. 1992. California halibut. In Leet, W. (ed.) California's living marine resources and their utilization. Calif. Dept. Fish and Game, Sacramento. pp. 94-97.

Kramer, S.H. 1991. The shallow-water flatfishes of San Diego County. CalCOFI Rept. 32:128-142.

Kramer, S.H. 1991. Growth, mortality, and movements of juvenile California halibut (Paralichthys californicus) in shallow coastal and bay habitats of San Diego County, California. Fishery Bulletin, U.S. 89:195-207.

Kramer, Sharon H. 1990. Distribution and abundance of juvenile California halibut, Paralichthys californicus, in shallow waters of San Diego County. Calif. Dept. Fish and Game, Fishery Bulletin 174:99-126.

Fleminger, A. and S. Hendrix Kramer. 1988. Recent introduction of an Asian estuarine copepod, Pseudodiaptomus marinus (Copepoda:Calanoida), into southern California embayments. Mar. Biol. 98:535-541.

Kaya, C.M., A.E. Dizon. S.D. Hendrix, T. Kazama, and M. Queenth. 1982. Rapid and spontaneous maturation, ovulation, and spawning of ova by a newly captured skipjack tuna, Katsuwonus pelamis. Fishery Bulletin, U.S. 80:393-396.

INVITED PRESENTATIONS (SELECTED CONFERENCES)

Kramer, S.H., S.H. Kramer and S. Terrill. 2007. A non-salmonid perspective on habitat provided by bar-built estuaries. American Fisheries Society National Meeting, September 2007, San Francisco, CA

Kramer, S.H., S.H. Kramer, and S. Dusterhoff. 2006. Guidelines to Evaluate, Modify and Develop Estuarine Restoration Projects for Tidewater Goby Habitat. 30 March 2006 California-Nevada Chapter Annual Meeting, American Fisheries Society Conference.

Kramer, S.H., F. Ligon, and E. Bell. 2006. Population Dynamics of Bull Trout in the upper McKenzie River, Oregon. 16 May 2006 Western Division American Fisheries Society Annual Meeting.

Kramer, S.H. 2005. Symposium Facilitator for "Pacific Salmon Environment and Life History Models: Advancing Science for Sustainable Salmon in the Future". American Fisheries Society National Meeting, Anchorage Alaska. Currently coauthoring the closing chapter for the symposium book

Kramer, S.H., and R. Klein. 2000. The change in distribution and role of large woody debris in upper Prairie Creek, a pristine Northern California redwood watershed, after a 10 year flood event. First annual international conference on wood in large rivers, Corvallis OR, October 2000.

OTHER TESTIMONY

Sharon has not testified in any other cases in the last four years.

COMPENSATION

Brian Cleary, M.S.

Plant Ecologist

Areas of Expertise

- Ecology of plants
- Rare/endangered plant surveys
- Wetland delineation
- Ecology of riparian environments

Education

- M.S. Ecological Botany, California State Univ. Stanislaus, 1997
- B.S. California State Univ. Fresno, 1986

Prior Professional Experience

- Senior Associate, Swanson Hydrology & Geomorphology, 2003-2005
- Botanist, H. T. Harvey & Associates 1998-2003
- Botanist, EA Engineering, Science & Technology 1993-1997
- Professional Botanist, U.S. Forest Service 1989-1993

Key Projects

- Butte County mitigation project
- Neary mitigation project
- Teichert Ponds restoration project
- Newark Area 4 wetland delineation

Key Publications

Cleary, B.C. 1993. Physiographic Influences Affecting Plant Community Types in Yosemite National Park, California. Paper presented at the annual California State University student research convention, Fullerton State University, California.

Cleary, B.C. 1994. Alpine Flora of Mt. Dana, Yosemite National Park. Invited presentation by the California Native Plant Society, Sierra Foothills Chapter.

Cleary, B.C. 1996. Endemic Flora and Plant Communities of Mt. Kenya, Africa. Invited presentation at the University of California Botanical Gardens.

Professional Profile

Brian is a plant ecologist responsible primarily for conducting wetland delineations in many different habitats throughout California including vernal pools, freshwater marshes, and riparian communities

Brian has more than 19 years experience performing comprehensive floristic and vegetation studies. He has conducted botanical investigations throughout the U.S., with particular emphasis on the flora and terrestrial ecosystems of California and Oregon. He has extensive technical expertise California plant taxonomy, including rare, threatened, endangered (RTE), and sensitive plants, terrestrial plant ecology, conservation, and environmental legislation. Brian is experienced in quantitative and qualitative terrestrial plant community description and analysis, wetland delineation, as well as field surveys for RTE and sensitive plant species and sensitive plant communities.

Prior to his work for HTH, Brian used the U.S. Forest Service's Ecological Unit Inventory (EUI) technique for vegetation typing and GIS mapping of over 300,000 acres of land in southern California. As a vegetation management specialist, Mr. Cleary assisted the U.S. Forest Service in developing fire management prescriptions in chaparral and mixed conifer forest to enhance biodiversity and promote age class diversity.

With HTH, he provides assessment of project related environmental impacts, formulation of mitigative vegetation management and restoration strategies, plus utilization of various floristic and GIS database programs. His surveys involve extensive inventories of plant species in numerous habitat types including wetland communities, coastal dune, coastal scrub, grassland, chaparral, oak woodland, coniferous forest, alpine tundra, desert, ultramafic, halophytic, and anthropogenic communities. Mr. Cleary carried out data analysis and description of over 400,000 acres of natural vegetation for Louisiana-Pacific's sustained yield timber management approach and Habitat Conservation Plan (HCP) in northern California.

Other Testimony

Brian has not testified in any other cases in the last four years.

Compensation

Lorrie Bott, B.A.

Marine Invertebrate Biologist

Areas of Expertise

- Marine ecology
- Biology of Marine Invertebrates
- Intertidal and Subtidal Ecology
- Sediment and Water Quality Analysis

Education

- B.A. Biology, Humboldt State University (1974)

Prior Professional Experience

- 2000 – 2002, Marine Invertebrate Taxonomist through a grant Administered by the Humboldt State University Foundation, Arcata, California.
- 1995 – 1996, Marine Invertebrate Taxonomist., through a grant Administered by the Humboldt State University Foundation, Arcata, California.
- 1987 – 1995, Marine Invertebrate Taxonomist / Marine Biologist., Telonicher Marine Laboratory, Trinidad, California through a grant Administered by the Humboldt State University Foundation, Arcata, California.
- 1981 – 1987, Marine Invertebrate Taxonomist / Marine Biologist, Gail Newton and Associates, Eureka, California and Karen Theiss and Associates, McKinleyville, California.
- 1978 – 1980, Marine Invertebrate Taxonomist / Marine Biologist, through a grant Administered by the Humboldt State University Foundation, Arcata, California.
- 1975 – 1977, Marine Invertebrate Taxonomist / Marine Biologist, Environmental Research Consultants, Arcata, California.

Professional Profile

Ms. Bottt has over 30 years of experience as a marine biologist and marine invertebrate taxonomist working in a variety of marine habitats along the northern California coast. Her experience covers all aspects of biological work including sample collection of intertidal and subtidal samples, sample analysis, data analysis, and report preparation. She has also participated in surveys of marine fish, stomach content analysis of fish, collection of samples for sediment and water quality analysis, and analysis of water and sediment samples.

Ms. Bott has particular expertise in the nearshore and offshore habitats in Northern California. From 2000 to 2002, Lorrie's acted as head taxonomist for invertebrates in a survey of non-indigenous species in Humboldt Bay, California. In 1995 and 1996, she served as an invertebrate taxonomist for a study of animal-sediment relations in offshore muds from samples along the Humboldt County coast.

During the late 1980's and early 1990's, Ms. Bott was Head Taxonomist for the Ocean Monitoring Project, which conducted surveys of invertebrates and fish in sands/muds off the mouth of Humboldt Bay and in nearshore sands off the Samoa Peninsula of the Bay. She participated in all aspects of the project including supervising stomach content analysis of fish, collection of fish and invertebrate tissue for chemical analysis, water quality and sediment sampling and analysis, data analysis and report preparation. Telonicher Marine Laboratory, Trinidad, California.

In the late 1970's and early 1980's Lorrie acted as a consulting marine biologist through three firms and conducted intertidal surveys of invertebrates and marine plants at a variety of sites around Humboldt Bay, on the Samoa Peninsula of the Bay, and in Monterey Bay. During this time, she also participated in dune revegetation projects.

Shortly after receiving her degree, Ms. Bott acted as a taxonomist for a survey of invertebrates in the shipping channels of Humboldt Bay, including data analysis and report preparation under a grant administered by the Humboldt State University Foundation, Arcata, California.

H.T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Professional Fees

Fees Effective January 1, 2008

Personnel Classification	Hourly Billing Rate
Principal	$ 205 - 235
Senior Associate Ecologist	$ 185
Associate Ecologist	$ 170
Senior Ecologist 2	$ 155
Senior Ecologist 1	$ 140
Ecologist 2	$ 125
Ecologist 1	$ 115
Field Biologist 2	$ 95
Field Biologist 1	$ 80
Graphics	$ 100
Technical Editor	$ 95
Administrative Support	$ 80
Clerical Support	$ 65
Deposition and Testimony	Two times standard
Subcontractural Consultants	Cost plus 10%
Direct Expenses	Cost plus 10%
Transportation	Current IRS Federal Standard Mileage Rate *(50.5¢ / mile as of January 2008)*
Travel per diem (at cost)	~ $178/day
Computer Services	Variable
Field Equipment Operation	Variable

APPENDIX A.
SPECIES DESCRIPTIONS

Background on Dungeness crab (*Cancer magister*)

Description

Dungeness crabs are a uniform color, a somewhat greenish red, over the carapace with varying intensity of purple on the claws and legs. The tips of claws and legs tend to be whitish. Dungeness crabs are the widest at the tenth and most prominent carapace tooth after the eye. They can reach 230 mm carapace width, and possibly larger, but are usually less than 190 mm.

Life History

The breeding season for Dungeness crab is from spring through the fall. Males mate with female crabs that have just molted their shells. Males may mate with more than one female. The female crab stores the sperm until her eggs are fully developed and then fertilizes them as she extrudes the eggs under her abdomen where she carries them until they hatch. A female Dungeness crab can carry up to 2.5 million eggs. Larval crabs are planktonic for 4-12 months. Planktonic larval crab metamorphose through 6 different stages before settling as a juveniles. Crabs continually molt as they grow, and remain juveniles for the first two years. After two years male crabs grow faster than females and are larger at the same age. Juveniles usually avoid habitat overlap with adults in order to avoid cannibalism. Although juvenile Dungeness crab can be found in coastal habitats as well as in bays, juveniles prefer shallow estuarine areas with protective structure such as pilings, woody debris, and eelgrass. Juvenile Dungeness crab use bay and estuarine habitats as nursery areas, as evidenced by the abundance of juvenile Dungeness crab captured in Clark Slough on 31 July 2007. Movement out of bay habitats is likely associated with increases in freshwater discharges during late fall and winter rains, when they move into bay and coastal habitats. Maximum life expectancy for Dungeness crab is about 10-12 years. Most commercially caught Dungeness crab are approximately 4 years old. Adult Dungeness crab trapped off Humboldt Bay support a substantial commercial fishing industry.

Distribution

Dungeness crabs occur from Santa Barbara, California to the Pribilof Islands. They are usually found subtidally on sandy bottoms and in eelgrass beds although they can occur from the low intertidal to depths of 230 meters. Juveniles can be very abundant in the intertidal zone, and are common and abundant in slough channels of Humboldt Bay.

Ecology

Dungeness crabs feed on clams, smaller crustaceans, and fish. They can avoid predators by remaining buried in the substrate during the day, with only their eyestalks protruding. Dungeness crabs are a major target for sport and commercial fisheries from Kodiak, Alaska to central California.

Background on Tidewater goby (*Eucyclogobius newberryi*)

Status

Tidewater gobies were listed as endangered by the USFWS in 1994 (59 FR 5494). Critical habitat was designated for tidewater goby in Humboldt County in 2006 (71 FR 68914). The recovery plan for the tidewater goby was approved by USFWS in December 2005; tidewater gobies in Humboldt Bay are in the North Coast recovery Unit, subunit NC3, and have been found primarily in high marsh channels of Arcata Bay.

Reasons for Decline

The reasons for tidewater goby decline include poor watershed management, diking and draining of wetlands and riparian areas, human breaching of sandbars at estuary mouths, pollution, and non-native species which may prey on or compete with tidewater gobies.

Description of Tidewater Gobies

Tidewater gobies are small fish, rarely longer than 50 mm standard length (SL). They are elongate with a blunt tail. The pelvic fins are fused and form a sucker. Their coloration is gray, brown, or olive, with dark mottling. The upper third of the first dorsal fin is transparent. Breeding females turn bluish-black in color.

Life History of Tidewater Gobies

Tidewater gobies can tolerate a wide range of water salinity (0-41 ppt) and water temperature (8-25°C). They appear to prefer salinities less than 10 ppt. Tidewater gobies are poor swimmers and are not known to migrate. They may be dispersed by high flows to other nearby suitable habitats, but most likely do not disperse well over long distances. They are essentially an annual species, rarely living longer than one year. They are prolific breeders, with the populations peaking in the warmer summer months and crashing during the winter months when high flows breach lagoon barriers. Breeding can occur all year but little spawning occurs from December through March. Breeding is unusual in that females compete for males that construct vertical burrows which they defend from other males. The burrows are used for spawning and incubation of eggs and are usually constructed in relatively coarse unconsolidated sand. Females lay clutches of 300-500 eggs and may lay 6-12 clutches per year. Males guard the eggs for 9-11 days until they hatch.

Distribution of Tidewater Gobies

Tidewater gobies occur only in California. Their range extends from Tillas Slough in the mouth of the Smith River near the Oregon border, south to Agua Hedionda Lagoon in San Diego County, which is just north of the Mexican border. They typically occupy lagoons of coastal streams and are absent where the coastline is steep or where streams do not form lagoons.

Tidewater Gobies in Humboldt Bay

Humboldt Bay is designated as "Water Quality Limited" by the State Water Resources Control Board. Threats to tidewater gobies in Humboldt Bay include operation of tide gates that control water flow and lagoon formation, grazing, oil spill contamination, highway construction and maintenance, pollution, alteration of stream flood flows, and possibly sedimentation.

In Humboldt Bay, tidewater gobies are known to occur in a number of tributaries. They are known to occur in the northern portion of the bay, known as Arcata Bay. Most of those tributaries form a lagoon at the mouth during low tide. Tidewater gobies also occur where a lagoon is artificially formed by man-made structures such as tide gates. The Humboldt Bay tributaries where tidewater gobies are known to occur include Mad River Slough, McDaniel Slough/Klopp Lake, KATA Radio Station Site, Jacoby Creek/ Gannon Slough, Rocky Gulch, and Freshwater Slough. Freshwater Slough is the closest to Clark Slough at approximately 2.8 kilometers distance.

Background on threespine stickleback (*Gasterosteus aculeatus*)

Description

Threespine sticklebacks are small, laterally compressed fish, with adults usually reaching only 3-5 cm. They are named for the three spines which are located in front of the soft dorsal fin. They have large eyes, a terminal upward slanting mouth. Pelvic fins have a single spine and a small ray. Sticklebacks have 1-35 bony plates on their sides and they lack scales. Some populations have no plates. Adult sticklebacks are usually an olive green in color on the back and sides and whitish bellies. Breeding males have red bellies and throat, blue sides and blue or green eyes. Breeding females are olive green with silvery bellies. Anadromous populations tend to be larger and more silvery.

Life History

Stickleback populations can be diverse with complex interrelationships among populations. Many forms or subspecies may exist depending on location. In many coastal locations two different forms of stickleback may exist. One form is a larger anadromous form with bony plates along the whole side and keel on the caudal peduncle. A second form is often a small resident fresh water fish with bony plates only on the anterior portion of each side, and no keel. The two forms may behave as separate species and the freshwater forms in each drainage could possibly be endemic. California may have three forms of threespine stickleback. There is a fully plated form, a partially plated form, and a form with little or no plates. The three forms may intermingle and be found in the same location. In general, it appears that the fully plated forms are anadromous. The plates may serve as protective armor and increase survival of the anadromous forms which are likely to encounter more predators.

Sticklebacks require cool, calm waters and occupy weedy pools and backwaters or areas among emergent plants and over gravel, sand, and muddy bottoms. Sticklebacks can occupy highly modified and urbanized streams that support few other fish. Aquatic plants are needed for building nests.

Sticklebacks can live their entire life cycles in fresh or salt water and live only one year. Some individuals can live 2 or 3 years. Non-breeding sticklebacks form loose schools while visually feeding. Stickleback move into breeding areas as the water warms from April through July. Males move away from the schools and defend territory in aquatic vegetation. They excavate a tiny pit and then create a tunnel in the vegetation above the pit. Males court schools of passing females that are full of eggs. A single female enters the nest tunnel and deposits 50-300 eggs. The male enters the tunnel and fertilizes the eggs and then chases the female away. Several females are courted for each nest. Males defend the nest and incubate the eggs by fanning water over them using their pectoral fins. The eggs hatch in 6-8 days at 18-20°C. Fry remain in the nest for several days and then emerge and form small schools. The male guards the schools and returns stragglers to the school by grabbing them with its mouth and spitting them back in. The male eventually stops guarding the school and either tries to spawn again or returns to a school of other fish. The juveniles join schools of similar sized fish.

Distribution

Threespine stickleback occur in coastal streams and estuaries from the Mediterranean north to Russia and east to Japan and Korea. They are found in North America on the East Coast of North America south to Chesapeake Bay and on the West Coast south to Baja California. They do not occur in the Arctic or interior North America. Anadromous forms usually occur close to shore but they have been captured as much as 800km offshore. In California, anadromous forms occur from the Oregon border to Monterey. Full plated resident forms occur south to San Luis Obispo. Resident threespine stickleback historically occurred in streams along the entire coast and upstream until a fish passage barrier was encountered.

In Humboldt Bay, threespine stickleback are generally the most common species collected in intertidal estuarine channel habitats that have mud substrates and are regularly flooded.

Ecology

Threespine stickleback are regularly present and abundant in Humboldt Bay estuary and tributary habitats. Both anadromous and resident forms are likely to occur. Resident forms feed on benthic organisms or those on aquatic vegetation such as insects, insect larvae, earthworms and fish eggs including other stickleback eggs. Anadromous forms may feed on free swimming crustaceans as well as bottom dwelling organisms.

Their small size and shallow, still water habitat make stickleback vulnerable to bird, mammal and fish predation. Predators can include otters and mink, herons and kingfishers, and various piscivorous fishes including salmon. Introduced predatory fishes can influence stickleback habitat use or their elimination from some areas.

Background on starry flounder (*Platichthys stellatus*)

Description

Starry flounder are in the right eyed flatfish family Pleuronectidae. However, the eyes can be on either the left or right side. Both eyes are on the upper side of the head. The lower side of the fish is white with a single pectoral fin. The upper side is brownish and mottled with the pelvic fins behind the operculum with the dorsal and anal fins extending around the body on either side. The dorsal and anal fins have a distinctive coloration with alternating whitish orange and black bands. Starry flounder can reach 3 feet in length and 20 pounds in weight.

Life History

Starry flounder live in marine and estuarine environments, but can be found as far 120 km upstream in fresh water. Small juvenile fish are usually found upstream and adults are usually found in higher salinities and in water temperatures of 10-20°C.

In marine habitat, males mature after the second year at approximately 35cm TL and females at approximately 49 cm TL. The largest fish are usually female and can be 7-8 years old. Spawning occurs from September through March, peaking around December and January. Females can produce 0.9 to more than 11 million eggs in estuaries and the nearshore marine environment. Fertilized eggs and larvae are initially pelagic and are dispersed by tides and currents. Larvae settle to the bottom after 39-75 days where they usually require warm low salinity water, such as near river mouths, estuaries and bays, in order to rear successfully.

Distribution

Starry flounder occur along the coast and in the lower reaches of streams that enter the North Pacific Ocean from Santa Barbara County, California to Tokyo, Japan. Their range includes the Aleutian chain and along the Arctic coast.

Starry flounder are found commonly in estuarine habitats of Humboldt Bay.

Ecology

Starry flounders are one of the few flatfish species that are likely to be found in fresh water. Before metamorphosis, the larvae feed on planktonic algae and crustaceans. Once juveniles assume a bottom dwelling lifestyle, they ambush prey in the water column and invertebrates emerging from the substrate. Prey items can include harpactacoid copepods, amphipods, mysid shrimp and other prey. In fresh water they feed on insect larvae, annelid worms and other prey. Larger adult fish feed on crabs, polychaete worms and mollusks. Starry flounder are primarily valued as a sport fish although they are also captured and landed commercially.

Background on staghorn sculpin (*Leptocottus armatus*)

Description

Staghorn sculpin are one of the most common species in California and are found in bays and estuaries. They are named after antler-like spines that extend from their gill covers and which they can raise defensively when captured. They have a large head with small eyes. Skin color is an olive gray and mottled on the back, light yellow on the sides, and white on the belly. The skin is smooth with no scales or prickling. All fins are barred and the first dorsal has a posterior spot. The lateral line is complete and extends to the narrow caudal peduncle.

Life History

The entire life cycle of most staghorn sculpin occurs in the marine environment. A small portion of the population moves into fresh water. Staghorn sculpin mature at one year and 12-15 cm SL. Although staghorn sculpin mature in fresh water, they are unlikely to spawn in streams. Adults in low salinity areas move down to higher salinities, where they spawn from October to April, with peak spawning activity in January and February in California. Females lay clusters of 2,000-11,000 adhesive eggs. Embryos require salinities of 10-34 ppt in order to develop. Larvae are planktonic before settling out on sandy and soft bottoms from February-May. After settling, juveniles disperse widely including into fresh water.

Distribution

Staghorn sculpin occur in shallow near-shore coastal waters, including bays, estuaries, and the lower reaches of coastal streams, from San Quintin Bay, Baja California to the southern Bering Sea Alaska.

Staghorn sculpin is one of the most abundant and widely distributed fish species in Humboldt Bay. However, they generally are found with threespine sticklebacks in the same intertidal estuarine channel habitats with mud substrates that are regularly flooded.

Ecology

Staghorn sculpin are usually found in marine and estuarine environments. However, they also occur in fresh water in the first few kilometers of the lower reaches of coastal streams and in coastal lagoons that form when sandbars close the stream off from the sea during low flows. Juvenile staghorn sculpin enter the streams and then gradually move upstream and are replaced by smaller fish, resulting in the largest staghorn sculpin occurring in freshwater and usually the farthest upstream.

In the marine/estuarine environment, staghorn sculpin follow the tides and move in and out while feeding. This movement exposes staghorn sculpin to stranding on mudflats. While stranded, staghorn sculpin can breathe air and burrow into the substrate until the tide returns. However, stranding makes them vulnerable to birds such as herons. In fresh water staghorn sculpin eat

bottom dwelling euryhaline amphipods, mysid shrimp, gammarid amphipods, neried worms, aquatic insect larvae, and small fish. In marine environments, juvenile staghorn sculpin feed on amphipods, decapods, and small fish including gobies. Marine dwelling adults feed on crabs, shrimp, and fish.

Background on coastrange sculpin (*Cottus aleuticus*)

Description

Coastrange sculpin are darkly mottled dorsally and white on the belly. Two to three vertical bands occur on the second dorsal fin and one on the caudal peduncle. Most fins are barred. Breeding males have an orange band on the leading edge of the first dorsal fin, an orange spot on the upper side of the caudal peduncle, and a long genital papilla. On specimens less than 100mm the pelvic fins reach the vent when compressed. The posterior nostrils are large, the dorsal fins are separate, they have a complete lateral line, and a single chin pore. A small patch behind the pectoral fins is prickly and there is one sharp preopercular spine.

Life History

Coastrange sculpin can reach 170mm TL and live 8 years. They have an amphidromous lifestyle; the large individuals, that are often found upstream, migrate downstream to spawn near estuaries. They also occur in lakes. Coastrange sculpin mature in their second or third year. Spawning usually occurs in the spring or from January through March in California. Large adults, that occur many kilometers upstream, may spawn in the upper reaches of streams rather than make a round trip downstream spawning migration. Spawning sites are usually under flat rocks in swift water where adhesive fertilized eggs are attached. Females can produce 100-1,764 eggs, depending on the size of the female. Larvae are planktonic for 3-5 weeks and move downstream to rear in estuaries, lakes, or large pools in streams. Once they settle to the bottom, juveniles move to the lower reaches of streams and gradually move upstream as they grow.

Distribution

Coastrange sculpin occur in coastal areas from Santa Barbara County, California to the Aleutian Islands and Bristol Bay, Alaska. Distribution south of Mendocino County is sporadic. They can occur as much as 120 km upstream in freshwater streams and lakes, although most are no more than 20 km upstream. Coastrange sculpin are relatively rare in Humboldt Bay, with adults primarily found in creek and stream habitats.

Ecology

Coastrange sculpin are still widespread despite adverse impacts such as pollution, reduced stream flows, and estuary filling which have destroyed or reduced habitat in parts of their range, especially in the south. They are often found in the company of threespine sticklebacks, prickly sculpin, and anadromous salmonids in riffles with gravel and rubble bottoms. In-stream cover, such as large rocks or logs, provides protection from predators. Preferred water temperatures are usually less than 20-22°C. The streams in which they are found often have a lagoon or estuary at the mouth. Coastrange sculpin, which are active mostly at night, feed on insect larvae, clams, snails, loose fish eggs, other bottom dwelling organisms, and occasionally on small fish and frogs.

Background on prickly sculpin (*Cottus asper*)

Description

Prickly sculpin can be identified by their long anal fin which has 16-19 rays. Coloration is a darkly mottled reddish brown dorsally and a yellowish white ventrally. The fins are barred and the first dorsal can have a darker oval spot on the posterior portion. Breeding male and females can have an orange band on the leading edge of the first dorsal fin. Males have a long genital papilla when not breeding. The caudal peduncle is narrow and round. On specimens less than 100 mm the pelvic fins reach the vent when compressed. The posterior nostrils are large, the dorsal fins are separate, they have a complete lateral line, and a single chin pore. A patch behind the pectoral fins is prickly and can be small in area or more complete, with older, inland, specimens having the most extensive prickling. The dorsal fins are joined at the base. They have a complete lateral line, and a one or two chin pores.

Life History

Prickly sculpin are very adaptable and can live in a wide variety of habitats ranging from fresh water to seawater. They can live in streams, lakes, bays, and reservoirs. The water quality can range from cool and clear to warm and turbid. They can grow up to 200 cm and live more than 7 years. In the Eel River and elsewhere in their distribution, prickly sculpin and coastrange sculpin have very similar distributions and ecology. Prickly sculpin mature at 40-70 cm in their second through fourth year. Spawning usually occurs in the spring or from February through June in California. Large adults, that occur many kilometers upstream, may spawn in the upper reaches of streams rather than make a round trip downstream spawning migration. Spawning sites are usually under flat rocks in swift water where adhesive fertilized eggs are attached. Males can spawn with more than one female in the same nest. Females can produce 280-11,000 eggs, depending on the size of the female. Larvae are planktonic for 3-5 weeks and move downstream to rear in estuaries, lakes, or large pools in streams. Once they settle to the bottom, juveniles move to the lower reaches of streams and gradually move upstream or to the shallower areas in lakes and pools.

Distribution

Prickly sculpin occur in coastal areas from the Ventura River, California to the Kenai Peninsula, Alaska. There is no reported reproduction south of Point Conception. Fish found to the south are likely larval colonists. Prickly sculpin can be found in tributaries as far as 120 km upstream including the Central Valley and the California Aqueduct system. They are usually missing from streams that do not have estuaries or lagoons.

Ecology

Prickly sculpin are still widespread despite adverse impacts such as pollution, reduced stream flows, and estuary filling which have destroyed or reduced habitat in parts of their range, especially in the south. They often occur with threespine sticklebacks, coastrange sculpin,

staghorn sculpin, and anadromous salmonids in riffles with gravel and rubble bottoms. In-stream cover, such as large rocks or logs, provides protection from predators. Prickly sculpin, which are active mostly at night, feed on insect larvae, amphipods, clams, snails, loose fish eggs, other bottom dwelling organisms, and occasionally on small fish and frogs.

Background on saddleback gunnel (*Pholis ornata*)

Description

The saddleback gunnel has an eel-like body and is olive green or brown on its back and is red or yellowish on its belly. Dark markings on its back are "V" or "U" shaped saddles. The pectoral fins are small and the pelvic fins are absent or vestigial splints. The dorsal and anal fins are continuous with a caudal fin and are plain coloration or with a few faint bars. A dark bar is below the eye with two bars above on the head. There is no lateral line canal and the scales are tiny and embedded in the skin.

Life History

Saddleback gunnel can grow to a size of 12 inches. They are solitary and cryptic. They probably aggregates for spawning and are most likely not territorial. They spawn intertidally and deeper during winter, under rocks in sea grass beds. Both male and females guard the eggs, probably after a single mating of one male and one female. Larvae are briefly planktonic before settling on intertidal areas and moving to bays, estuaries and brackish mudflats.

Distribution

The saddleback gunnel occurs in nearshore waters from Carmel, California to the Bering Sea and the Sea of Japan. The saddleback gunnel has been reported to occur in intertidal water out to a depth of 120 feet. It is common but since it is cryptic it is often overlooked. It is considered a common species in Humboldt Bay.

Ecology

Juvenile saddleback gunnels feed primarily on small crustaceans, such as copepods, and polychaete worms. Adults prey on clam siphons and small crustaceans. Saddleback gunnels may be preyed upon by other fish, birds, and crustaceans. However, its cryptic nature likely provides some protection.

APPENDIX B.
FISH PHOTOS

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Clark Slough: Dip net sampling in Clark Slough using the tidewater goby survey protocol, 31 July 2007

Proj No. **2818-01**	Date **Jan. 2008**	**Photo 1**
ML	N:\Projects\2818-01	

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Threespine stickleback *(Gasterosteus aculeatus)*
Clark Slough, 31 July 2007

Proj No. **2818-01**	Date **Jan. 2008**	**Photo 2**
ML	N:\Projects\2818-01	

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Starry flounder *(Platichthys stellatus)*
Clark Slough, 31 July 2007

Proj No.	**2818-01**	Date	**Jan. 2008**	**Photo 3**
ML	N:\Projects\2818-01			

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Staghorn sculpin*(Leptocottus armatus)*
Clark Slough, 31 July 2007

Proj No.	**2818-01**	Date	**Jan. 2008**	**Photo 4**
ML	N:\Projects\2818-01			

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Coastrange sculpin *(Cottus aleuticus)* or prickly sculpin *(Cottus asper)*; Clark Slough, 31 July 2007

Proj No.	**2818-01**	Date	**Jan. 2008**	**Photo 5**
ML	N:\Projects\2818-01			

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Saddleback gunnel *(Pholis ornata)*
Clark Slough, 31 July 2007

Proj No.	**2818-01**	Date	**Jan. 2008**	**Photo 6**
ML	N:\Projects\2818-01			

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Juvenile Dungeness crab *(Cancer magister)*
Clark Slough, 31 July 2007

Proj No.	**2818-01**	Date	**Jan. 2008**	**Photo 7**
ML	N:\Projects\2818-01			

APPENDIX C.
WILDLIFE PHOTOS

Photograph 1. Brown Pelican beginning dive for food over Clark Slough.

Photograph 2. The same Brown Pelican while capturing food.

Photograph 3. The same Brown Pelican with a fish in its pouch.

Photograph 4. Double-crested Cormorant feeding just outside Clark Slough.

Photograph 5. Another Brown Pelican beginning dive for food.

Photograph 6. Same Brown Pelican as in Photograph 5 in mid-dive.

Photograph 7. Same Brown Pelican as in Photograph 5 at bottom of dive.

Photograph 8. Same Brown Pelican as in Photograph 5 capturing food.

Photograph 9. Location reference for Brown Pelican in Photographs 5-8.

Photograph 10. Great Egret on levee at Clark Slough mouth.

Photograph 11. Peregrine Falcon above the Balloon Tract site on 31 July 2007.

Photograph 12. Same Peregrine Falcon perching within the Balloon Tract site.

Photograph 13. Dead Virginia opossum on the Balloon Tract site on 10 January 2008.

Photograph 14. Pacific tree frog on the Balloon Tract site on 10 January 2008.

Photograph 15. Striped skunk observed on the Balloon Tract site on 30 July 2007.

APPENDIX D.
ASSORTMENT OF PHOTOS COMPILED IN SUPPORT OF OPINIONS

APPENDIX E.
WETLAND DATAFORMS

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
SP 1

Project/Site: Balloon Tract Property Applicant/Owner: Investigator: Brian Cleary	Date: 30 July 2007 County: Humboldt State: California
Do Normal Circumstances exist on the site? **Yes** No Is the site significantly disturbed (Atypical Situations?) **Yes** No Is the area a potential Problem Area? Yes **No** (If needed, explain on reverse.)	Community ID: Freshwater Emergent Wetland Transect ID : Plot ID: SP 1

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Typha latifolia*	H	OBL	9.		
2. *Polygonum persicaria*	H	FACW	10.		
3. *Potentilla anserina ssp. anserina*		OBL	11.		
4. *Holcus lanatus*	H	FAC	12.		
5. *Rumex crispus*	H	FACW-	13.		
6. *Epilobium ciliatum*	H	FACW	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 6/6 = 100%

Remarks:
- Hydrophytic vegetation criteria met.
- Sample point located in freshwater emergent wetland adjacent to an excavated drainage channel in the south section of the site.

HYDROLOGY

Recorded Data (describe in Remarks):

	Stream, Lake, or Tide Gauge
	Aerial Photographs
	Other
X	No Recorded Data Available

Field Observation:

Depth of Surface Water: 8 (in.)

Depth to Free Water in Pit: 8 (in.)

Depth to Saturated Soil 3 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

X	Inundated
X	Saturated
	Water Marks
	Drift Lines
	Sediment Deposits
X	Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

	Oxidized Root Channels in Upper 12 in.
	Water-Stained Leaves
	Local Soil Survey Data
	FAC-Neutral Test
X	Other (Explain in Remarks)

Remarks:
- Hydrology supporting wetlands apparently the result of an artificially excavated drainage ditch within likely historic wetland in the southern section of the site.
- Hydrology criteria met.

Sample Number
SP 1

SOILS

Map Unit Name
(Series and Phase) Fill Material

Taxonomy (Subgroup):

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-6		10 YR 2/2		few/fine/faint	clay loam
6-12		10 YR 3/1	7.5 YR 4/6	common/medium/ distinct	clay
12-18		Gley 2 2.5/10 B.G.			sand

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
X	Aquic Moisture Regime		Listed on Local Hydric Soils List
X	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low-Chroma colors	X	Other (Explain in Remarks)

Remarks:
- Hydric soils present with pronouced redoximorpic features including gleys at 12-inches.
- Soil profile saturated below 3-inches with standing water at apporximately 8-inches.

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	Yes	No
Wetland Hydrology Present?	Yes	No
Hydric Soils Present?	Yes	No
Is this Sampling Point Within a Wetland?	Yes	No

Remarks:
- Positive indicators observed for each of the three wetland parameters. However, the site represents an atypical situation based on the presence of historic fill material consisting of hydric soils dredged from Humboldt Bay.
- Note: This area of the site includes wetlands mapped by Zentner and Zenter in March 2007 and by the Huffman and Broadway Group, Inc. in June 2007.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
SP 2

Project/Site: Balloon Tract Property Applicant/Owner: Investigator: Brian Cleary	Date: 30 July 2007 County: Humboldt State: California
Do Normal Circumstances exist on the site? [Yes] No Is the site significantly disturbed (Atypical Situations?) [Yes] No Is the area a potential Problem Area? Yes [No] (If needed, explain on reverse.)	Community ID: Marginal Seasonal Wetland Transect ID : Plot ID: SP 2

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Agrostis stolonifera*	H	FACW	9.		
2. *Anthoxanthum odoratum*	H	FACU	10.		
3. *Holcus lanatus*	H	FAC	11.		
4. *Rumex crispus*	H	FACW-	12.		
5. *Epilobium ciliatum*	H	FACW	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 4/5 = 80%

Remarks:
- Hydrophytic vegetation criteria met.
- Sample point located in a marginal wetland associated with the upper floodplain area of the excavated drainage ditch documented in Sample Point 1.

HYDROLOGY

Recorded Data (describe in Remarks):

- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observation:

Depth of Surface Water: 0 (in.)

Depth to Free Water in Pit: >16 (in.)

Depth to Saturated Soil >16 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

- ____ Inundated
- ____ Saturated
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- ____ Oxidized Root Channels in Upper 12 in.
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- ____ FAC-Neutral Test
- X Other (Explain in Remarks)

Remarks:
- Hydrology likely marginal to absent.
- Site monitoring during the winter rainfall period warranted.

Sample Number
SP 2

SOILS

Map Unit Name
(Series and Phase) Fill Material

Taxonomy (Subgroup):

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-18		YR 10 3/2		absent	sandy loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
	Gleyed or Low-Chroma colors	X	Other (Explain in Remarks)

Remarks: • Redoxymorphic soil features absent.

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	Yes	No
Wetland Hydrology Present?	Yes	No
Hydric Soils Present?	Yes	No
Is this Sampling Point Within a Wetland?	Yes	No

Remarks:
- Wetland determination inconclusive per the Corps 1987 Manual three parameter delineation method.
- Note: This area of the site includes wetlands mapped by Zentner and Zenter in March 2007 and by the Huffman and Broadway Group, Inc. in June 2007.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
SP 3

Project/Site: Balloon Tract Property Applicant/Owner: Investigator: Brian Cleary	Date: 30 July 2007 County: Humboldt State: California
Do Normal Circumstances exist on the site? [Yes] No Is the site significantly disturbed (Atypical Situations?) [Yes] No Is the area a potential Problem Area? Yes [No] (If needed, explain on reverse.)	Community ID: Potential Other Waters Transect ID : Plot ID: SP 3

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Bare ground with algal matting*			9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).

Remarks: • Sample point taken in area of bare ground with algal matting.

HYDROLOGY

Recorded Data (describe in Remarks):

- Stream, Lake, or Tide Gauge
- Aerial Photographs
- Other
- X No Recorded Data Available

Field Observation:

Depth of Surface Water: 0 (in.)

Depth to Free Water in Pit: >16 (in.)

Depth to Saturated Soil 32 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

- Inundated
- Saturated
- Water Marks
- Drift Lines
- X Sediment Deposits
- X Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- Oxidized Root Channels in Upper 12 in.
- Water-Stained Leaves
- Local Soil Survey Data
- FAC-Neutral Test
- X Other (Explain in Remarks)

Remarks: • Sample point located within drainage channel documented in Sample Point 1.

Sample Number
SP 3

SOILS

Map Unit Name
(Series and Phase) Fill Material

Taxonomy (Subgroup):

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-32		10 YR 3/2	7.5 YR 4/6	many/course/ prominent	sandy clay loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
	Gleyed or Low-Chroma colors		Other (Explain in Remarks)

Remarks: • Low chroma hydric soils with pronounced redoxymorphic features, i.e., heavy mottling.

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	Yes	**No**
Wetland Hydrology Present?	**Yes**	No
Hydric Soils Present?	**Yes**	No
Is this Sampling Point Within a Wetland?	Yes	**No**

Remarks:
- Vascular hydrophytic plant species absent; however, algal mats documented within sample point.
- Site represents potential Other Waters of the U.S. per Corps 1987 Wetland Delineation Manual.
- Note: This area of the site includes wetlands mapped by Zentner and Zenter in March 2007 and by the Huffman and Broadway Group, Inc. in June 2007.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
SP 4

Project/Site: Balloon Tract Property Applicant/Owner: Investigator: Brian Cleary	Date: 30 July 2007 County: Humboldt State: California
Do Normal Circumstances exist on the site? [Yes] No Is the site significantly disturbed (Atypical Situations?) [Yes] No Is the area a potential Problem Area? Yes [No] (If needed, explain on reverse.)	Community ID: Marginal Seasonal Wetland Transect ID : Plot ID: SP 4

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Anthoxanthum odoratum*	H	FACU	9.		
2. *Dactylis glomerata*	H	FACU	10.		
3. *Scirpus microcarpus*	H	OBL	11.		
4. *Agrostis stolonifera*	H	FACW	12.		
5. *Rubus discolor*	S	FACW	13.		
6. *Equisetum telmateia ssp. braunii*	H	OBL	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 4/6 = 67%

Remarks:
- Hydrophytic vegetation criteria met.
- Sample point located in a marginal seasonal wetland area along the outer fringe of a topographic depression.

HYDROLOGY

Recorded Data (describe in Remarks):

- Stream, Lake, or Tide Gauge
- Aerial Photographs
- Other
- X No Recorded Data Available

Field Observation:

Depth of Surface Water: 0 (in.)

Depth to Free Water in Pit: >16 (in.)

Depth to Saturated Soil >16 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

- Inundated
- Saturated
- Water Marks
- Drift Lines
- Sediment Deposits
- X Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- Oxidized Root Channels in Upper 12 in.
- Water-Stained Leaves
- Local Soil Survey Data
- FAC-Neutral Test
- X Other (Explain in Remarks)

Remarks:
- Sample point likely within area supporting marginal wetland hydrology.
- Site monitoring during the winter rainfall period warranted.

Sample Number
SP 4

SOILS

Map Unit Name
(Series and Phase) Fill Material

Taxonomy (Subgroup):

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-18		10 YR 3/1		few/fine/faint	sandy loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
X	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low-Chroma colors	X	Other (Explain in Remarks)

Remarks: • Marginal hydric soil features.

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	Yes	No
Wetland Hydrology Present?	Yes	No
Hydric Soils Present?	Yes	No
Is this Sampling Point Within a Wetland?	Yes	No

Remarks: • Likely marginal seasonal wetland.
• Note: This area of the site includes wetlands along the edge of a wetland/upland boundary mapped by Zentner and Zenter in March 2007 and by the Huffman and Broadway Group, Inc. in June 2007.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
SP 5

Project/Site: Balloon Tract Property Applicant/Owner: Investigator: Brian Cleary	Date: 30 July 2007 County: Humboldt State: California
Do Normal Circumstances exist on the site? [Yes] No Is the site significantly disturbed (Atypical Situations?) [Yes] No Is the area a potential Problem Area? Yes [No] (If needed, explain on reverse.)	Community ID: Marginal Seasonal Wetland Transect ID : Plot ID: SP 5

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Anthoxanthum odoratum*	H	FACU	9.		
2. *Foeniculum vulgare*	H	FACU	10.		
3. *Lotus corniculatus*	H	FAC	11.		
4. *Trifolium sp.*	H	---	12.		
5. *Rubus ursinus*	S	FACW	13.		
6. *Lupinus rivularis*	H	FAC	14.		
7. *Holcus lanatus*	H	FAC	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 4/7 = 57%

Remarks:
- Hydrophytic vegetation criteria met.
- Sample point located within a marginal seasonal wetland area.

HYDROLOGY

Recorded Data (describe in Remarks):

- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other
- X No Recorded Data Available

Field Observation:

Depth of Surface Water: 0 (in.)

Depth to Free Water in Pit: >16 (in.)

Depth to Saturated Soil >16 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

- ___ Inundated
- ___ Saturated
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- ___ Oxidized Root Channels in Upper 12 in.
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- X Other (Explain in Remarks)

Remarks:
- Although wetland vegetation is present, sample point is located on a small, somewhat-elevated topographic plain.
- Wetland hydrology is likely marginal to absent.
- Site monitoring during winter rainfall period warranted.

Sample Number
SP 5

SOILS

Map Unit Name
(Series and Phase) Fill Material

Taxonomy (Subgroup):

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-18		10 YR 3/2		few/fine/faint	sandy loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
X	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low-Chroma colors	X	Other (Explain in Remarks)

Remarks:
- Potential reducing conditions.
- Hydric soil indicators inconclusive.
- Mottles faint to absent.

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	Yes	No
Wetland Hydrology Present?	Yes	No
Hydric Soils Present?	Yes	No
Is this Sampling Point Within a Wetland?	Yes	No

Remarks:
- Hydrophytic vegetation present. Marginal hydric soils documented. Wetland hydrology may be absent.
- Site monitoring warranted.
- Note: This area of the site included wetlands mapped by Zentner and Zenter in March 2007.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
SP 6

Project/Site: Balloon Tract Property Applicant/Owner: Investigator: Brian Cleary	Date: 30 July 2007 County: Humboldt State: California

Do Normal Circumstances exist on the site?	[Yes]	No	Community ID:	Ruderal field
Is the site significantly disturbed (Atypical Situations?)	[Yes]	No	Transect ID :	
Is the area a potential Problem Area?	Yes	[No]	Plot ID:	SP 6
(If needed, explain on reverse.)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Lotus corniculatus*	H	FAC	9.		
2. *Rumex crispus*	H	FACW-	10.		
3. *Picris echioides*	H	FAC	11.		
4. *Plantago major*	H	FAC-	12.		
5. *Holcus lanatus*	H	FAC	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 4/5 = 80%

Remarks: • Ruderal, disturbed, upland grassland supporting marginal wetland indicator plant species.

HYDROLOGY

Recorded Data (describe in Remarks):

- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observation:

Depth of Surface Water: 0 (in.)

Depth to Free Water in Pit: >16 (in.)

Depth to Saturated Soil >16 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

- ____ Inundated
- ____ Saturated
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- ____ Oxidized Root Channels in Upper 12 in.
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- ____ FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: • Hydrology absent; upland habitat.

Sample Number
SP 6

SOILS

Map Unit Name
(Series and Phase) Imported Fill Material

Taxonomy (Subgroup):

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-8		2.5 Y 3/2			sandy loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
	Gleyed or Low-Chroma colors		Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	Yes	No
Wetland Hydrology Present?	Yes	No
Hydric Soils Present?	Yes	No
Is this Sampling Point Within a Wetland?	Yes	No

Remarks: • Marginal hydrophytic plant species documented in upland habitat.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
SP 7

Project/Site: Balloon Tract Property Applicant/Owner: Investigator: Brian Cleary	Date: 30 July 2007 County: Humboldt State: California
Do Normal Circumstances exist on the site? [Yes] No Is the site significantly disturbed (Atypical Situations?) [Yes] No Is the area a potential Problem Area? Yes [No] (If needed, explain on reverse.)	Community ID: Ruderal field Transect ID : Plot ID: SP 7

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Holcus lanatus*	H	FAC	9.		
2. *Equisetum telmateia ssp. braunii*	H	OBL	10.		
3. *Foeniculum vulgare*	H	FACU	11.		
4. *Picris echioides*	H	FAC	12.		
5. *Rubus ursinus*	S	FACW	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 4/5 = 80%

Remarks: • Ruderal, disturbed, upland grassland supporting marginal wetland indicator plant species.

HYDROLOGY

Recorded Data (describe in Remarks):

- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observation:

Depth of Surface Water: 0 (in.)

Depth to Free Water in Pit: >16 (in.)

Depth to Saturated Soil >16 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

- ____ Inundated
- ____ Saturated
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- ____ Oxidized Root Channels in Upper 12 in.
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- ____ FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: • Hydrology absent; upland habitat.

Sample Number
SP 7

SOILS

Map Unit Name
(Series and Phase) Imported Fill Material

Taxonomy (Subgroup):

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-6		10 YR 4/3			sandy clay loam
6-12		5 YR 5/6			sandy loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
	Gleyed or Low-Chroma colors		Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	Yes	No
Wetland Hydrology Present?	Yes	No
Hydric Soils Present?	Yes	No
Is this Sampling Point Within a Wetland?	Yes	No

Remarks: • Marginal hydrophytic plant species documented in upland habitat.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
SP 8

Project/Site: Balloon Tract Property Applicant/Owner: Investigator: Brian Cleary	Date: 30 July 2007 County: Humboldt State: California
Do Normal Circumstances exist on the site? [Yes] No Is the site significantly disturbed (Atypical Situations?) [Yes] No Is the area a potential Problem Area? Yes [No] (If needed, explain on reverse.)	Community ID: Seasonal Wetland Transect ID : Plot ID: SP 8

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Phragmites australis*	H	FACW	9.		
2. *Convolvulus arvensis*	H	NOL	10.		
3. *Ranunculus repens*	H	FACW	11.		
4. *Holcus lanatus*	H	FAC	12.		
5. *Dactylis glomerata*	H	FACU	13.		
6. *Rubus ursinus*	S	FACW	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 4/6 = 67%

Remarks: • Wetland indicator plant species present.

HYDROLOGY

Recorded Data (describe in Remarks):

- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other
- X No Recorded Data Available

Field Observation:

Depth of Surface Water: 0 (in.)

Depth to Free Water in Pit: >16 (in.)

Depth to Saturated Soil >16 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

- ___ Inundated
- ___ Saturated
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- ___ Oxidized Root Channels in Upper 12 in.
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- X Other (Explain in Remarks)

Remarks:
- Sample point located adjacent to an artificially-place, elevated berm.
- Based on the presence of hydric soil features (see soils section of this data form), hydrology in the form of prolonged soil saturation likely occurs during the winter rainfall months.
- Winter site monitoring warranted.

Sample Number
SP 8

SOILS

Map Unit Name
(Series and Phase) Fill Material

Taxonomy (Subgroup):

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12		10 YR 2/1			sandy loam
12-18		2.5 Y 5/2	5 YR 4/6	common/medium/ distinct	sandy loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
X	Aquic Moisture Regime		Listed on Local Hydric Soils List
X	Reducing Conditions		Listed on National Hydric Soils List
	Gleyed or Low-Chroma colors	X	Other (Explain in Remarks)

Remarks:
- Prolonged soil saturation conditions likely occur during the winter rainfall months.
- Some of the hydric soil features may be historic because the area includes imported dredge material from Humboldt Bay.

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	Yes	No
Wetland Hydrology Present?	Yes	No
Hydric Soils Present?	Yes	No
Is this Sampling Point Within a Wetland?	Yes	No

Remarks:
- Hydrophyic vegetation and hydric soils present.
- Based on the presence of hydric soils, this area is likely saturated for prolonged periods although some of the hydric soil featurs may be the result of historic dredge fill material from Humboldt Bay.
- Note: This area of the site included wetlands mapped by Zentner and Zenter in March 2007.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
SP 9

Project/Site: Balloon Tract Property Applicant/Owner: Investigator: Brian Cleary	Date: 30 July 2007 County: Humboldt State: California
Do Normal Circumstances exist on the site? [Yes] No Is the site significantly disturbed (Atypical Situations?) [Yes] No Is the area a potential Problem Area? Yes [No] (If needed, explain on reverse.)	Community ID: Seasonal Wetland Transect ID : Plot ID: SP 9

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Lotus corniculatus*	H	FAC	9.		
2. *Rubus discolor*	S	FACW	10.		
3. *Trifolium repens*	H	FACU+	11.		
4. *Holcus lanatus*	H	FAC	12.		
5. *Equisetum telmateia ssp. braunii*	H	OBL	13.		
6. *Anthoxanthum odoratum*	H	FACU	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 4/6 = 67%

Remarks: • Hydrophytic vegetation criteria met.
• Sample point located in a seasonal wetland associated with a small topographic depression on site.

HYDROLOGY

Recorded Data (describe in Remarks):

- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other
- X No Recorded Data Available

Field Observation:

Depth of Surface Water: 1+ (in.)

Depth to Free Water in Pit: 0 (in.)

Depth to Saturated Soil 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

- X Inundated
- X Saturated
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- X Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- ___ Oxidized Root Channels in Upper 12 in.
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- X Other (Explain in Remarks)

Remarks: • Prolonged inundation and soil saturation documented with aerial photographs by Humboldt Baykeepers January 2007.

Sample Number
SP 9

SOILS

Map Unit Name
(Series and Phase) Fill Material

Taxonomy (Subgroup):

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12		10 YR 2/1			sandy loam
12-16		10 YR 5/6	7.5 YR 4/6	few/fine/faint	sandy loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
X	Aquic Moisture Regime		Listed on Local Hydric Soils List
X	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low-Chroma colors	X	Other (Explain in Remarks)

Remarks: • Hydric soil criteria met.

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	Yes	No
Wetland Hydrology Present?	Yes	No
Hydric Soils Present?	Yes	No
Is this Sampling Point Within a Wetland?	Yes	No

Remarks:
- Positive indicators for each of the three wetland parameters per the Corps 1987 Wetland Delineation Manual.
- Note: This area represents a small potential wetland feature not identified in the Zentner and Zenter 2007 or the Huffman and Broadway Group, Inc. 2007 wetland delineation reports.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
SP 10

Project/Site: Balloon Tract Property Applicant/Owner: Investigator: Brian Cleary	Date: 30 July 2007 County: Humboldt State: California
Do Normal Circumstances exist on the site? [Yes] No Is the site significantly disturbed (Atypical Situations?) [Yes] No Is the area a potential Problem Area? Yes [No] (If needed, explain on reverse.)	Community ID: Seasonal Wetland Transect ID : Plot ID: SP 10

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Lotus corniculatus*	H	FAC	9.		
2. *Agrostis exarata*	H	FACW	10.		
3. *Ranunculus repens*	H	FACW	11.		
4. *Rubus ursinus*	S	FACW	12.		
5. *Equisetum telmateia ssp. braunii*	H	OBL	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 5/5 = 100%

Remarks:
- Hydrophytic vegetation criteria met.
- Sample point located in a seasonal wetland associated with a small topographic depression in the central section of the site.

HYDROLOGY

Recorded Data (describe in Remarks):

- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other
- X No Recorded Data Available

Field Observation:

Depth of Surface Water: 1+ (in.)

Depth to Free Water in Pit: 0 (in.)

Depth to Saturated Soil 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

- X Inundated
- X Saturated
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- X Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- ___ Oxidized Root Channels in Upper 12 in.
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- X Other (Explain in Remarks)

Remarks:
- Likely prolonged inundation and soil saturation documented with aerial photographs by Humboldt Baykeepers January 2007.

Sample Number
SP 10

SOILS

Map Unit Name
(Series and Phase) Fill Material

Taxonomy (Subgroup):

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-22		10 YR 3/2	7.5 YR 4/6	few/fine/faint	sandy loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
X	Aquic Moisture Regime		Listed on Local Hydric Soils List
X	Reducing Conditions		Listed on National Hydric Soils List
	Gleyed or Low-Chroma colors	X	Other (Explain in Remarks)

Remarks:
- Matrix chroma of 2 in mottled soils.
- Hydric soil criteria met.

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	Yes	No
Wetland Hydrology Present?	Yes	No
Hydric Soils Present?	Yes	No
Is this Sampling Point Within a Wetland?	Yes	No

Remarks:
- Positive indicators for each of the three wetland parameters per the Corps 1987 Wetland Delineation Manual.
- Note: This area represents a small potential wetland feature not identified in the Zentner and Zenter 2007 or the Huffman and Broadway Group, Inc. 2007 wetland delineation reports.

No photo available

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
SP 11

Project/Site: Balloon Tract Property Applicant/Owner: Investigator: Brian Cleary	Date: 30 July 2007 County: Humboldt State: California
Do Normal Circumstances exist on the site? [Yes] No Is the site significantly disturbed (Atypical Situations?) [Yes] No Is the area a potential Problem Area? Yes [No] (If needed, explain on reverse.)	Community ID: Seasonal Wetland Transect ID : Plot ID: SP 11

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Cyperus eragrostis*	H	FACW	9. *Foeniculum vulgare*	H	FACU
2. *Juncus effusus*	H	OBL	10. *Holcus lanatus*	H	FAC
3. *Equisetum telmateia ssp. braunii*	H	OBL	11. *Anthoxanthum odoratum*	H	FACU
4. *Juncus xiphioides*	H	OBL	12. *Athyrium felix-femina*	H	FAC
5. *Typha latifolia*	H	OBL	13. *Sonchus oleraceus*	H	NI
6. *Rubus discolor*	S	FACW	14. *Mimulus guttatus*	H	OBL
7. *Scirpus pungens*	H	OBL	15.		
8. *Daucus carota*	H	NOL	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 10/14 = 71%

Remarks: • Seasonal wetland located within the historic railroad turntable.

HYDROLOGY

Recorded Data (describe in Remarks):

- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other
- X No Recorded Data Available

Field Observation:

Depth of Surface Water: 0 (in.)

Depth to Free Water in Pit: >16 (in.)

Depth to Saturated Soil >16 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

- ___ Inundated
- ___ Saturated
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- X Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- ___ Oxidized Root Channels in Upper 12 in.
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- X Other (Explain in Remarks)

Remarks: • Although soils currently only very moist, this historically-excavated area likely supports continuous saturation and inundation during the rainy season.

Sample Number
SP 11

SOILS

Map Unit Name
(Series and Phase) Fill Material

Taxonomy (Subgroup):

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12		10 YR 2/1	7.5 YR 4/6	many/medium/ distinct	sandy loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
X	Aquic Moisture Regime		Listed on Local Hydric Soils List
X	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low-Chroma colors	X	Other (Explain in Remarks)

Remarks:
- Hydric soils present with pronounced redoxymorphic features.
- Soils very moist at 12-inches.

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	Yes	No
Wetland Hydrology Present?	Yes	No
Hydric Soils Present?	Yes	No
Is this Sampling Point Within a Wetland?	Yes	No

Remarks:
- Positive indicators for each of the three wetland parameters.
- Note: This area represents a small potential wetland feature not identified in the Zentner and Zenter 2007 or the Huffman and Broadway Group, Inc. 2007 wetland delineation reports.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
SP 12

Project/Site: Balloon Tract Property Applicant/Owner: Investigator: Brian Cleary	Date: 30 July 2007 County: Humboldt State: California

Do Normal Circumstances exist on the site?	[Yes]	No	Community ID:	Ruderal field
Is the site significantly disturbed (Atypical Situations?)	[Yes]	No	Transect ID :	
Is the area a potential Problem Area?	Yes	[No]	Plot ID:	SP 12
(If needed, explain on reverse.)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Phragmites australis*	H	FACW	9.		
2. *Foeniculum vulgare*	H	FACU	10.		
3. *Rubus discolor*	S	FACW	11.		
4. *Convolvulus arvensis*	H	NOL	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 2/4 = 50%

Remarks:
- Bare ground at 50%.
- Vegetation dominated by Phragmites australis.

HYDROLOGY

Recorded Data (describe in Remarks):

	Stream, Lake, or Tide Gauge
	Aerial Photographs
	Other
X	No Recorded Data Available

Field Observation:

Depth of Surface Water:	0	(in.)
Depth to Free Water in Pit:	>16	(in.)
Depth to Saturated Soil	>16	(in.)

Wetland Hydrology Indicators:

Primary Indicators:

	Inundated
	Saturated
	Water Marks
	Drift Lines
	Sediment Deposits
	Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

	Oxidized Root Channels in Upper 12 in.
	Water-Stained Leaves
	Local Soil Survey Data
	FAC-Neutral Test
X	Other (Explain in Remarks)

Remarks:
- Sample point located on top of an elevated berm.
- Hydrology inconclusive.
- Winter monitoring warranted.

Sample Number
SP 12

SOILS

Map Unit Name
(Series and Phase) Fill Material

Taxonomy (Subgroup):

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-18		10 YR 3/2			sand and gravel

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
	Gleyed or Low-Chroma colors	X	Other (Explain in Remarks)

Remarks: • Sand and gravel is likely fill material associated with the elevated berm.

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	Yes	No
Wetland Hydrology Present?	Yes	No
Hydric Soils Present?	Yes	No
Is this Sampling Point Within a Wetland?	Yes	No

Remarks:
- Vegetation dominated by Phragmites australis. Hydric soils absent. Hydrology inconclusive.
- Winter monitoring warranted.
- Note: This area of the site includes wetlands mapped by Zentner and Zenter in March 2007.

No photo available

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
SP 13

Project/Site: Balloon Tract Property Applicant/Owner: Investigator: Brian Cleary	Date: 30 July 2007 County: Humboldt State: California
Do Normal Circumstances exist on the site? **Yes** No Is the site significantly disturbed (Atypical Situations?) **Yes** No Is the area a potential Problem Area? Yes **No** (If needed, explain on reverse.)	Community ID: Seasonal Wetland Transect ID : Plot ID: SP 13

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Agrostis exarata*	H	FACW	9. *Holcus lanatus*	H	FAC
2. *Anthoxanthum odoratum*	H	FACU	10. *Rumex crispus*	H	FACW-
3. *Lotus corniculatus*	H	FAC	11.		
4. *Ranunculus repens*	H	FACW	12.		
5. *Trifolium repens*	H	FACU+	13.		
6. *Aster chilensis*	H	FAC	14.		
7. *Poa annua*	H	FACW-	15.		
8. *Juncus effusus*	H	OBL	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 8/10 = 80%

Remarks: • Hydrophytic vegetation criteria met.
• Sample point located in a seasonal wetland associated with a small topographic depression.

HYDROLOGY

Recorded Data (describe in Remarks):

- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other
- X No Recorded Data Available

Field Observation:

Depth of Surface Water: 1+ (in.)

Depth to Free Water in Pit: 0 (in.)

Depth to Saturated Soil 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

- ___ Inundated
- ___ Saturated
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- ___ Oxidized Root Channels in Upper 12 in.
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: • Prolonged inundation and soil saturation documented with aerial photography by Humboldt Baykeepers January 2007.

Sample Number
SP 13

SOILS

Map Unit Name
(Series and Phase) Fill Material

Taxonomy (Subgroup):

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-16		10 YR 3/2	7.5 YR 4/6	few/fine/faint	sandy loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
X	Aquic Moisture Regime		Listed on Local Hydric Soils List
X	Reducing Conditions		Listed on National Hydric Soils List
	Gleyed or Low-Chroma colors	X	Other (Explain in Remarks)

Remarks:
- Matrix chroma of 2 in mottled soils.
- Hydric soil criteria met.

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	Yes	No
Wetland Hydrology Present?	Yes	No
Hydric Soils Present?	Yes	No
Is this Sampling Point Within a Wetland?	Yes	No

Remarks:
- Note: This area represents a small potential wetland feature not identified in the Zentner and Zenter 2007 or the Huffman and Broadway Group, Inc. 2007 wetland delineation reports.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
SP 14

Project/Site: Balloon Tract Property Applicant/Owner: Investigator: Brian Cleary	Date: 30 July 2007 County: Humboldt State: California

Do Normal Circumstances exist on the site?	[Yes]	No	Community ID:	Ruderal field
Is the site significantly disturbed (Atypical Situations?)	[Yes]	No	Transect ID :	
Is the area a potential Problem Area?	Yes	[No]	Plot ID:	SP 14
(If needed, explain on reverse.)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Lotus corniculatus*	H	FAC	9.		
2. *Trifolium fragiferum*	H	NI	10.		
3. *Foeniculum vulgare*	H	FACU	11.		
4. *Daucus carota*	H	NOL	12.		
5. *Anthoxanthum odoratum*	H	FACU	13.		
6. *Holcus lanatus*	H	FAC	14.		
7. *Hypochaeris radicata*	H	NOL	15.		
8. *Rubus discolor*	S	FACW	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 3/8 = 38%

Remarks:
- Vegetation dominated by disturbance-oriented plant species.
- Likely upland habitat.

HYDROLOGY

Recorded Data (describe in Remarks):

	Stream, Lake, or Tide Gauge
	Aerial Photographs
	Other
X	No Recorded Data Available

Field Observation:

Depth of Surface Water:	0	(in.)
Depth to Free Water in Pit:	>16	(in.)
Depth to Saturated Soil	>16	(in.)

Wetland Hydrology Indicators:

Primary Indicators:

	Inundated
	Saturated
	Water Marks
	Drift Lines
	Sediment Deposits
	Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

	Oxidized Root Channels in Upper 12 in.
	Water-Stained Leaves
	Local Soil Survey Data
	FAC-Neutral Test
	Other (Explain in Remarks)

Remarks:
- Hydrology uncertain.
- Monitoring during the winter rainfall period warranted.

Sample Number
SP 14

SOILS

Map Unit Name
(Series and Phase) Fill Material

Taxonomy (Subgroup):

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12		10 YR 3/2			sandy loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
	Gleyed or Low-Chroma colors		Other (Explain in Remarks)

Remarks: • Low chroma soils without mottling.

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	Yes	No
Wetland Hydrology Present?	Yes	No
Hydric Soils Present?	Yes	No
Is this Sampling Point Within a Wetland?	Yes	No

Remarks: • Sample point located in uplands along an upland/seasonal wetland boundary.

No photo available

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
SP 15A

Project/Site: Balloon Tract Property Applicant/Owner: Investigator: Brian Cleary	Date: 30 July 2007 County: Humboldt State: California
Do Normal Circumstances exist on the site? [Yes] No Is the site significantly disturbed (Atypical Situations?) [Yes] No Is the area a potential Problem Area? Yes [No] (If needed, explain on reverse.)	Community ID: Seasonal Wetland Transect ID : Plot ID: SP 15A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Juncus effusus*	H	OBL	9.		
2. *Lotus corniculatus*	H	FAC	10.		
3. *Phragmites australis*	H	FACW	11.		
4. *Equisetum hyemale ssp. affine*	H	FACW	12.		
5. *Agrostis exarata*	H	FACW	13.		
6. *Holcus lanatus*	H	FAC	14.		
7. *Convolvulus arvensis*	H	NOL	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 6/7 = 86%

Remarks:
- Seasonal wetland within a linear depression.
- Hydrophytic vegetation criteria met.

HYDROLOGY

Recorded Data (describe in Remarks):

- Stream, Lake, or Tide Gauge
- Aerial Photographs
- Other
- X No Recorded Data Available

Field Observation:

Depth of Surface Water: 0 (in.)

Depth to Free Water in Pit: >16 (in.)

Depth to Saturated Soil >16 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

- Inundated
- Saturated
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- Oxidized Root Channels in Upper 12 in.
- Water-Stained Leaves
- Local Soil Survey Data
- FAC-Neutral Test
- X Other (Explain in Remarks)

Remarks:
- Hydrology likely associated with surface water runoff from surrounding uplands into this depression.
- Monitoring during the winter rainfall period warranted.

Sample Number
SP 15A

SOILS

Map Unit Name
(Series and Phase) Fill Material

Taxonomy (Subgroup):

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-4		10 YR 3/1		faint to absent	sandy loam
4-18		5 YR 3/1			sand

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
X	Aquic Moisture Regime		Listed on Local Hydric Soils List
X	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low-Chroma colors	X	Other (Explain in Remarks)

Remarks: • Low chroma hydric soils.

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	Yes	No
Wetland Hydrology Present?	Yes	No
Hydric Soils Present?	Yes	No
Is this Sampling Point Within a Wetland?	Yes	No

Remarks: • Note: This area of the site includes wetlands mapped by Zentner and Zenter in March 2007 and by the Huffman and Broadway Group, Inc. in June 2007.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
SP 15B

Project/Site: Balloon Tract Property Applicant/Owner: Investigator: Brian Cleary	Date: 30 July 2007 County: Humboldt State: California

Do Normal Circumstances exist on the site?	[Yes]	No	Community ID:	Ruderal field
Is the site significantly disturbed (Atypical Situations?)	[Yes]	No	Transect ID :	
Is the area a potential Problem Area?	Yes	[No]	Plot ID:	SP 15B
(If needed, explain on reverse.)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Anthoxanthum odoratum*	H	FACU	9.		
2. *Holcus lanatus*	H	FAC	10.		
3. *Rubus discolor*	S	FACW	11.		
4. *Foeniculum vulgare*	H	FACU	12.		
5. *Equisetum hyemale ssp. affine*	H	FACW	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 3/5 = 60%

Remarks: • 60% bare ground.
• Marginal hydrophytes present.

HYDROLOGY

Recorded Data (describe in Remarks):

- Stream, Lake, or Tide Gauge
- Aerial Photographs
- Other
- X No Recorded Data Available

Field Observation:

Depth of Surface Water: 0 (in.)

Depth to Free Water in Pit: >16 (in.)

Depth to Saturated Soil >16 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

- Inundated
- Saturated
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- Oxidized Root Channels in Upper 12 in.
- Water-Stained Leaves
- Local Soil Survey Data
- FAC-Neutral Test
- Other (Explain in Remarks)

Remarks: • Hydrology apparently absent.

Sample Number
SP 15B

SOILS

Map Unit Name
(Series and Phase) Fill Material

Taxonomy (Subgroup):

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-4		10 YR 3/2			sandy loam
4-18		5 Y 3/2			sand

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
	Gleyed or Low-Chroma colors		Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	Yes	No
Wetland Hydrology Present?	Yes	No
Hydric Soils Present?	Yes	No
Is this Sampling Point Within a Wetland?	Yes	No

Remarks: • Sample point within upland habitat.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
SP 16

Project/Site: Balloon Tract Property Applicant/Owner: Investigator: Brian Cleary	Date: 30 July 2007 County: Humboldt State: California
Do Normal Circumstances exist on the site? **Yes** No Is the site significantly disturbed (Atypical Situations?) **Yes** No Is the area a potential Problem Area? Yes **No** (If needed, explain on reverse.)	Community ID: Seasonal Wetland Transect ID : Plot ID: SP 16

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Cyperus eragrostis*	H	FACW	9.		
2. *Mentha pulegium*	H	OBL	10.		
3. *Aster chilensis*	H	FAC	11.		
4. *Rumex crispus*	H	FACW-	12.		
5. *Lotus corniculatus*	H	FAC	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 5/5 = 100%

Remarks: • Hydrophytic vegetation criteria met.

HYDROLOGY

Recorded Data (describe in Remarks):

- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other
- X No Recorded Data Available

Field Observation:

Depth of Surface Water: 0 (in.)

Depth to Free Water in Pit: >16 (in.)

Depth to Saturated Soil >16 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

- ___ Inundated
- ___ Saturated
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- ___ Oxidized Root Channels in Upper 12 in.
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- X Other (Explain in Remarks)

Remarks: • Sample point occurs within a small topographic depression.
• Algal mats observed.

Sample Number
SP 16

SOILS

Map Unit Name
(Series and Phase) Fill Material

Taxonomy (Subgroup):

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-4		10 YR 3/1		few/medium/distinct	sandy loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
X	Aquic Moisture Regime		Listed on Local Hydric Soils List
X	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low-Chroma colors	X	Other (Explain in Remarks)

Remarks:
- Root channels (oxodized rhizospheres) observed.
- Hydric soil criteria met.

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	Yes	No
Wetland Hydrology Present?	Yes	No
Hydric Soils Present?	Yes	No
Is this Sampling Point Within a Wetland?	Yes	No

Remarks:
- Note: This area of the site included wetlands mapped by Zentner and Zenter in March 2007.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
SP 17

Project/Site: Balloon Tract Property Applicant/Owner: Investigator: Brian Cleary	Date: 30 July 2007 County: Humboldt State: California
Do Normal Circumstances exist on the site? [Yes] No Is the site significantly disturbed (Atypical Situations?) [Yes] No Is the area a potential Problem Area? Yes [No] (If needed, explain on reverse.)	Community ID: Seasonal Wetland Transect ID : Plot ID: SP 17

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Lythrum hyssopifolium*	H	FACW	9.		
2. *Mentha pulegium*	H	OBL	10.		
3. *Lotus corniculatus*	H	FAC	11.		
4. *Rumex crispus*	H	FACW-	12.		
5. *Anthoxanthum odoratum*	H	FACU	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 4/5 = 80%

Remarks: • Hydrophytic vegetation criteria met.

HYDROLOGY

Recorded Data (describe in Remarks):

- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other
- X No Recorded Data Available

Field Observation:

Depth of Surface Water: 0 (in.)

Depth to Free Water in Pit: >16 (in.)

Depth to Saturated Soil >16 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

- ___ Inundated
- ___ Saturated
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- ___ Oxidized Root Channels in Upper 12 in.
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- X Other (Explain in Remarks)

Remarks: • Sample point with a small, linear topographic depression.

Sample Number
SP 17

SOILS

Map Unit Name
(Series and Phase) Fill Material

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes No

Taxonomy (Subgroup):

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-4		10 YR 3/1		few/medium/ prominent	sandy loam
4-16		10 YR 2/1			

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
	Gleyed or Low-Chroma colors	X	Other (Explain in Remarks)

Remarks:
- Root channels (oxodized rhizospheres) also observed.
- Hydric soil criteria met.

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	Yes	No
Wetland Hydrology Present?	Yes	No
Hydric Soils Present?	Yes	No
Is this Sampling Point Within a Wetland?	Yes	No

Remarks:
- Note: This area represents a small potential wetland feature not identified in the Zentner and Zenter 2007 or the Huffman and Broadway Group, Inc. 2007 wetland delineation reports.

APPENDIX F.
WETLAND HYDROLOGY MONITORING PHOTOS

Photograph 1. Northeast view of surface ponding supporting seasonal wetlands mapped by H. T. Harvey & Associates in the central section of the study area.

Photograph 2. Southeast view of surface water ponding as a result of incident rainfall in the southeast section of the study area.

Photograph 3. Evidence of inundation and soil saturation in the southeast section of the study area supporting wetlands.

Photograph 5. East view of one of the two hydrology monitoring transects excavated by H. T. Harvey & Associates on 10 January 2008.

Photograph 6. Example of localized ground water observed in each of the 12 hydrology monitoring soil pits excavated in the southern portion of the Balloon Track Project Site.

Photograph 16. Example of the water level in a hydrology monitoring pit rising to within approximately 3-inches of the soil surface 15 minutes after excavation.