San Diego Bay
Avian Species Surveys
2009-2010

Final
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The birding skills of these field observers improved the quality of the survey results: ***Philip Unitt****,* ***Robert Patton****,* ***Brian Foster****,* ***Thomas Meyer****,* ***Lea Squires****,* ***Bryan Munson****,* ***Mark Billings****,* ***Tim Burr****,* ***Matt Sadowski*** *(also photography),* ***Maryanne Bache****,* ***Gretchen Cummings****,* ***Guy McCaskie****,* ***Bonnie Petersen****,* ***Kate Goodenough****,* ***Brennan Mulrooney****,* ***Dennis Parker****, and* ***Paul Lehman****.*

The following people participated as data recorders, vessel pilots, survey coordinators, and in report production: ***High Tech High Volunteers, Brian Collins, Lorin Lima, Derek Lerma, Harry Smead, Melissa Fehling,*** *and* ***Chelsea Snover****.*

John Vetter *of Tierra Data Inc. was the lead author and conscientious data cruncher of this report.* ***Derek Lerma*** *and* ***Erica Cunningham*** *oversaw the field logistics and coordinated observers and access to all sites.*

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Executive Summary

This report details results from the San Diego Bay avian surveys conducted between March 2009 and February 2010, partially in support of the San Diego Bay Integrated Natural Resources Management Plan (INRMP) revision and in concert with the 2000 San Diego Bay INRMP. This work was jointly funded by the Port of San Diego (Port), and the U.S. Navy, specifically Commander Navy Region Southwest, represented by Naval Facilities Engineering Command Southwest, in San Diego, California.

The vision of the Port and Navy was to conduct the first comprehensive survey of avian species in a single year that covered the entire bay, and contained focused methods to detect multiple classes of birds, i.e. shorebirds, waterbirds, and seabirds. The methods used in this survey are being used for future long-term monitoring of birds as well as for comparing these results to those of other major survey efforts. For this reason, the sampling protocol was developed through a collaborative process among biologists with expertise on local avian fauna. Finally, the survey protocol was developed collaboratively with the U.S. Fish and Wildlife Service Refuges, a landowner in south San Diego Bay. Refuge personnel surveyed the salt ponds, using this protocol, concurrently with the Navy and Port sponsored bay-wide surveys. Initial surveys under this methodology were completed in 2006-07, and the surveys detailed here represent the second iteration of this long-term monitoring plan.

The goal of this project was to:

Establish a scientifically defensible baseline and conduct a long-term trend monitoring program to census water-dependent birds (shorebirds, waterfowl, gulls, terns, and others) of San Diego Bay to assist in the protection and management of the bay and its associated species.

To achieve this goal, we sought to capture the density and distribution of avian species among bay subregions and among census locations throughout a year-long cycle of monitoring. Repeating these surveys every three to five years would allow us to detect a significant change in the population of key species utilizing the bay (defined in this report as a 20% change in abundance between surveys). Identifying species experiencing a long-term decline (or increase) in population will allow agencies managing the natural resources of the bay to adapt management strategies to focus on these species and their habitats.

Shorebird surveys took place monthly (excluding May and July) between March 2009 and February 2010; conducted in the four hours before low tide. These falling tide surveys were designed to capture bird use of foraging habitats as mudflats and other substrates became exposed by the receding water. Quarterly peaking tide surveys were also conducted, over the crest of the tide, four times during the year. These surveys were designed to observe high tide refugia, or areas that contained high bird use which would be missed during falling tide surveys. All monthly surveys were intended to be completed over the course of three days.

The bay and ocean shoreline were surveyed on foot or by boat, depending upon the most advantageous view and access. Observers were assigned and transited an established route recording species and number of birds observed, including substrate where the bird was first sighted.

In addition to the shoreline survey of grid cells (which are used for other general and focus species surveys in the bay), focused observation points were created and surveyed along the transect routes. These points were chosen for several different reasons, including: coordination with other monitoring efforts, as sites of special management concern to the Navy or Port, or as known bird congregation areas. Concentric rings (50, 100, and 500 meter radius) were developed around these points and an "instantaneous" count of each species within the rings was taken.

Surveys to detect the presence of waterbirds occurred monthly between November 2009 and February 2010, when maximum migratory waterbird presence was expected. To complete the survey within a morning window, two boats were employed. One started at the mouth of the bay and the other at the south end of the bay near the salt ponds, following established routes, and meeting in the bay's center.

Data was examined by grid cell and by six regions based on hydrodynamic patterns of the bay. Abundance (total number of observations), species richness (individual species per grid cell or region), and species diversity (evenness of species distribution by grid cell or region) were all calculated and reported, and density (observations per area of grid cell) was calculated for mapping purposes.

A total of 491,317 birds from 175 distinct species and subspecies were observed during the shorebird and waterbird surveys. Of this total, 470,815 were sighted during the shorebird portion of the survey; 133,070 of which were counted during the peaking tide surveys (145 species). The waterbird surveys totaled 20,502 bird observations from 44 different species. Abundance, density, richness, and diversity are discussed by month, region, and by bay grid cell for each survey type. An additional 133,498 bird observations were made during the point count of the shorebird surveys. Done simultaneously with the shoreline survey, these birds are a subset of those seen during those transects.

During the shoreline survey, the number of birds observed per month varied considerably from a low of 12,656 in April to a high of 54,037 in November, with winter months having more observations generally. Birds were concentrated in the salt ponds of south San Diego Bay, along the extensive mudflats in the south bay, and around the bait barge in North Bay. These areas also contained the highest concentrations of birds during the falling tides, while grids in the interior salt ponds, near the Navy Enhancement Island (also known as Homeport Island), and along the western shore of North Island served as refugia during peaking tides.

Species richness per cell during the shoreline survey was higher along the ocean shoreline, along the western shore of the central bay, and in the salt ponds. When compared by region, the south bay and salt ponds contained the highest species richness (133 and 130 species, respectively). In a similar trend with number of birds observed, species richness was greatest from November through March (114-123 species) and lowest in June (75 species).

Species diversity during shoreline surveys showed a much more even distribution throughout the bay with smaller peaks along the ocean and western bay shoreline and in the salt ponds (range from 2.65 to 3.22). The index of diversity used in this analysis, Shannon-Wiener, can be very dependent on species richness, especially when there is a large difference in richness between samples. The grid cells do vary greatly in number of species recorded, and in this survey there is a high degree of correlation between richness and diversity.

The point count surveys were done at the same time and constitute a smaller replicate of the shoreline surveys. Bird observations showed a similar pattern between the two, though all metrics were slightly lower due to the smaller area covered. A greater number and more types of birds were observed in the shoreline transects compared to the point count stations (175 versus 134 species); and the density and diversity were both minimally lower as well during the point counts (84.7 birds/ha versus 77.3 birds/ha; 3.39 versus 3.20). Density calculated for the point count stations is likely an underestimate because at no station could the entire 500 meter buffer be observed due to obstructions such as buildings and terrain.

Like the shorebird surveys, more birds were observed per hectare in the south region than in other bay regions during the waterbird surveys. The number of birds observed per month was greatest in December due to a peak in the north-central bay. Lowest counts were noted in February. The cells with the highest density occurred mainly in sheltered coves, perhaps due to the later survey time in this iteration. For both species richness and species diversity, highest concentrations occurred in the south bay and peaked in January for the waterbird surveys, with surf scoter numbers driving lower diversity in the south-central bay and in November.

Species richness and abundance changed little between the 2006-07 survey effort and the 2009-10 survey effort. The most abundant species in the previous survey remained the same throughout this survey as well, with surf scoters, western sandpipers, and western gulls remaining the most recorded species. Fewer observations were made overall during both the shorebird and waterbird surveys in 2009-10, and declines were seen in a number of species. Key species showing a greater than 20% decline include: California least tern, black skimmer, red knot, and willet. Three species showed an increase of greater than 20%: redhead, Brandt's cormorant, and elegant tern. Multiple years of documentation will be necessary to establish how

various species' populations fluctuate through time, and whether or not the declines seen between these two surveys are merely artifacts of sampling over a large area or represent a serious decline in a population.

It is recommended that future comprehensive surveys such as this should be conducted every three to five years. In addition, annual or biennial point count surveys would allow for the discernment of natural variation in observer coverage and population size and would make trend analysis of the five-year surveys easier to interpret. Revisiting initial goals and developing current management objectives of the survey effort should be an ongoing process to determine whether or not these surveys meet those goals and whether additional detailed objectives would be desired. Recommendations for the future as well as a summary of issues encountered during this survey are discussed more fully in Section 4 of this document.

Data sets are stored and delivered in three separate Microsoft Excel files, one each for the shorebird, point count, and waterbird survey data. The first tab in the file contains the data; the second tab a Pivot Table, which can be used to manipulate and display the data without harming the integrity of that stored in the first tab.

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Acronyms and Abbreviations

AOU	American Ornithologists' Union
CDFG	California Department of Fish and Game
GPS	Global Positioning System
ha	hectare
INRMP	Integrated Natural Resources Management Plan
NASNI	Naval Air Station North Island
NASSCO	National Steel and Shipbuilding Company
NAVFAC	Naval Facilities Engineering Command
NRDA	Natural Resource Damage Assessment
NWR	National Wildlife Refuge
SCB	Southern California Bight
USFWS	U.S. Fish and Wildlife Service

1.0 Introduction

This report details results from the San Diego Bay avian surveys conducted between March 2009 and February 2010, in support of the San Diego Bay Integrated Natural Resources Management Plan (INRMP) revision. This work was jointly funded by the Port of San Diego (Port), and the U.S. Navy, represented by Naval Facilities Engineering Command (NAVFAC) Southwest, in San Diego, California.

The vision of the Port and Navy was to develop the first comprehensive survey of avian species in a single year that covered the entire bay, and contained focused methods to detect multiple classes of birds, i.e. shorebirds, waterbirds, and seabirds. The methods used in this survey are being used for future long-term monitoring of birds as well as for comparing these results to those of other major survey efforts. For this reason, the sampling protocol was developed through a collaborative process among biologists with expertise on local avian fauna and with the U.S. Fish and Wildlife Service (USFWS) Refuges, a landowner in south San Diego Bay. Refuge personnel surveyed the salt ponds, using this protocol, concurrently with the Navy and Port sponsored bay-wide surveys. Initial surveys under this methodology were completed in 2006-07, and the surveys detailed here represent the second iteration of this long-term monitoring plan.

1.1 Project Goals and Objectives

The goal of this project was to:

Establish a scientifically defensible baseline and conduct a long-term trend monitoring program to census water-dependent birds (shorebirds, waterfowl, gulls, terns, and others) of San Diego Bay to assist in the protection and management of the bay and its associated species.

To achieve this goal, we sought to capture the density and distribution of avian species among bay subregions and among census locations throughout a year-long cycle of monitoring. Repeating these surveys every three to five years would allow us to detect a significant change in the population of key species utilizing the bay (defined in this report as a 20% change in abundance between surveys). Identifying species experiencing a long-term decline (or increase) in population will allow agencies managing the natural resources of the bay to adapt management strategies to focus on these species and their habitats.

1.2 Literature Review

1.2.1 Regional Setting

San Diego Bay is part of the Pacific Ocean's Southern California Bight (SCB), a curve in the southwestern California coastline that extends from Point Conception to just south of the Mexican border. This ecological region is very productive and diverse for several reasons. The underwater topography of the SCB region is extremely complex, especially when compared to the long, flat shelf extending seaward from the Atlantic coast. The SCB contains both cool and warm water due to ocean currents mixing from subarctic and equatorial regions. Sea temperatures fluctuate regularly due to the currents' changing strengths (Dailey et al. 1993). These changes are reflected mostly by plankton and to a varying degree are transferred up the food chain. Finally, the SCB's embayments, including San Diego Bay, which are naturally scarce in southern California (compared to the East and Gulf Coasts), contain intertidal habitat required by a number of species. These ecological edges are even more limited today due to commercial development in other harbors, ports, marinas, and estuaries of the SCB (Navy and Port 2000).

Due to its position along the transition zone between cold subarctic waters and warmer subtropical water, San Diego Bay experiences a large variability in the structure of its bird communities throughout the seasons (USFWS 2005). The bay is a part of the Pacific Flyway used by millions of birds traveling between northern breeding grounds and southern wintering sites. It is one of a dwindling number of stopover sites used by migrants to replenish their energy during this long journey (Hickey et al. 2003). It supports large populations of over-wintering birds depending on bay resources for food, shelter, resting, and staging before migration (Hickey et al. 2003). San Diego Bay provides the largest expanse of protected bay waters in

southern California to migrants on the Flyway (Hickey et al. 2003). The bay also serves as the northern range for tropical species, including several that breed and nest locally. Fully one-third of birds dependent on San Diego Bay have been identified as sensitive or declining by the federal or state governments or by the Audubon Society (Navy and Port 2000).

More than 300 bird species have been documented to use the bay, of which 136 directly depend upon it (Navy and Port 2000). A number of them and their local status and distribution, both historically and during this survey, are described in *Appendix B: Species Profiles*. The majority of these species, representing 30 families, are migratory and may only stop to rest and feed, while others spend the winter or breed. Several are terrestrial birds of special concern or influence found around the bay even though not directly dependent upon it. Resident birds live and breed in the area year-round. Migrants not usually found in the area, disoriented in their travel, on the edges of their range, or simply looking for suitable habitat are regarded as vagrants. Although vagrants are not ordinarily regarded as dependent on the bay, a considerable number pass through and visit each year (Unitt 2004).

When compared to midwinter populations of the SCB, the bay provided habitat for more than half of the entire midwinter duck population (USFWS 1995a). A comparison to the 1994 winter waterbird population estimate of the Pacific Flyway and the state of California (Bartonek 1994), showed the bay also supporting a substantial proportion of midwinter seabird and waterbird populations.

San Diego Bay provides breeding, wintering, and/or stopover habitat for most shorebirds identified in the Southern Pacific U.S. Shorebird Conservation Plan as retaining primary importance within the region and has been identified as a Western Hemisphere Shorebird Reserve Network site of Regional Importance (Hickey et al. 2003). Of the ten species for which coastal habitats in the Southern Pacific Region are especially important, the black-bellied plover (*Pluvialis squatarola*), western snowy plover (*Charadrius alexandrinus nivosus*), semipalmated plover (*Charadrius semipalmatus*), willet (*Tringa semipalmata*), marbled godwit (*Limosa fedoa*), black turnstone (*Arenaria melanocephala*), short-billed dowitcher (*Limnodromus griseus*), and red-necked phalarope (*Phalaropus lobatus*) are supported by San Diego Bay (Hickey et al. 2003). The bay supports significant percentages of black-necked stilt (*Himantopus mexicanus*) and willet in the spring, when over 5% of these species' populations are present; and for red knot (*Calidris canutus*) in the fall, spring, and winter, when almost a third of the U.S. Pacific coast population can be present in the bay (Hickey et al. 2003).

San Diego Bay has been divided into four separate hydrodynamic regions under research performed by Largier (1995; Largier et al. 1996). Based on water circulation, temperature, and salinity, these four regions are the marine, thermal, seasonally hypersaline, and seasonally estuarine (Largier 1995, Largier et al. 1996). For our efforts, these areas correspond to the north, north-central, south-central, and south regions, with additional survey areas in the salt works and the ocean outside of the bay.

1.2.2 Habitat Partitioning

Habitat and foraging dependencies specific to San Diego Bay are, in general, known only in a broad sense and extrapolated from other locations. Figure 1-1 is a simplified view of foraging habitat partitioning by birds. Whether birds actually use an available site is much more complicated. Factors such as habitat fragmentation, parcel size and connectivity, juxtaposition of other habitats, predator-prey relations, competition, disturbance, and species behavior patterns will affect a site's value and carrying capacity for birds. Although not used often, certain habitats could be of importance for use by a species within a much larger area and array of habitats. An example is the availability of roosting structures with relatively low human disturbance near foraging areas. Ogden (1995) and USFWS (1995b) documented a use of various artificial structures around the bay for roosts, and use of dikes at the Salt Works (USFWS 1994a). Baird (1997) documented high use of man-made structures for California least tern (*Sternula antillarum browni*) roosting. Merkel and Associates (2002) documented no clear difference in tern foraging between pier and open water habitats. Ogden (1994, 1995) showed a significant preference by many waterbirds and seabirds for shallow, nearshore areas compared to deeper water. Shorebirds are often concentrated around the 4,500 hectares (ha) of subtidal and intertidal areas, including the 310 ha of remaining mud flats, as well as the 560+ ha in the salt ponds of the south bay (Hickey et al. 2003).

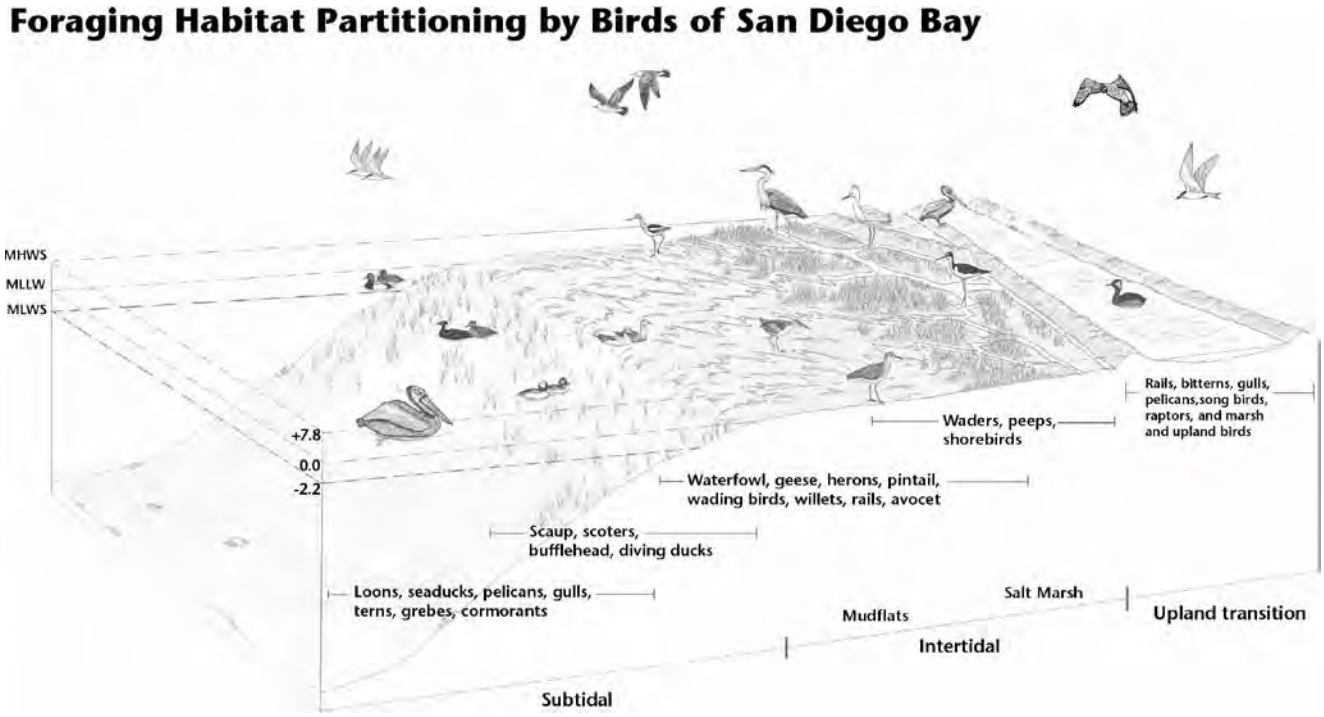


Figure 1-1. Foraging habitat partitioning by birds of San Diego Bay. Dabbling ducks forage in brackish water, unrelated to tidal elevation. MHWS – Mean High Water Springs; MLLW – Mean Lower Low Water; MLWS – Mean Low Water Springs. Line art created by Peter Els and figure developed by Tierra Data Inc.

Important bird movement areas, such as crossover points between the bay and ocean at Emory Cove and Delta Beach, have been identified (Copper 1998). The USFWS (Manning 1998) observed that brant established a movement corridor between beds of eelgrass in south bay. There is substantial movement between the Tijuana Estuary and the bay, and between the agricultural fields of the Tijuana River Valley and the bay by shorebirds.

1.2.3 Previous Survey Efforts

Table 1-1 compares methods and levels of effort of previous avian surveys performed in the bay. The first two surveys, sponsored by the Navy and conducted by Ogden Environmental and Energy Services (Ogden 1994, 1995), covered waterbirds of the north and central bay over the course of two years, 1993 and 1994. The third and fourth surveys were conducted by USFWS (1995a and 1994a), covered waterbirds of the south and central bay, and birds of the salt works, respectively. The fifth was the initial survey effort of this monitoring program.

The surveys of north (Ogden 1994), central (Ogden 1994, 1995; USFWS 1995a), and south (USFWS 1995a) bay did not account for use by shorebirds; dabbling ducks were under-represented in south bay and not all terns and gulls were identified to species. The biggest discrepancy between the Ogden and USFWS surveys in areas where they overlapped in central bay was in scoter and scaup counts (scoters 78,309 vs. 32,929; scaups 13,976 vs. 1,035 for Ogden and USFWS, respectively). The counts occurred in different years (USFWS 1993; Ogden 1994), which seemed to affect the scoter results. Otherwise, the differences may be at least partly due to survey coverage and methods. Ogden surveyed both shore and open water areas, whereas USFWS primarily surveyed in open water and did not survey Glorietta Bay and Seventh Street Channel, known scaup concentration areas. Scaup preferred shoreline areas according to Ogden's 1993 surveys. The USFWS expended less of a survey effort in central bay alone, instead combining central and south bay for a total of 350 hours, while Ogden spent 290 hours targeting only central bay.

Table 1-1. Comparison of three surveys of bay avian fauna conducted in 1993, one 1994 survey of central bay, and previous survey from this study conducted in 2006.

Survey	Location and Area Surveyed	Survey Period	Total Observations	Methods Summary
Ogden 1994	North and central bay (3,937 acres [1,593 ha] in north bay)	Jan. 1, 1993-Dec. 31, 1993	208,564 birds 70 waterbird species	Performed 48 surveys for north bay approximately once/week. Central bay surveyed approximately once/month. Made observations during boat transects traveling 5 to 15 mph with stops. The bay was stratified by grids into 1,000 ft (305 m) lengths across from shore to shore, then divided into depth categories (shallow, intermediate, deep), then further divided into marina, pier, and other shoreline categories. Did not identify most gulls and shorebirds to species.
USFWS 1995a	Central and south bay, excluding Coronado Yacht Club, 7th St. Channel, Coronado Cays, and diked ponds of Salt Works	April 15, 1993-April 14, 1994	149,553 total birds (52,853 waterbirds in central bay) 52 species	Performed 46 surveys approximately once/week totaling 350 field hours. Made observations from boat traveling 5 to 20 mph with 5 minute stops. Survey routes were 1,000 ft (305 m) widths. Staggered time of start at each location throughout the season. Observations recorded within a 500 ft (152 m) radius of the boat (18 acre [7 ha] circle). Did not record shorebirds, herons, egrets. Missed most ducks. Combined most gulls, terns, scaup, and western and Clark's grebe.
USFWS 1994a	Salt Works, Emory Cove, Marine Biological Study Area (1,730 acres [700ha])	Feb. 17, 1993-Feb. 2, 1994	522,553 birds 94 species	Performed 52 surveys once/week. Biologists on foot covered four survey routes. Recorded tidal conditions at time of observation.
Ogden 1995	Central bay (4,298 acres [1,739 ha] of water and shoreline habitat)	Jan. 1, 1994-Dec. 31, 1994	181,488 total birds (126,008 waterbirds) 70 waterbird species	Performed 47 surveys approximately once/week totaling 290 field hours. Same methods as for Ogden 1994.
Navy/Port 2007	Shoreline, point counts, and central Bay waterbird survey	March 2006 – Feb. 2007	541, 374 birds (includes 31, 791 waterbirds in the central Bay) 110 waterbird species	Performed monthly falling tide shoreline surveys (excluding May and July) and quarterly high tide surveys of the entire Bay and Silver Strand shoreline, including 22 point count locations. Central Bay waterbird surveys were also performed once montly in winter (Nov.-Feb.) Field observation hours total over 700.

Ogden did not limit the survey time for collecting data (typical survey time: six hours), whereas USFWS limited survey time to approximately four hours per survey. The USFWS counts at each point location (18 acre [7 ha] circle) were restricted to five minutes to minimize errors from bird movement. Ogden counted all individuals with no time restriction.

These separate surveys of avifauna of San Diego Bay in 1993–1994 resulted in an estimate of over seven million bird-use days per year, or an average of over 19,000 birds per day (with substantial peaks and lows) based on the average number of sightings during survey days (USFWS 1994b; Ogden 1995; USFWS 1995a).

In the SCB as a whole, bird numbers and biomass are highest in the winter, when high-latitude nesters stop in the area. The three surveys all reported an abundance peak about December (November through February for central bay by Ogden 1995), but in the Salt Works there was another peak in August due to the arrival of many red-necked phalaropes. Abundance peaks at the Salt Works in December were attributable to a great number of western sandpipers (*Calidris mauri*). All surveyors found a low point around June.

In contrast to the December abundance peak, censuses conducted at the Tijuana Estuary (Kus and Ashfield 1989) and throughout the Pacific Flyway (Warnock et al. 1989; Page et al. 1990) documented that the number of migratory waterbirds peaks in the fall season and is of an order of magnitude greater than the number present in spring, by which time most birds depart for breeding grounds.

The 2006-07 surveys were the most comprehensive ever undertaken in San Diego Bay. In contrast to the previous surveys, these surveys covered the entire bay in one year, documenting abundance and richness of all birds in all parts of the bay, as well as along the ocean shoreline of Coronado peninsula. The methodology for the 2009-10 surveys was essentially unchanged and is discussed in *Section 2.0: Methods*. Similarly, the results of the 2006-07 surveys are compared alongside the 2009-10 survey results for ease of interpretation.

2.0 Methods

Methods for this avian survey were developed considering previous San Diego Bay ornithological survey methods, which are summarized in the Port Environmental Services Department's San Diego Bay Bird Survey Protocol (Port 2005), and the San Diego Bay INRMP (Navy and Port 2000). Protocol was developed collaboratively with respected San Diego Bay area birders and the USFWS Ecological Services and Refuges. The 2006-07 surveys served partly as a pilot study to determine the best methodology for surveying the entirety of the bay. This survey further refined many of these methods, and provided validation to earlier techniques.

2.1 Criteria for Selection of Methods

To achieve project objectives, certain criteria were decided upon from earlier methods:

- Methods should lead toward a long-term monitoring program, including annual monitoring employing a subset of methods, census locations, or focus species.
- Methods should provide natural resources managers with information valuable to making effective conservation and management decisions.
- Methods should help to improve the predictive and interpretive power of project-level surveys and analyses of impacts. This includes development projects, restoration projects, surface use (boat wakes, flushing by boats, etc.), surface coverage (piers, marinas with boats parked, etc.), shoreline substrate changes such as armoring, oil spill response, and cumulative effects.
- Methods should address data gaps and inconsistencies in previous surveys, while making use of past data whenever possible.
- Methods should build on the investment in San Diego Bay bird surveys by integrating both published and unpublished data sets into the results of the project whenever possible.
- Where possible, methods should be used to support national and regional monitoring priorities, as well as other survey information collected locally by federal and state agencies, to enable a comparison of trends within San Diego Bay to other sites.
- Finally, the methods should be based on the assumption that it is more important to establish a reliable baseline and consistent methodology for assessing long-term trends, than to be comprehensive.

2.2 Project Area

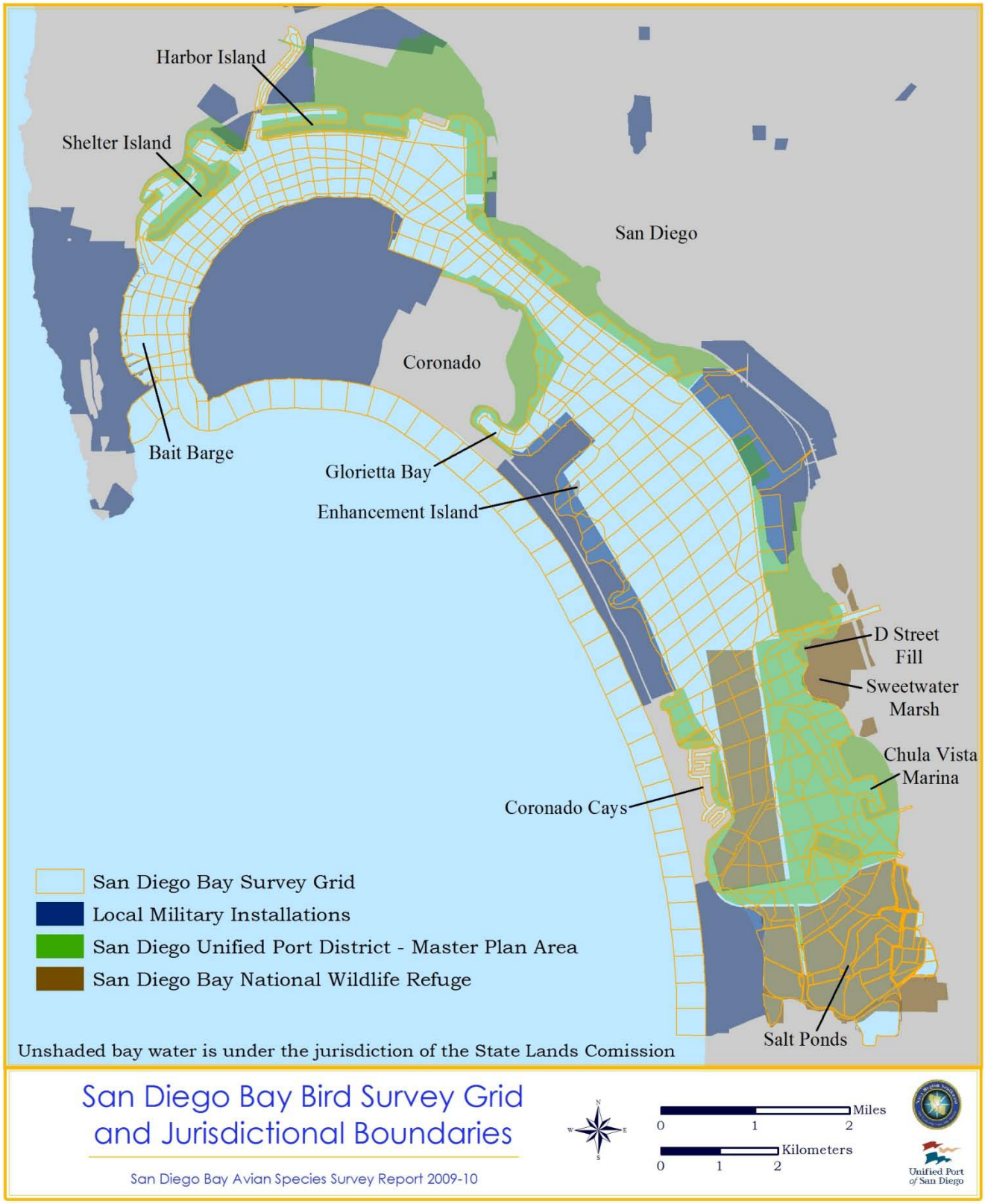
The project area includes the entire bay footprint (with the salt ponds of the South San Diego Bay National Wildlife Refuge (NWR) covered mostly by USFWS Refuges) and the shoreline on the ocean side, which is functionally connected to the bay and contains known bird concentrations. A grid system based water depth and habitat was used for this project (Map 2-1). Each grid cell was surveyed during the shore and/or waterbird survey. Close-up aerial maps of the survey area are included in *Section 7.0: Oversize Figures*.

In addition to surveys in grid cells, focused observation points were established at known bird concentration areas or to highlight areas of special management concern.

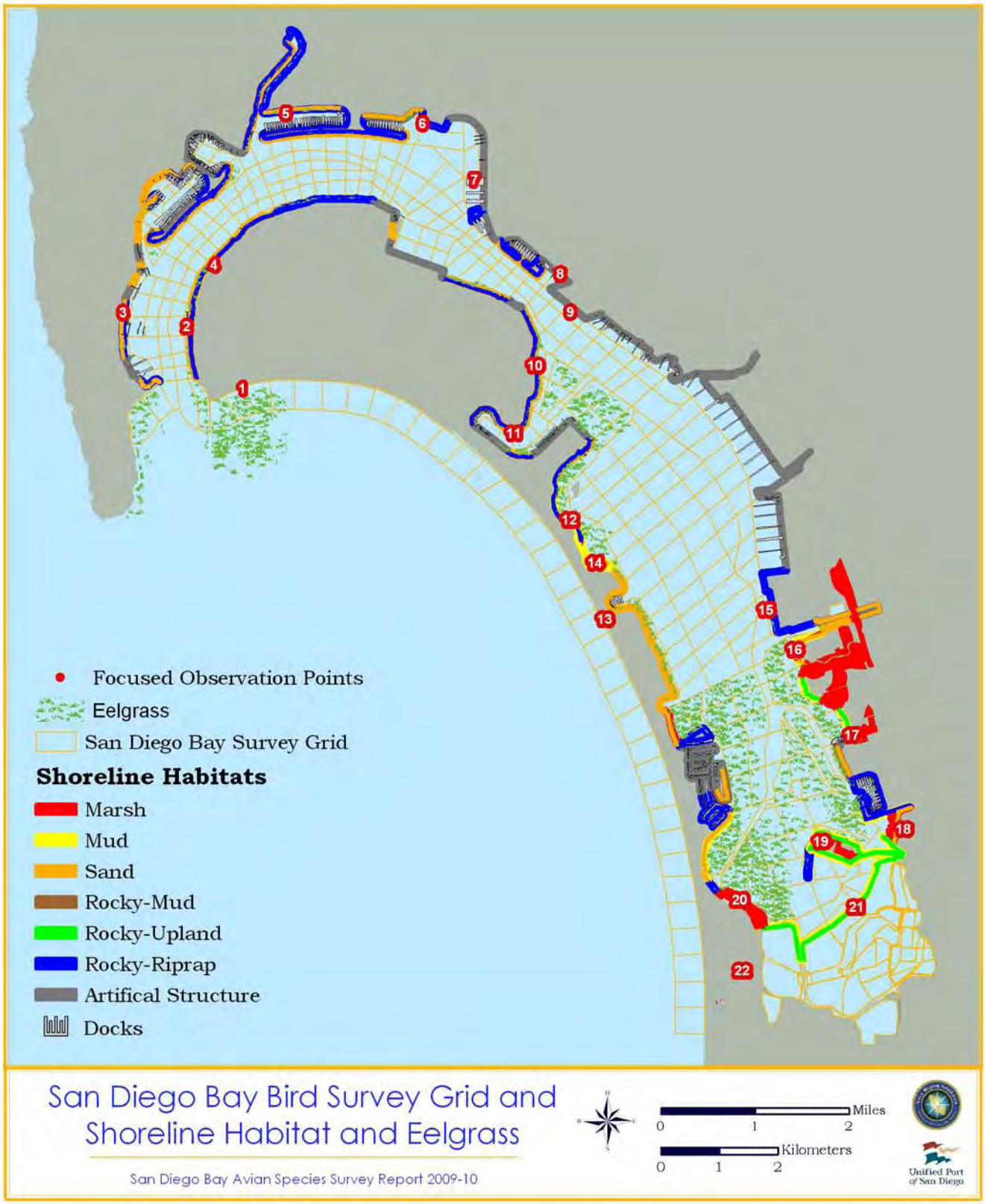
The observations collected in the salt works in south San Diego Bay, part of the San Diego Bay NWR, were funded independently by USFWS through an independent contractor. The data for all salt pond observations collected with that funding is summarized and analyzed in this report.

2.3 Habitat and Species Focus

The survey focus included open water areas, shorelines, and fresh- to brackish-bay wetlands and waters within the Project Area (Map 2-2). The primary focus of this survey was on aquatic birds such as shorebirds, waterfowl, gulls and terns. Marsh birds such as rails, passerines, herons, and egrets were not specifically targeted, and are best surveyed under specific methodology; however, these species and terrestrial birds were also recorded when observed.



Map 2-1. Survey area and management jurisdictions for the San Diego Bay bird surveys with major landmarks labeled.



Map 2-2. Avian survey grid in relation to San Diego Bay shoreline habitat and eelgrass.

2.4 Project Participants

Table 2-1 lists observers who participated in species identification during this project. Many other individuals participated in capacities such as vessel pilots, data recorders, data entry, error checking, and analysis. The number of observers required for this effort is a reflection of the fact that surveys were tied to tidal level and conducted over the whole bay simultaneously.

Table 2-1. Individuals who participated in identifying birds for the San Diego Bay bird survey.

Observers	
Brian Foster	Philip Unitt
Maryanne Bache	Robert Patton
Elizabeth Copper	Bonnie Petersen
Gretchen Cummings	Thomas Meyer
Lea Squires (Norton)	Kate Goodenough
Mark Billings	Tim Burr
Matt Sadowski	Brennan Mulrooney
Brian Collins	Dennis Parker
Guy McCaskie	Paul Lehman

2.5 Frequency, Timing, and Location of Shorebird Surveys

Shorebird surveys took place monthly (excluding May and July, ensuring consistency with the 2006-07 surveys) between March 2009 and February 2010 (Table 2-2). Surveys were conducted within four hours preceding low tide in what is entitled a falling tide survey. Falling tide surveys are designed to capture bird use of foraging habitats as mudflats and other substrates become exposed by receding water.

Peaking tide surveys were also conducted, over the crest of the tide, four times throughout the year. These surveys were designed to observe high tide refugia, or areas that contain high numbers of birds during a peaking tide, which would be missed during falling tide surveys. It was the intention to complete all surveys over the course of three days; however, at times adverse weather conditions delayed survey teams.

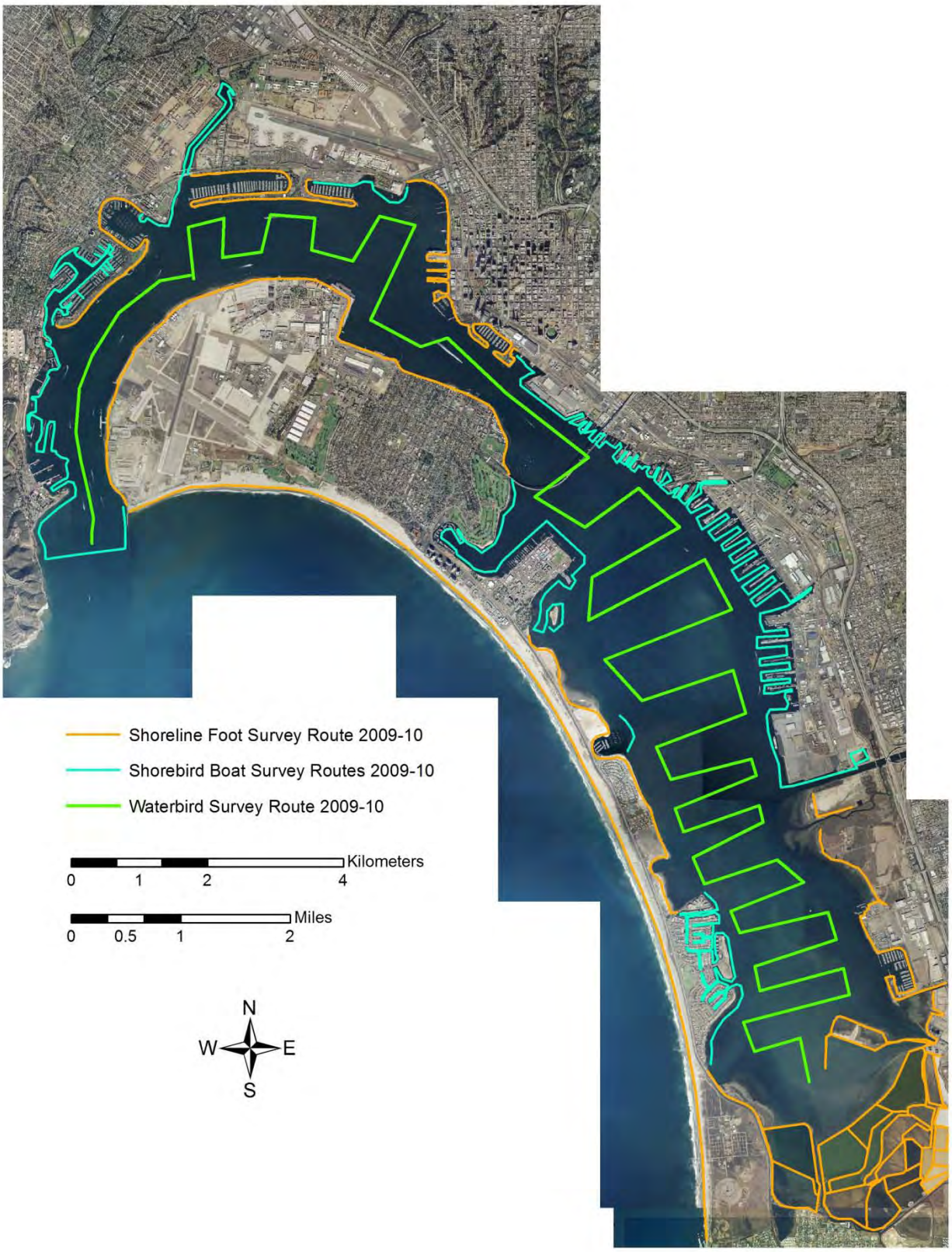
Table 2-2. Survey dates and tides for the San Diego Bay shorebird surveys.

Survey Date		
Month	Days	Tidal Cycle
March 2009	24, 25, 26	Falling
April	21-24	Peaking and Falling
June	14-17	Falling
August	10-12, 18-22	Peaking and Falling
September	16-18	Falling
October	13-16	Falling
November	16-21	Peaking and Falling
December	15-18	Falling
January 2010	11-14	Falling
February	13, 15-19	Peaking and Falling

The bay and ocean shoreline were surveyed either on foot or by boat, depending upon the most advantageous view and access (Photo 2-1 and Photo 2-2). Map 2-3 indicates areas surveyed by boat and by foot. Many land and water locations consisted of Navy security zones. Private areas, such as the National Steel and Shipbuilding Company (NASSCO) shipyard, hire individual security patrols. A security form was forwarded to the appropriate Points of Contact one week prior to survey work. *Appendix A: Example Security Form and Protocol* contains an example of the form, as well as the protocol followed on the day of the survey.

Photo 2-1. Example of shoreline survey crew. Pictured are Tim Burr (left) and Bryan Munson. Photo by Rob Wolf 2007.

Photo 2-2. One of the vessels used during the water surveys. Photo by Rob Wolf 2007.



Map 2-3. San Diego Bay bird waterbird and shorebird survey routes.

Observers were assigned an area and transited an established route recording species, number of birds observed, and substrate where the bird was first sighted. Substrate classifications were defined as:

- **Air:** a bird flying;
- **Water:** a bird anywhere below the high water line;
- **Upland:** a bird anywhere above the high water line;
- **Dock:** a bird perched on anchored, floating, or other substrate over the water to include: docks, boats, bridges, wave attenuators, in water fences, and other like structures;
- **Water-Riprap:** a bird perched on riprap, jetty, or any broken up concrete or rock used for artificial shoreline stabilization below the high tide line, and
- **Upland-Riprap:** riprap or jetty above the high tide line.

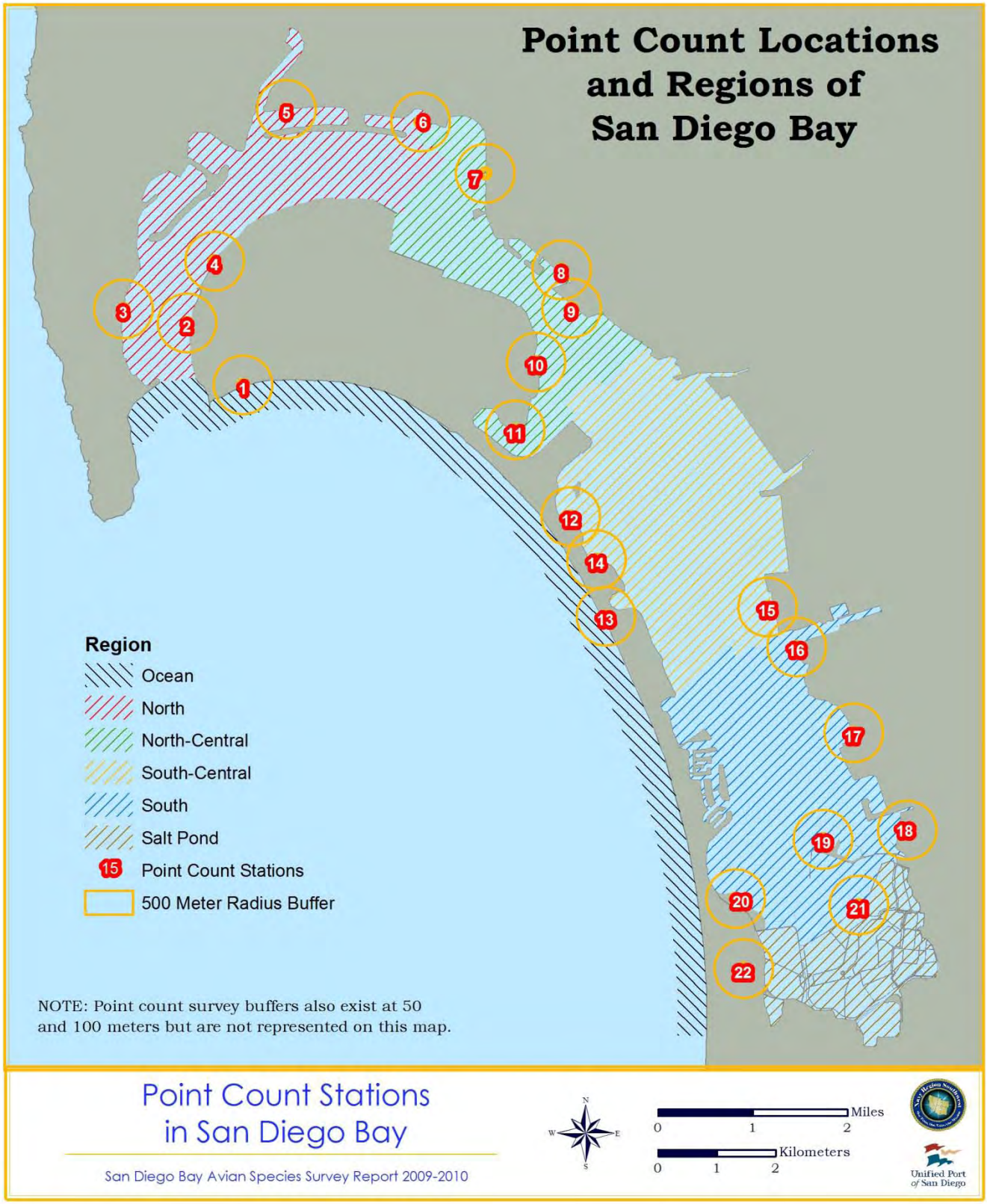
Observers were instructed to focus on one grid cell at a time and birds flying overhead were considered in the grid they were in when first sighted. In addition to species and substrate information, data were collected on time of day, air temperature, wind, cloud cover, visibility, and precipitation. Additional anecdotal comments such as bird behavior, other survey conditions, notes, and/or difficulties were also included.

2.6 Point Count Surveys

In addition to the shoreline survey of grid cells, focused observation points were established and surveyed along the transect routes. Chosen for several reasons, these points are indicated on Map 2-14. Points are Natural Resource Damage Assessment (NRDA) sites (Points 1, 2, 3, 12, 13, 16, 18, 19, and 20), long-term fish sampling locations (Points 4, 10, 14, and 19) established by Allen (1999), sites of special management concern to the Navy or Port (Points 1, 6, 7, 8, 9, 15, 16, 17, 21, 22), or known bird congregation areas (Points 1, 4, 5, 10, 11, 12, 13, 16, 20, 21). Concentric rings (50, 100, and 500 meter radius) were developed around these points and an "instantaneous" count of each species within the rings was taken. As with the shoreline surveys, birds flying overhead were included in the count, if they occurred within the circle at the beginning of the count. Density was calculated by dividing the number of birds observed by the total area covered by 500 meter radius buffer around each of the 22 points (each point total = 78.43 ha), which was to mark the maximum extent of each point count. Point counts lasted a total of 15 minutes, with the counts being broken into three five-minute sections. The results of the counts are summarized and briefly discussed in the appropriate sections. However, as these counts are done at the same time as the shoreline transect surveys and are thus a subset of the those counts, all analysis of totals and trends use only data collected during shoreline and waterbird surveys. The point counts can be compared directly in future iterations of the overall survey.

Although point count data collection in relation to tide was to mirror data collection during the shorebird transects, some point count data were collected at inopportune tides despite best efforts in the field. Where this occurred, data were left in the dataset when the alternative was no data for that month. Where duplicate data were collected for months when only one tidal survey was to be performed, these data were removed from the analysis. These issues were much less common than previous surveys, and this survey represents a strong baseline for future point count efforts.

Habitat characterizations were also done around each of the point count stations. Point 3 was not included due to access difficulty when the sketches were collected. These are presented in *Appendix C: Point Count Habitat Sketches*.



Map 2-4. Point count station locations and bay regions.

2.7 Waterbird Surveys

Surveys to detect the presence of waterbirds (seabirds and waterfowl) using the open water of the bay were conducted once monthly between November 2009 and February 2010, when maximum migratory waterfowl and seabird presence was expected (Table 2-3). During this time of year, these species gather in large groups throughout the bay (called rafts). For optimal detection, surveys began in the morning, and all were completed by early afternoon. The 2009-10 surveys were started and completed later in the day (most beginning in mid-late morning) than the 2006-07 surveys, which were all completed by noon. Wind and water conditions required modification of the times and surveys were conducted to ensure conditions were as optimal as possible on the day selected. Weather conditions are generally more calm and consistent during mornings than afternoons, when winds can pick up, creating chop in the bay and making it difficult to detect rafting waterbirds. Waterbirds also tend to migrate offshore towards mid-morning and disperse as a result of greater mid-day boat traffic. Thus, the surveys were done as early in the day as conditions allowed.

Table 2-3. Survey days and times for waterbirds in San Diego Bay.

Survey Date		Time
Month	Day	(24-hour clock, US Pacific Time)
November 2009	10	09:08-12:40
December 2009	09	11:00-14:49
January 2010	14	10:40-14:47
February 2010	22	08:21-12:52

Since the focus was on the open water habitat within the bay, the few grid cells at the mouth of the bay in the ocean region were not surveyed during this survey, unlike 2006-07. Two boats were used to complete the surveys in as short a time as possible. One vessel started at the mouth of the bay and the other at the south end of the bay near the salt ponds. Radio contact between the two was maintained ensuring start times and survey pace. The boats traveled between 5 and 20 miles per hour, stopping very briefly to count rafting birds if necessary. Boats moved throughout the bay ensuring that all open water cells in the bay, as well as a few cells touching the shoreline in narrow areas of the bay, were covered in the waterbird surveys (Map 2-3). Observers tracked their position in the bay using a hand-held global positioning system (GPS) unit displaying the bay grid and a location beacon. Instructions were to survey for waterbirds. Shorebirds were recorded if observed; however, efforts were concentrated on the open water.

2.8 Data Analysis

2.8.1 Database Creation and Error Checking

Standardized field data collection forms were provided to observer teams and all data was compiled in Microsoft Excel spreadsheets. Considerable effort was spent inputting data, reformatting it, and checking for errors. Original data forms were compiled to allow for checking when questions came up, and observers were also available to answer questions about specific records.

When referring to data in this report, a record is an observation of a bird species in a single cell. Fields are types of information collected for each record, such as Grid Cell, Time, Observer, Abundance, Substrate, Comments, etc. Each record may contain multiple observations of a single species, or only one, depending on what was seen in each cell.

Error checking consisted of checking the four-letter bird code field against the species field to ensure a match. Records were also compared against a master bird code list to identify any typing errors. The grid cell field was also checked against the master list of grid cells created for the 2006-07 surveys. Cells that did not match the list were identified and corrected. Other cells that did not match the official list were

sometimes specific areas within an established cell; the more specific information was moved to the comments field and the cell changed to match the rest. There are other established names for areas of the bay used by the birders participating in this project; those conversions were made as necessary.

An overview of the species and counts recorded each month was performed. Records were sorted by month, time, and cell to ensure that cells were not double counted, that all routes were covered each month, and that cells were not entered incorrectly (which become apparent when cell entries are compared to time and other matching entries). When suspect records were discovered that could not be corrected by searching the original data sheets or talking with data recorders, these records were flagged and not used in the analysis. Additional records were removed in areas where duplicate counts of one cell were performed. In these instances, the counts taken on the falling tide closest to low tide were used in the analysis.

2.8.2 Calculations and Mapping

Initial calculations and mapping consisted of species lists with abundance data for both the shore and waterbird surveys. Species richness was calculated as the total number of unique species observed within each survey cell. Only identified species were used for this calculation (i.e. observations recorded only to group, such as gull species, were not used). Density was calculated by dividing the total number of observations by the cell area in hectares (ha). All observations were used for this measure whether they indicated specific species or merely the group. The Shannon-Wiener Index of Diversity was used to compare diversity among grid cells, regions, and months. The following equation defines the Shannon-Wiener Index (H) where *pi* is the proportion of the number observed of a single species over the total number of all individuals observed in a sample. These proportions are summed for each species observed in the sample, and the negative taken.

$$H = -\sum_{i=1}^{S\,obs} pi\ \ln p$$

Figures displaying density, richness, and diversity were created in ArcGIS 10 and are displayed in *Section 3.0: Results*. Each of the three survey types (shoreline, point count, and waterbird) were analyzed separately to allow for the different collection methodology and to provide a better comparison between years. As the point count surveys are a replicate of the shoreline survey, total trend data was examined using the combined shoreline and waterbird surveys only. Future surveys will be able to compare point count data directly.

As the focus of these surveys is on the birds that use the bay habitats extensively, terrestrial birds were excluded in this analysis. In addition, only those species with 1000+ observations during either survey period were examined to eliminate issues with small sample size. Four species groups (savannah sparrow/Belding's savannah sparrow; short-billed dowitcher/long-billed dowitcher/dowitcher sp.; greater scaup/lesser scaup/scaup sp.; and western grebe/Clark's grebe/western/Clark's grebe) were excluded as they were predominately artifacts of better observer identification, with a decline in general observations and a corresponding increase in species-specific observations.

3.0 Results

A total of 491,317 individual bird observations were recorded during the shoreline and waterbird surveys. Additionally, during the point count surveys at 22 locations around the bay, 133,498 individual observations were recorded (as the point counts were taken along with the shoreline survey these numbers are not independent). Table 6-1 presents a combined species list for all surveys. Table 6-2 and Table 6-28 list species and number of birds observed per month separated by shore and waterbird survey, respectively. Results for each survey type are presented separately below.

3.1 Shorebird Surveys

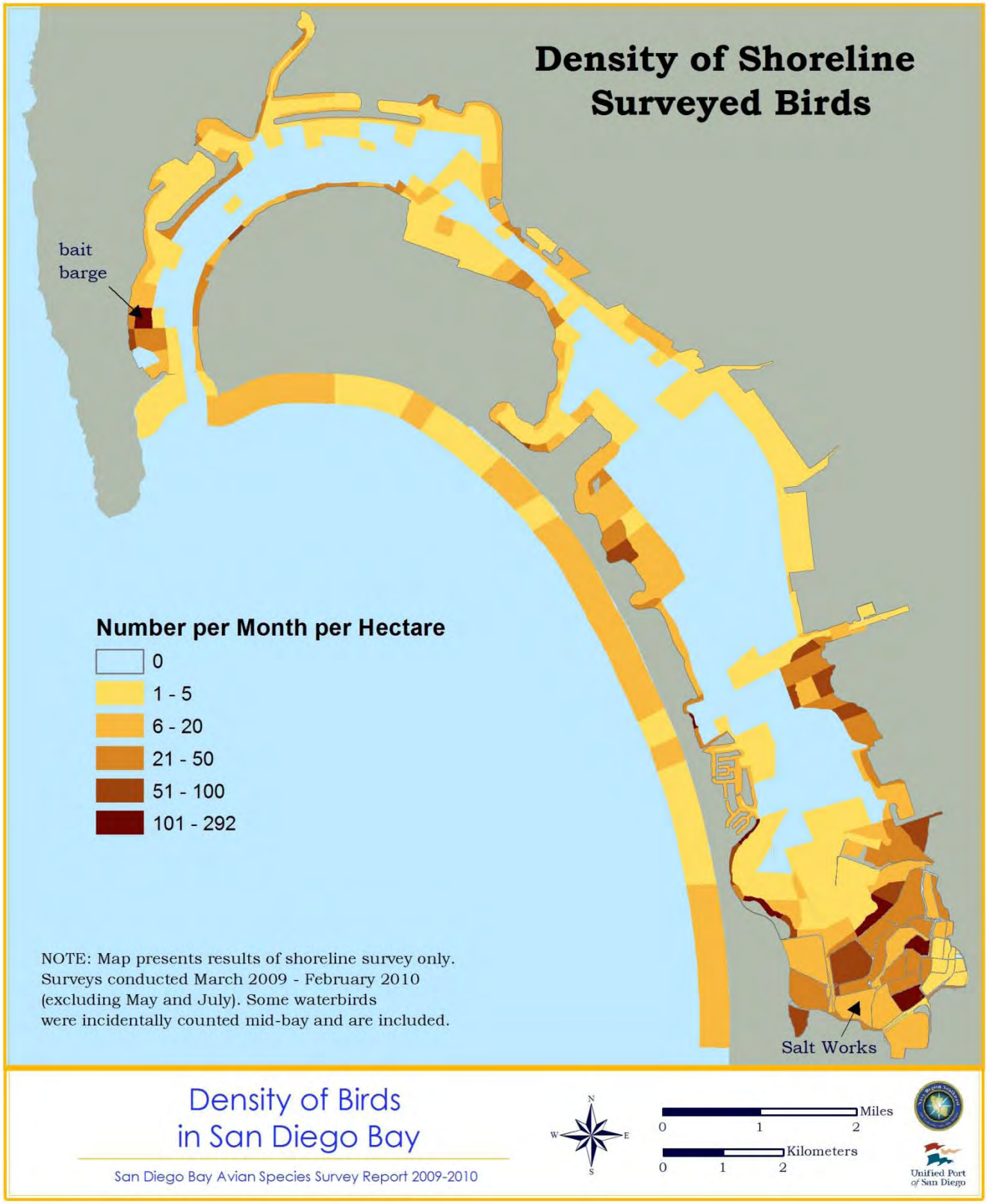
3.1.1 Abundance and Density

A total of 470,815 observations were made during the shoreline portion of this survey effort. Of these, 133,070 birds were observed during the peaking tide surveys; the remainder being observed during the monthly falling tide surveys. Map 3-1 displays the density of all birds. Birds are generally denser along extensive mudflat areas in the south bay, in some salt ponds, and around the bait barge in north bay. The salt pond area has the greatest density of observed birds, while the north-central and south-central regions have the lowest density.

Table 3-1 compares the density of observed birds between regions in the bay, as well as the Pacific shoreline and salt ponds. One big difference with the previous survey was the much lower density found in the ocean grids and the salt ponds, both of which had nearly half of the density during this survey as during the 2006-2007 survey.

Table 3-1. Number of birds observed per hectare in each of the bay regions, including falling and peaking tide data.

	Number Observed per Hectare	
Region	2006 - 2007	2009 - 2010
Ocean	80.5	46.3
North	79.0	74.3
North-Central	52.7	37.0
South-Central	40.3	53.1
South	186.2	152.6
Salt Ponds	377.6	189.5



Map 3-1. Density of shoreline surveyed birds during the San Diego Bay bird surveys.

The number of birds observed per month varied considerably with a low of 12,656 in April and high of 54,037 in November (Table 3-2). Overall trends, though, were very consistent between the 2006-07 and the 2009-10 surveys. Peak numbers occur in the bay in late fall/early winter, while a considerable drop occurs in the late spring/summer period.

Table 3-2. Number of birds observed each month during the falling tide shoreline survey.

	Number of Birds Observed	
Month	2006	2009
March	44,340	34,958
April	16,904	12,656
June	15,014	16,049
August	28,560	17,229
September	55,143	46,204
October	42,761	25,622
November	42,093	54,037
December	58,087	49,035
	2007	2010
January	48,651	46,338
February	36,202	35,617

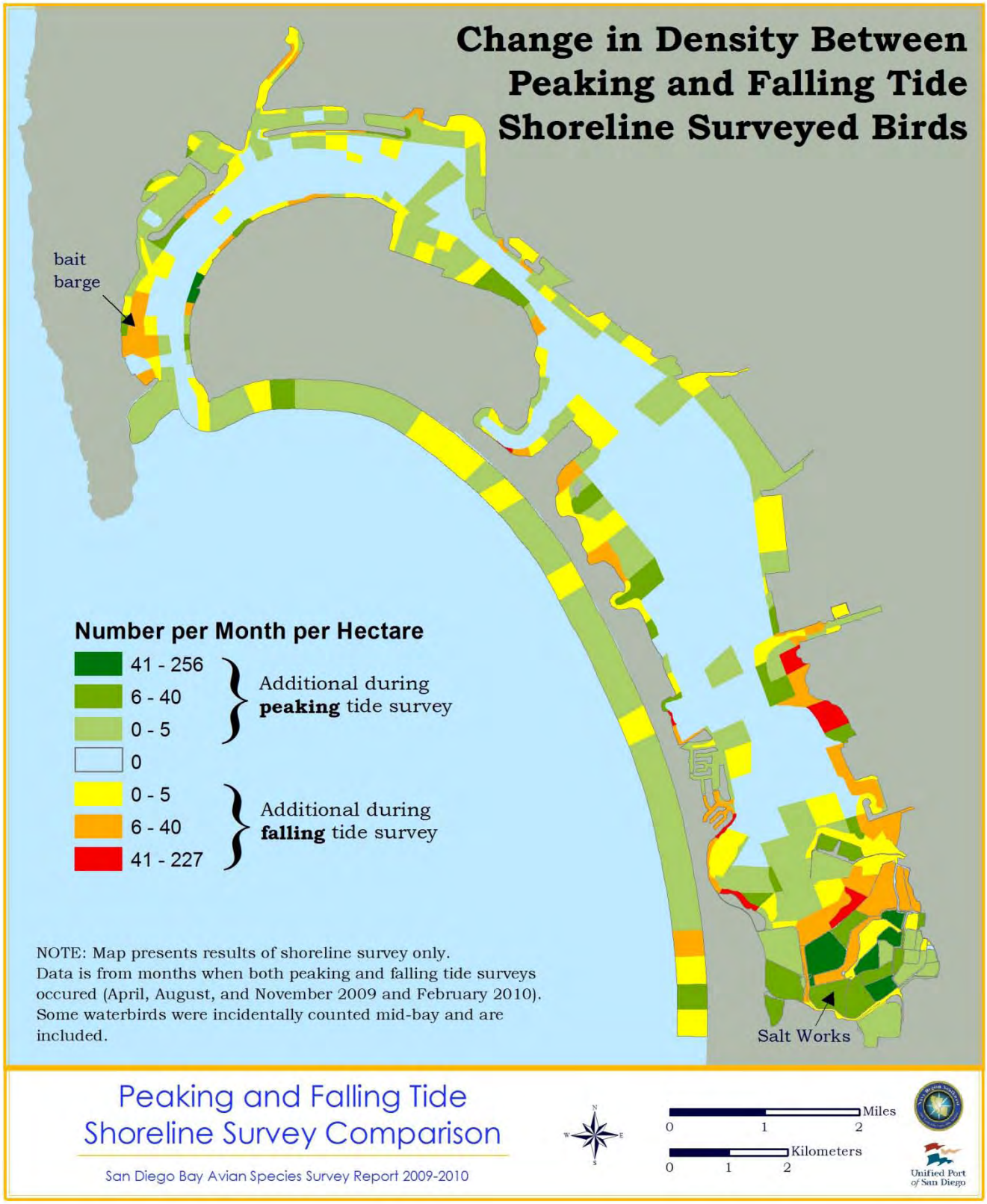
Examining just the four months where both a falling and peaking tide survey were performed, we observed 119,539 birds during falling tides (134 species) and 133,070 during peaking tides (145 species). Bird densities during the falling and peaking tide survey were notably different at several locations in the bay (Map 3-2). The bait barge as well as several mudflat and marsh areas in the south bay had additional birds during the falling tide survey, particularly the southeastern portion of the bay. During the peaking tide survey, the bird density was much higher in the interior salt ponds, which were a key concentration area. Additional peaking tide concentrations occurred in a few areas along Coronado, near the enhancement island in the central bay, and in many of the harbors.

3.1.2 Richness and Diversity

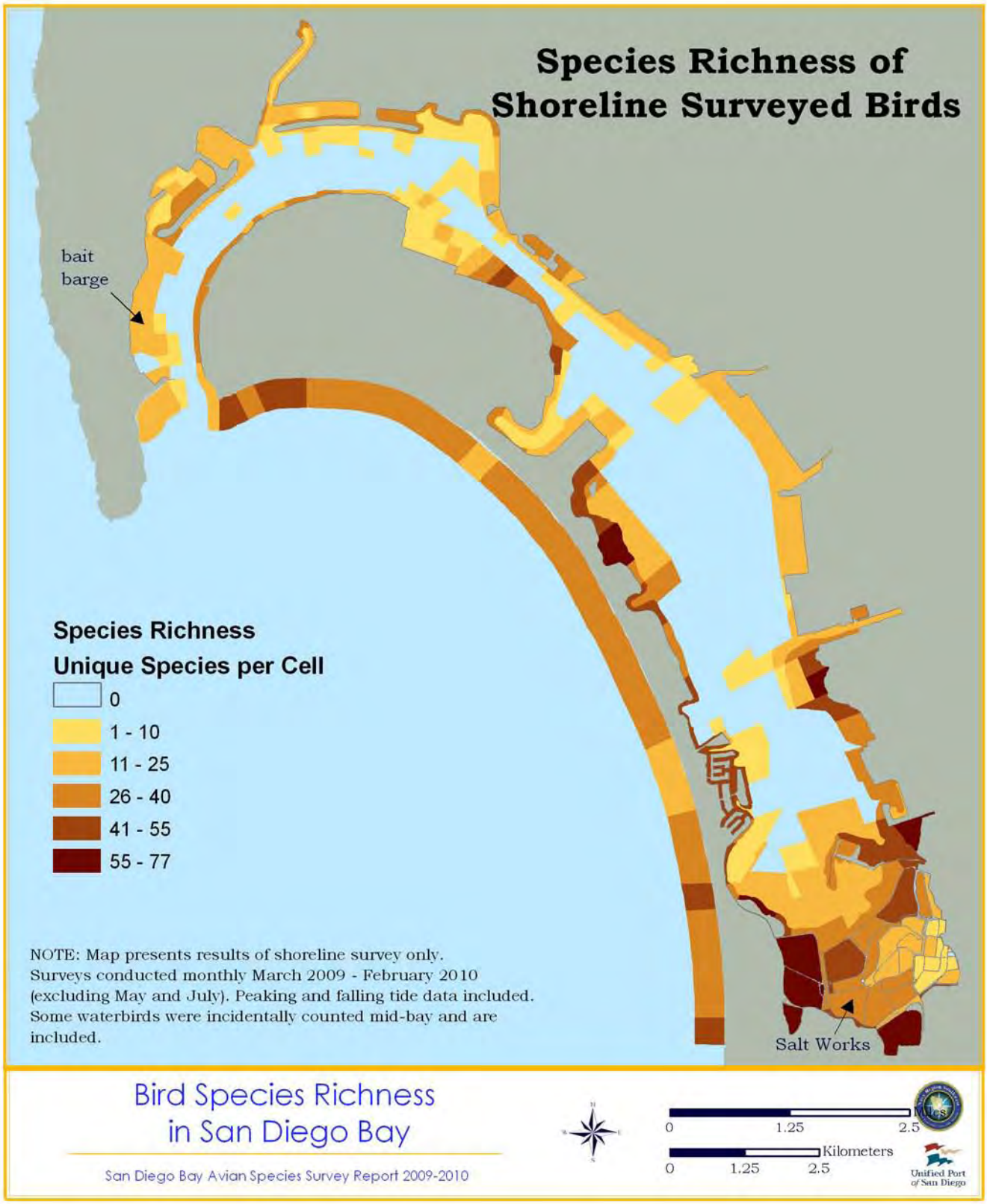
During the bay bird surveys 175 distinct species or subspecies were observed. Species richness per cell (the number of species observed) during the shoreline survey was highest in the salt ponds, along both shorelines in the south bay, as well as along the western shore of the central bay (Map 3-3). When compared by region, the south bay and salt ponds had the highest species richness (Table 3-3).

Table 3-3. Number of distinct species observed by region during the bay shoreline survey.

	Species Richness	
Region	2006 - 2007	2009 - 2010
Ocean	108	93
North	106	100
North-Central	90	93
South-Central	102	102
South	141	133
Salt Ponds	141	130



Map 3-2. Comparison between peaking and falling densities of shoreline surveyed birds.



Map 3-3. Species richness observed during the shoreline bay bird surveys.

Similar to density, species richness was greatest in November through March and lowest in June (Table 3-4; Figure 3-1). However, the number of species observed remained relatively constant outside of the dip in June.

Species diversity during the shoreline surveys was greatest along the western shore of the bay and along the ocean shoreline, as well as in the salt ponds (Map 3-4). The index of diversity used in this analysis, Shannon-Wiener, can be dependent on species richness, especially when there is a large difference in richness between samples. The grid cells do vary greatly in number of species recorded, and there is a high degree of correlation between richness and diversity in this survey (r = 0.86) (Figure 3-2).

Table 3-4. Species richness by month during the bay falling tide shoreline survey for the 2006-07 surveys and the 2009-10 surveys.

	Species Richness	
Month	2006	2009
March	116	114
April	95	99
June	89	75
August	82	95
September	98	96
October	110	101
November	113	123
December	124	116
	2007	2010
January	121	115
February	107	116

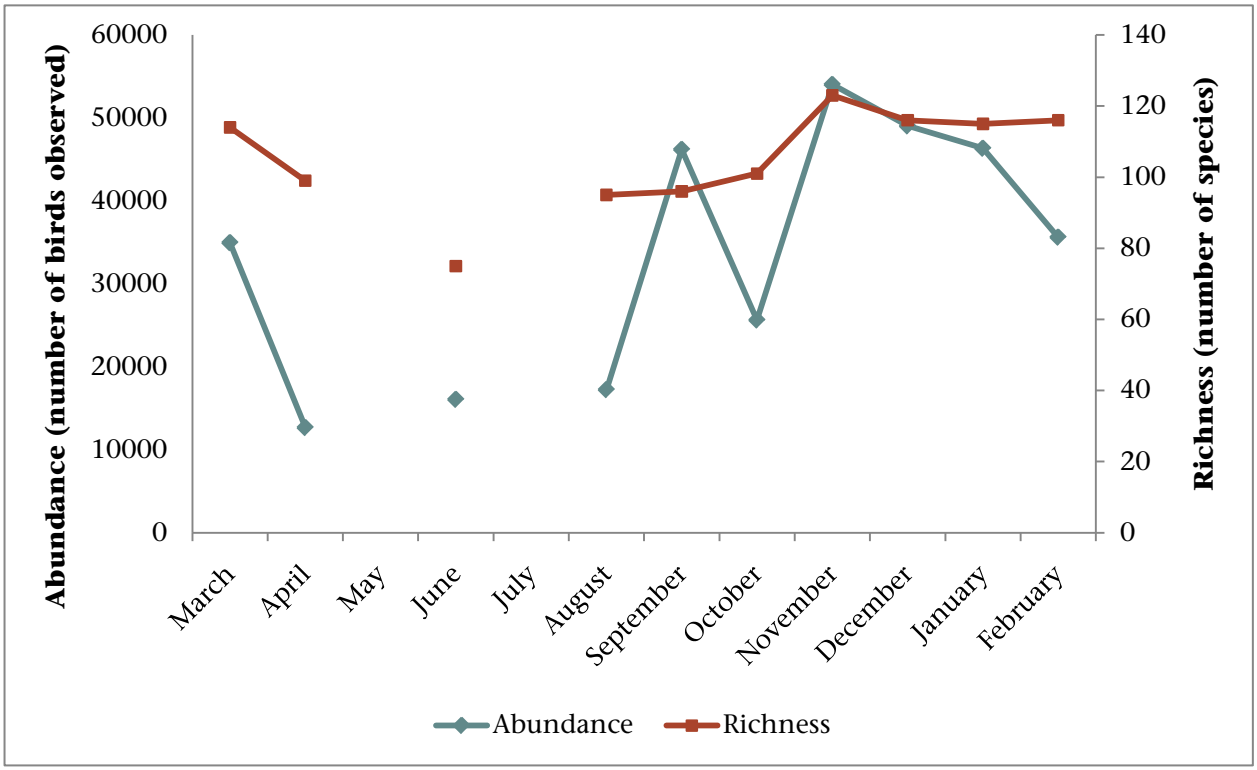
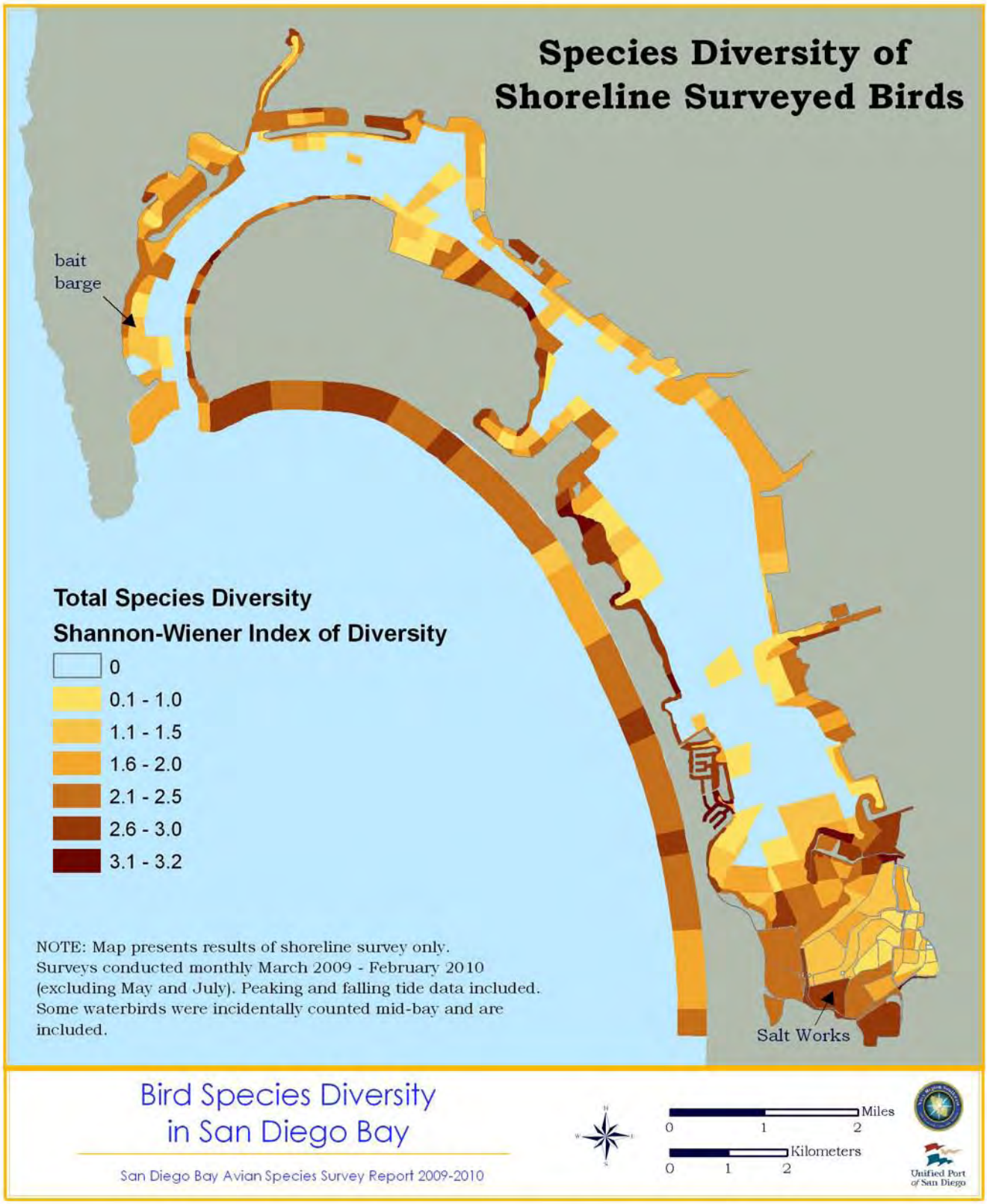


Figure 3-1. Bird abundance and species richness compared across months of the 2009-10 bay avian survey. Data is included for falling tide surveys only. Surveys did not take place in May or July.



Map 3-4. Species diversity of shoreline surveyed birds.

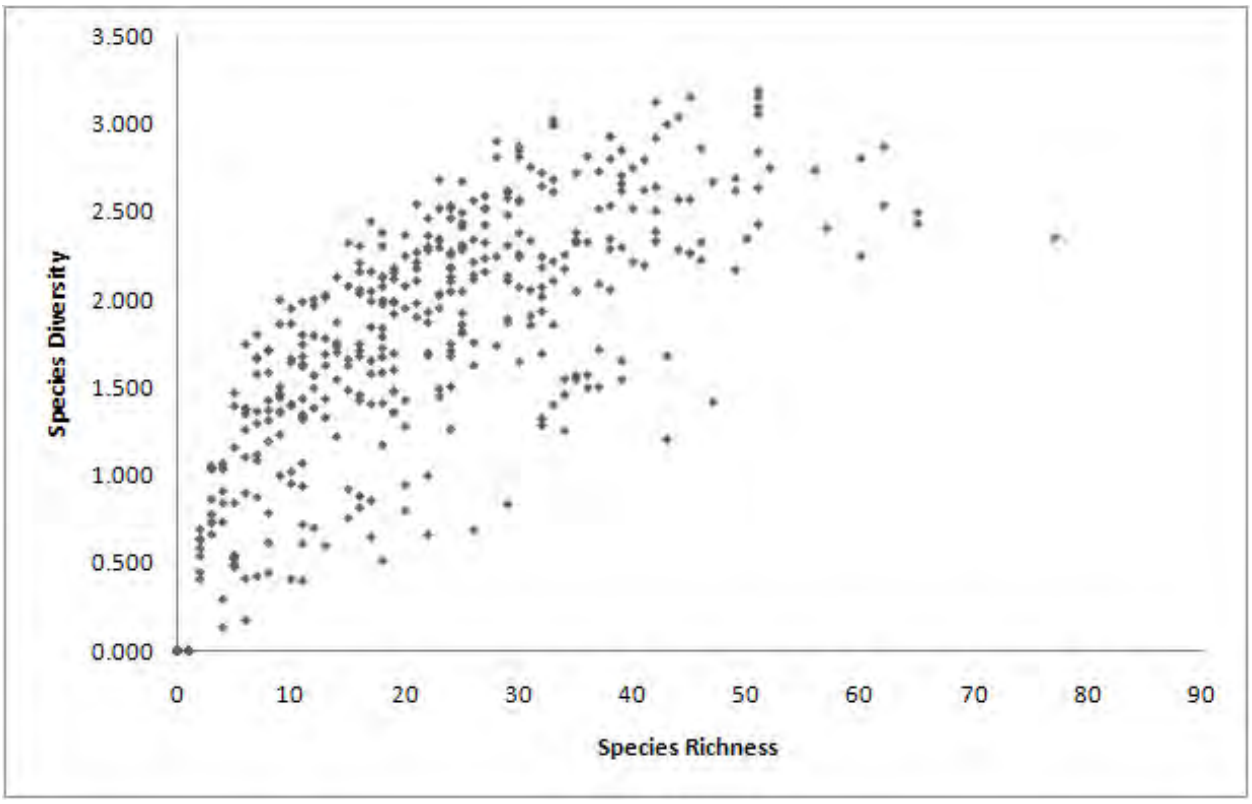


Figure 3-2. Graph of species richness versus diversity for grid cells during the bay shorebird surveys (r = 0.86).

Species diversity, when compared by region was consistent throughout the bay, with the notable exception of a high diversity value for the south-central region. The lowest diversity occurred in the north bay (Table 3-5). As these two regions had nearly identical species richness scores, the diversity measure shows that the north bay region contains high populations of certain species, while species are distributed more evenly in the south-central bay.

Table 3-5. Species diversity compared by region during the bay shoreline survey.

	Species Diversity	
Region	2006 – 2007	2009 – 2010
Ocean	3.04	2.74
North	2.89	2.65
North-Central	2.91	2.87
South-Central	3.06	3.22
South	2.85	2.78
Salt Ponds	3.07	2.78

Species diversity fluctuated throughout the year with a peak in the winter and early spring months and lower diversity during the summer (Table 3-6). This pattern was similar to the previous survey, with January having the highest diversity in both instances. Unlike the last survey however, June had a very low diversity score, whereas it was one of the highest in the 2006-07 surveys.

Table 3-6. Species diversity compared by month during the bay shoreline survey.

	Species Diversity	
Month	2006	2009
March	3.05	3.25
April	3.07	3.27
June	3.21	2.40
August	2.95	3.02
September	2.94	2.61
October	2.90	2.96
November	3.08	2.94
December	3.33	3.14
	2007	2010
January	3.32	3.30
February	3.17	3.29

3.2 Point Count Surveys

A total of 133,498 birds were observed during the point count surveys; 28,259 of these were observed during the peaking tide surveys in April, August, November, and February, the remaining being observed during the monthly falling tide surveys.

3.2.1 Whole Bay Numbers

Point count stations observed during this effort are depicted on Map 2-4. There are two stations on the ocean shoreline, five in the north region, five in north-central, three in south-central, five in the south, and one that straddles the south region and salt ponds. Since the stations were not equally distributed between regions, comparison between data summarized by region for the point counts and shoreline survey is not possible. A summary of the data collected for the whole bay between the shoreline and point count survey is presented in Table 3-7.

Table 3-7. Comparison of survey values between whole shoreline and point count bird surveys. Data is included from both peaking and falling tide surveys.

Value	Whole Shoreline	Point Count
Count	470,815	133,498
Species Richness	175	135
Density (birds/HA)	81.2	77.4
Diversity (Shannon-Wiener)	3.39	3.20

It is not surprising that a greater number and more types of birds were observed in the shoreline versus the point count survey because far more area was surveyed during the shoreline survey. The density calculated for the point count stations is likely an underestimate because at no station could the entire buffer be observed. Obstructions such as buildings and landscape irregularities prevented observers from seeing inland at many of the sites.

Since the point count survey is a subset of the shoreline transect, the types of birds observed during the two surveys were very similar (Table 6-2 and Table 6-45, respectively). Western sandpipers, surf scoters (*Melanitta perspicillata*), and various small sandpipers (peeps) were the most common observations during both surveys, each numbering double the next most common bird observed in the point count surveys. Of the ten most abundant species in each survey type, brant (*Branta bernicla*) were seen more often in point count surveys, while Brandt's cormorants (*Phalacrocorax penicillatus*) were seen more often during the shoreline transect survey. Of the top 20 species in abundance, semipalmated plover, dunlin (*Calidris alpinia pacifica*), lesser scaup (*Aythya affinia*), and red knot were seen more often during point counts, while

Brandt's cormorants, Heermann's gull (*Larus heermanni*), double-crested cormorant (*Phalacrocorax auritus*), and rock pigeon (*Columba livia*) were seen more often during shoreline transects.

The points were chosen based on sensitive habitat types, coordination with other monitoring locations (such as long-term fish data collection or NRDA sites), known bird congregation areas, and also areas of particular management interest to the Navy and Port. They do not necessarily equally represent the types of habitat around the bay, although all shoreline subtypes were represented in each region: sandy/muddy, riprap, docks, etc. *Appendix C: Point Count Habitat Sketches* maps the habitat at each point count station (except for Point 3).

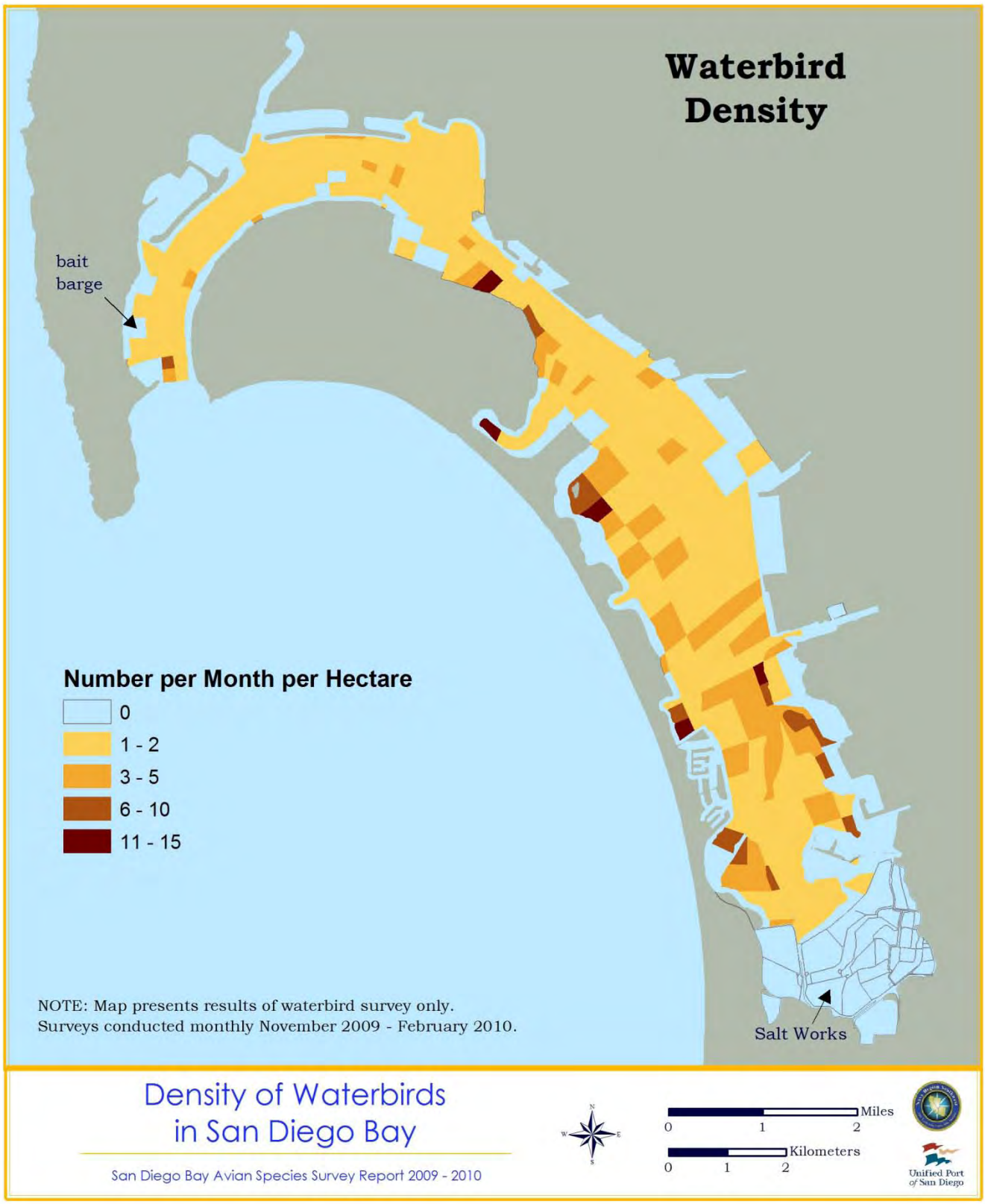
3.3 Waterbird Surveys

3.3.1 Abundance and Density

A total of 20,502 birds were observed during the waterbird portion of this survey effort; down from the 31,812 birds observed in the 2006-07 surveys. Map 3-5 displays the density of waterbirds observed per grid cell. In general, the highest densities were observed in the South region of the bay, with decreasing densities northward (Table 3-8). However, sheltered grids scattered throughout the study area contained the absolute highest densities. No grids in the ocean region were surveyed in 2009-10.

Table 3-8. Number of birds observed per hectare in each of the bay regions during the bay waterbird survey.

	Number of Birds Observed per Hectare	
Region	2006 - 2007	2009 - 2010
Ocean	6.4	N/A
North	2.4	2.8
North-Central	0.9	5.9
South-Central	19.1	6.8
South	12.8	9.2



Map 3-5. Density of waterbirds in San Diego Bay.

Similar to the 2006-07 survey, the number of birds observed peaked in the middle two months of the survey. Highest numbers were observed in December (vs. January in 2006-07), and the lowest number were seen in February (vs. November in 2006-07) (Table 3-9).

Table 3-9. Number of birds observed per month during the bay waterbird surveys.

	Number of Birds Observed	
Month	2006 - 2007	2009-2010
November	4207	3105
December	8777	7484
January	11663	6879
February	7165	3034
Totals	31812	20502

The numbers of waterbirds between each region was similar throughout the surveys, except for a high number of individuals in the North-central bay in December (Table 3-10).

Table 3-10. Number of birds observed in each region during each month of the bay waterbird survey.

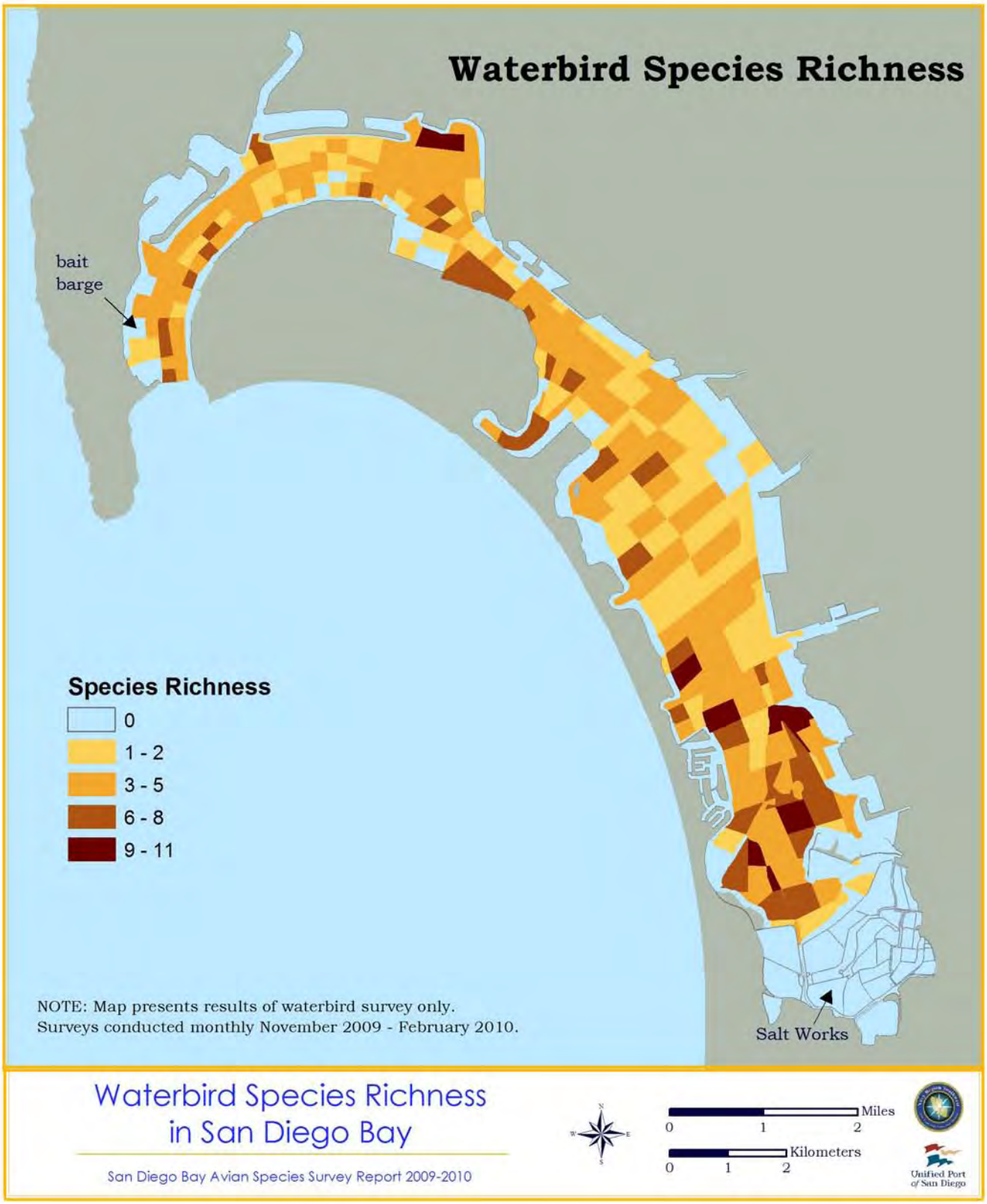
	Number of Birds Observed by Month and Region			
Region	November	December	January	February
North	161	430	722	423
North-Central	39	2066	682	499
South-Central	1965	1999	2750	1041
South	941	2989	2725	1070

3.3.2 Richness and Diversity

A total of 44 distinct species were observed during the bay waterbird surveys in 2009-10 (vs. 43 in 2006-07). Species richness per cell was highest in the south bay with the remainder of the bay containing an even spread of richness (Map 3-6; Table 3-11).

Table 3-11. Species richness by region during the waterbird surveys.

	Species Observed	
Region	2006 – 2007	2009 – 2010
Ocean	9	N/A
North	21	23
North-Central	16	24
South-Central	24	25
South	31	34



Map 3-6. Species richness observed during the bay waterbird surveys.

As was observed in the total numbers, higher species richness was observed in January and December. In contrast, the 2006-07 surveys had a species richness peak in the low count month of November (Table 3-12).

Table 3-12. Species richness by month during the waterbird surveys.

	Species Observed	
Month	2006 – 2007	2009 - 2010
November	34	21
December	22	28
January	27	30
February	20	22

Unlike the 2006-07 waterbird survey, the greatest regional species diversity occurred in the south bay (Table 3-13). Since diversity is a measure of the evenness in population size of the species represented in any area, those areas containing an equal number of individuals of each species score higher (Map 3-7).

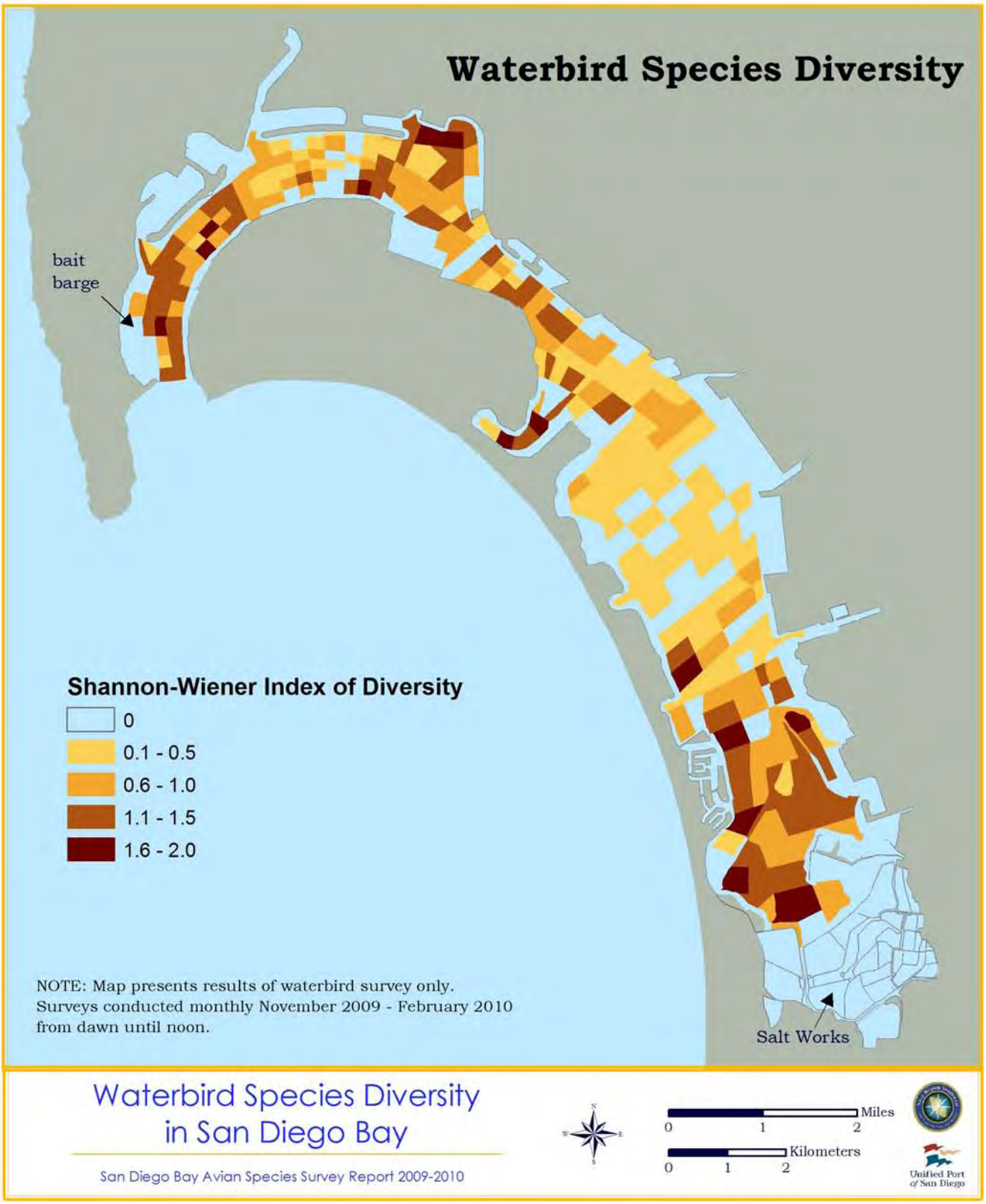
Table 3-13. Species diversity by region during the waterbird surveys.

	Species Diversity	
Region	2006 – 2007	2009-2010
Ocean	0.90	N/A
North	1.75	1.55
North-Central	1.59	1.11
South-Central	0.26	0.39
South	0.61	1.57

For this study, January had the highest species diversity score, while November had the lowest (Table 3-14).

Table 3-14. Species diversity by month during the bay waterbird surveys.

	Species Diversity	
Month	2006 – 2007	2009-2010
November	1.13	0.67
December	0.36	1.29
January	0.53	1.37
February	0.69	1.22



Map 3-7. Species diversity observed during the bay waterbird surveys.

While the individual count numbers differed between surveys, the same species that were most abundant in the previous survey were also the most abundant in the 2009-10 survey (Table 3-15). Of the ten most common species in the 2006-07 survey, only Forster's tern (*Sterna forsteri*) was not among the ten most abundant in the 2009-10 survey (falling from 101 individuals to 52 individuals). Replacing it in the top ten most numerous species was the redhead (*Aythya americana*), which was not seen at all during the 2006-2007 waterbird surveys.

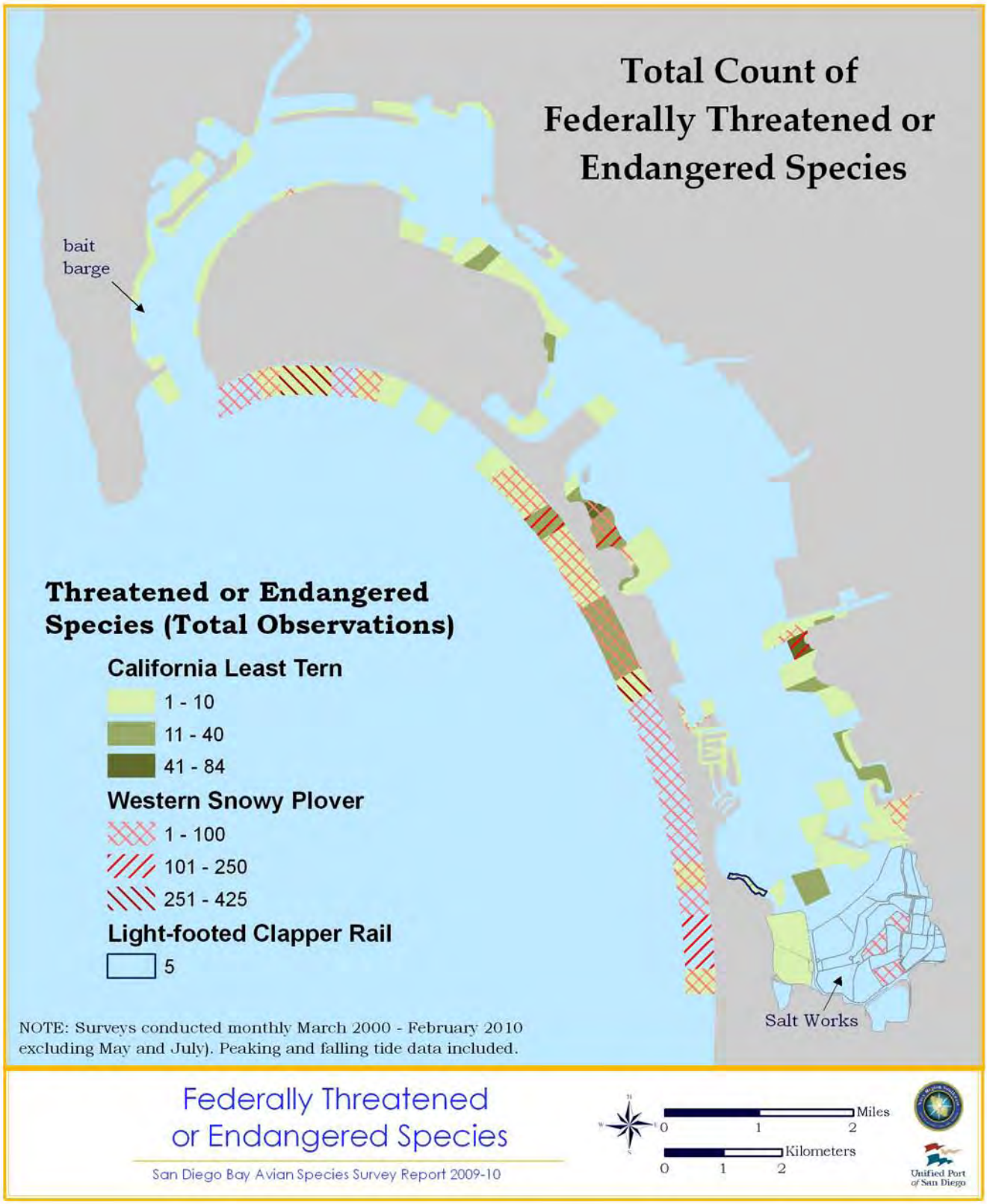
Table 3-15. Species that were recorded most often in 2009-10 waterbird survey and their total observations in 2006-07 survey. (* - combined lesser scaup and scaup sp. records).

	10 Most Abundant Species 09-10 Waterbird Survey	
Species	2006 - 2007	2009 - 2010
surf scoter	27357	14327
scaup sp.*	502	2256
Brandt's cormorant	1301	844
bufflehead	756	740
western gull	457	404
double-crested cormorant	142	325
brant	270	316
brown pelican	155	213
Heermann's gull	167	205
redhead	0	134

3.4 Distribution of Listed Species

The distribution of federally listed species differs per bay region based on the habitats that are used most often by each species; Map 3-8 displays the location and abundance of these protected species. Western snowy plovers are most abundant along the sandy beaches of the ocean region and at the D Street Fill on the eastern side of the bay, while California least terns are more widespread throughout the bay.

Western snowy plovers were the most numerous sensitive species recorded, due mainly to their year-round presence. During the breeding season, however, the California least tern is far more abundant than the snowy plover (compare June data in Table 6-2), but this species migrates out of the area in the fall and winter. Five light-footed clapper rails (*Rallus longirostris levipes*) were observed during the shorebird and waterbird surveys, all from one count in the southwestern corner of the bay. This secretive species is restricted to salt marshes and our surveys are not well suited for population-level trend analysis. The most numerous listed species in the 2006-07 surveys, the brown pelican, was delisted in December 2009 and thus was not included on this map.



Map 3-8. Location and of federally protected species observed during the bay avian surveys.

3.5 Overall Trends

By examining trends from the two complete bay surveys (2006-07 and 2009-10), we can see that species both declined and increased during this time period. Table 3-16 shows those species that showed a change of greater than 20% between the surveys.

Table 3-16. Species with counts of 1000+ individuals showing a change of >20% between 2006-07 and 2009-10.

Species	2009-10	2006-07	Difference	% change
black skimmer	1848	4895	-3047	-62.25%
caspian tern	800	1580	-780	-49.37%
willet	11931	22357	-10426	-46.63%
California least tern	675	1238	-563	-45.48%
ring-billed gull	3584	6168	-2584	-41.89%
snowy egret	1161	1988	-827	-41.60%
American coot	1116	1878	-762	-40.58%
American wigeon	6654	11180	-4526	-40.48%
mallard	1677	2594	-917	-35.35%
semipalmated plover	4612	7052	-2440	-34.60%
marbled godwit	19311	29351	-10040	-34.21%
red knot	3738	5654	-1916	-33.89%
American avocet	717	1030	-313	-30.39%
black-necked stilt	2688	3844	-1156	-30.07%
dunlin	4615	6123	-1508	-24.63%
red-necked phalarope	15534	20137	-4603	-22.86%
northern pintail	1108	1393	-285	-20.46%
redhead	1046	254	+792	+311.81%
Brandt's cormorant	15156	7605	+7551	+99.29%
elegant tern	16205	11727	+4478	+38.19%

The class of birds observed varied in different parts of the bay; differences in habitat availability and human disturbance presumably fostered different species assemblages. A comparison of abundance of species groups by region is presented in Figure 3-3.

Shorebirds were by far the most abundant class of bird observed in the bay, with 223,658 in total. The next most abundant was waterfowl, with 133,454 observations. Shorebirds are far more abundant than any other species group in the south bay and salt ponds; and the south bay also contained the most waterfowl. The majority of marshbirds were recorded in the south bay, salt ponds, and north bay.

North bay is noteworthy for its low numbers of all bird types except for the highest number of seabirds of any region. Most of these seabirds were western gulls and Heermann's gulls (15,752 total) and cormorants (Brandt's and double-crested; 16,269 total), along with brown pelicans (4,968 total). All of these species congregate near the bait barge in the north bay. The ocean region had similar numbers of shorebirds, waterfowl, and seabirds while having very few terrestrial or marsh birds.

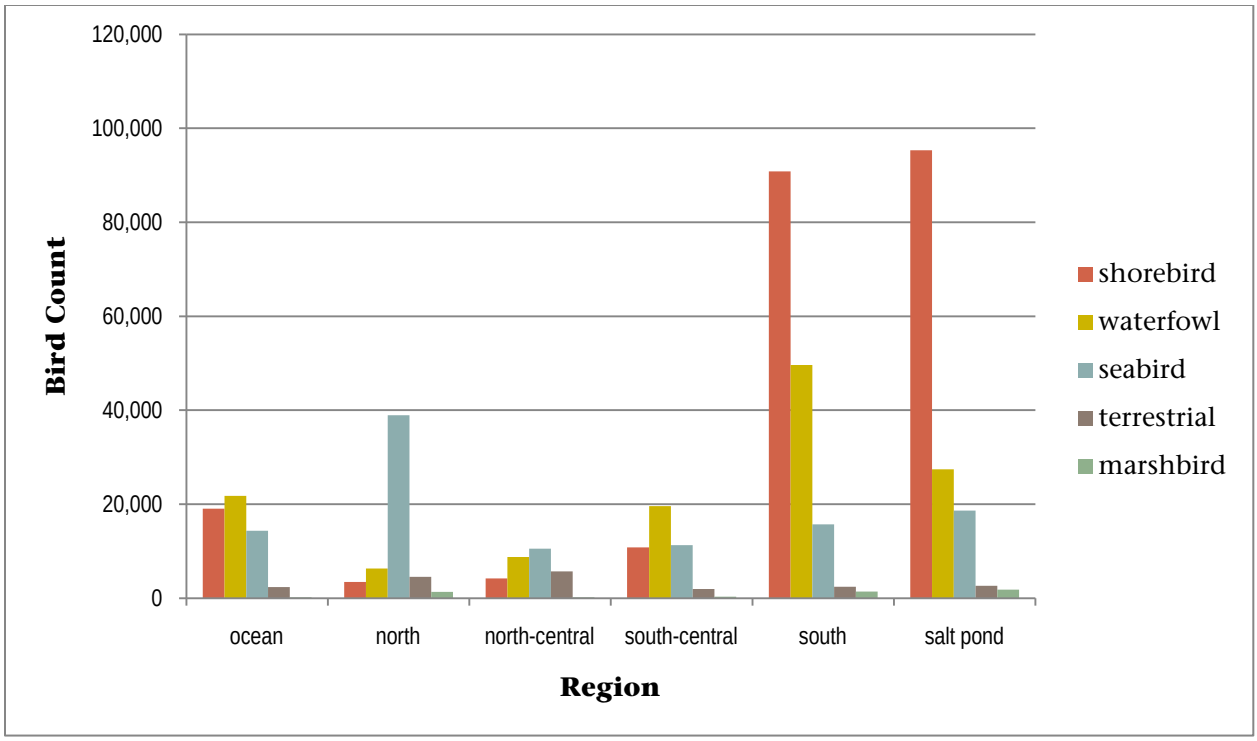


Figure 3-3. Bird class and abundance recorded per region during shore and water bird surveys 2009-10.

4.0 Discussion and Recommendations

4.1 Shorebird and Waterbird Surveys

The shorebird survey remained very similar between the first iteration of the survey in 2006-07 and the follow-up in 2009-10. The total number of individuals seen was down slightly, but the distribution and seasonality of the total numbers were very similar. Both surveys indicated fall and winter to be the peak seasons for abundance and richness in the bay. The importance of the bay for wintering species cannot be overstated, as it holds significant non-breeding concentrations of several species, including surf scoter, red knot, willet, and black-necked stilt. As in the previous survey, the most important regions of the bay are the salt ponds, the south bay, and the north bay (particularly around the bait barge). These areas consistently rank highest in abundance and richness. During the waterbird surveys, the very high number of surf scoter (7,241 out of 7,755 total birds) led to a low measure of diversity for the south-central bay despite high overall species richness (a similar pattern was seen in the south-central and south bay in 2006-07). While high numbers of surf scoters were present throughout all four months, they constituted a much higher percentage of the total count in November, greatly reducing the diversity index in a similar manner.

While the shorebird survey numbers dipped only slightly between the 2006-07 and 2009-10 surveys, there was a drop-off in the numbers of individuals seen during the waterbird surveys; much of which were driven by the halving of the surf scoter count. The timing of the surveys in 2009-10 was carried out later in the day, which may have contributed to this pattern, and one consequence of this timing can be seen in the distribution of observations. Many of the grids with the highest density fall on the edges of the bay, especially in sheltered coves, which would be expected if afternoon winds affect rafting numbers in the middle of the bay. Despite the drop-off in the number of individuals seen, the species makeup remained consistent during the waterbird surveys, with the only large-scale patterns being a slight increase in certain waterfowl (scaup and redhead) and a decrease in surf scoter observations.

When compared to previous avian surveys in San Diego Bay, similar results are found. Results for the previous surveys, as described in Table 1-1, are compared below in Table 4-1.

Table 4-1. Comparison of rankings for most abundant birds observed during previously conducted and these avian surveys in San Diego Bay, including shorebird and waterbird data. Previous surveys include those of Ogen 1994, Ogden 1995, USFWS 1994a, and USFWS 1995a.

	Previous Surveys	2006-07 Surveys	2009-10 Surveys
Waterfowl	surf scoter eared grebe scaup (lesser and greater)	surf scoter grebe (western and Clark's) eared grebe	surf scoter eared grebe western grebe
Shorebirds	western sandpiper red-necked phalarope peep	western sandpiper peep marbled godwit	western sandpiper peep marbled godwit
Seabirds	brown pelican elegant tern Heermann's gull	western gull elegant tern double-crested cormorant	western gull elegant tern Brandt's cormorant
Marshbirds	great blue heron snowy egret great egret	snowy egret Belding's Savannah sparrow great blue heron	Belding's Savannah sparrow snowy egret great egret

Where differences in rankings of the most abundant birds occur between the two most recent surveys and previous surveys, they can be explained by the field methods employed, including the coverage of the bay, the level of effort, and the detail in species identification. Western grebes (*Aechmophorus occidentalis*), which had placed sixth in previous efforts, were very common in this survey effort. Similarly, the brown pelican (*Pelecanus occidentalis californicus*) remains a common species, but not as common as western gulls (*Larus occidentalis wymani*) and Brandt's cormorants. Western gulls, which were observed in greatest number among seabirds during these surveys, placed seventh in previous efforts. This common gull was likely undercounted in previous surveys as they often did not distinguish gulls to species. The extent of this survey throughout the entire bay and throughout the year also captures a better snapshot of how species are distributed in different parts of the bay at different seasons.

Peeps are small, undistinguished shorebirds, usually sandpipers that are difficult to differentiate to species from a distance. Many of the birds counted in this category are most likely western sandpipers, which would add even more individuals to the count of this abundant species. As for actual species rather than species groups, the third most common was the red-necked phalarope, which was found exclusively in the salt ponds in this survey.

These surveys were not designed to detect secretive marshbird species, which often conceal themselves in vegetation and require specific sampling methodology. Conspicuous species, such as egrets, were recorded in greatest abundance while more secretive species were likely undercounted. The one small species recorded in great numbers was the Belding's savannah sparrow (*Passerculus sandwichensis beldingi*).

Bay use also changes with the tidal cycle, as shown in Map 3-2. Exposed mud flats hold a high concentration of species during low tides, and species then move into upland areas and into the interior salt ponds when these areas are covered during high tides. Preserving a variety of habitats at different inundation levels allows these species to find food and resting areas throughout the day and greatly contributes to the biodiversity seen in the bay.

4.2 Point Count Surveys

During the 2006-07 surveys, confusion among observers about where and when point counts were to be done hade made analysis difficult, and finished counts were not systematic. In contrast, very few problems were encountered in the 2009-10 surveys, and a solid baseline was established for future count comparisons. The point counts showed similar species makeup and diversity as the shorebird surveys, though all measurables were slightly lower, as would be expected when shorter time periods and smaller

areas are covered. However, these counts do show that we can capture much of the diversity of the bay in a short amount of time. They will also serve as a valuable replicate of the shorebird and waterbird surveys to assist in detecting species' trends through time.

The point counts do have some limitations, primarily in the uneven coverage of the bay. Comparing regions in the bay would necessitate adding additional stations in certain subregions to ensure that all areas receive equal effort. However, these counts do allow for quick, accurate snapshots of species assemblages at key locations, and the information could be analyzed even further through habitat associations and distance analysis. These more in-depth analyses are outside the scope of this general report.

4.3 Trends 2006-07 to 2009-10

One of the key objectives in the design and implementation of this program is the need for monitoring long-term trends of the waterbird species that use San Diego Bay, so that management effort can be allocated to focus on declining species and habitats. While a number of species were identified with a greater than 20% decline in observations between the 2006-07 surveys and the 2009-10 surveys, various factors could be implicated. Natural variation in populations, observer variation in counting large groups, or a failure to document all individuals actually using the bay (particularly problematic for rafting or colonial species) could all contribute to apparent trends. In addition, in comparing these two surveys, the later daily starting time for many of the waterbird surveys could have contributed to a decrease in observations for open-water species. Multiple years of documentation will be necessary to establish how various species' presence fluctuates through time, and whether or not the declines seen between these two surveys are merely artifacts of sampling over a large area or represent a serious decline in a population.

However, identifying those species showing a decline is important, particularly as a number of species such identified in this survey are sensitive species (California least tern and black skimmer [*Rynchops niger niger*]) or species for which San Diego Bay has been identified as holding a large portion of the population at any one time (red knot, willet, and black-necked stilt). These species require careful monitoring in the future and establishing a baseline with which to examine future trends is imperative for developing management strategies in the bay. Furthermore, significant population effects to birds of conservation concern (USFWS 2008) are reportable under migratory bird agreements beween the USFWS and U.S. Department of Defense.

4.4 Recommendations for the Future

4.4.1 Data Acquisition

Between the 2006-07 and the 2009-10 survey efforts, many improvements were made in the data collection portion of the project. More experienced observers, better communication, and improved data collection protocols led to a more refined and accurate data set. These improvements have enabled quicker identification and resolution of questions about records and cut down on the time needed to collate the data.

However, improvements in this area can still be made. Continuing to work with observers to standardize species names, search methods, and search efforts would provide several benefits, including reducing duplicate search efforts, enabling quicker compilation of data, and reducing time spent in both data collection and data analysis. Simplifying data sheets allowing observers to record only the information required would make a significant difference in removing questions and issues in the compilation of the data. Similarly, a standardized data entry form would eliminate many problems encountered in the data collection and compilation stage of the project. Development of a database in Microsoft Access that could be distributed among all participants would improve this process immensely.

Several issues came up in this iteration of the bay surveys, primarily related to survey effort and timing. For the waterbird surveys, keeping to an early morning time schedule (starting between 7am and 9am) would help determine whether the large drop in surf scoter observations is a relict of the later start times or a real decrease in individuals.

Additionally, standardization of effort could improve in several areas, particularly in time spent examining each grid. Currently, no set time is established, and can vary among observers. Point count surveys are 15-

minute counts broken into three five-minute intervals, however not all observers followed this convention. Continually improving the standardization of the surveys will make for a much stronger dataset and allow for more accurate monitoring through time.

4.4.2 Data Analysis and Viewing

Many combinations of factors (time, bird, tide, location, region, substrate, etc.) can be analyzed with the current data set. In-depth statistical analysis and other particular aspects of the data that are not appropriate for a general report may be of great interest to project proponents in certain jurisdictions of the bay. Allowing outside access to the data for further in-depth analysis should be a key component of the overall survey program. Pursuing relationships with local universities and graduate departments, as well as non-profit entities, would permit the addressing of specific questions at a minimal cost. An alternative option would be to identify important analyses (i.e. fish abundance and bird abundance) during the development of the work plan to provide appropriate budgeting.

4.4.3 Future Surveys

Future comprehensive surveys such as this one should be conducted every three to six years, preferably during the same years that periodic fish surveys take place. In this way, the ability to interpret trends and management implications can be maximized. These surveys are designed to answer general questions about the bay, including the abundance and distribution of species in the bay, and how these broad-scale trends may change through time. Two distinct datasets are now available from which to build upon, and adding additional snapshots of bird use and distribution will allow statistical analysis to improve and strengthen.

As was recommended in previous surveys, the point count stations and a boat-based transect similar to the waterbird surveys could be realized on an annual or biennial basis to better elucidate population trends. Many species in the bay occur in clusters, including rafts of scoters and scaups and concentrations of shorebirds along mudflats. Annual or biennial point count surveys would allow for the discernment of natural variation in observer coverage and population size and would make trend analysis of the longer term surveys easier to interpret. Extending the point count surveys to additional years could also allow answers to more specific questions about substrate use, bay use by focal species, or to develop richness and abundance at a finer scale throughout the bay.

Also, revisiting which species are recorded during the surveys could also make the field collection work more efficient. For example, terrestrial birds could be excluded in future surveys, which would streamline data collection and analysis. While improvements to standardization can and should be made, changes to the methods should be clearly weighed for tradeoffs in the context of how any change could help or hamper trend assessment, particularly now that multiple years of data have been accumulated toward a baseline assessment of the bay.

Accessing Naval secure areas required much coordination and cooperation among different Navy entities. Having a Navy Point of Contact for access and safety is essential to completing the surveys and should continue to be coordinated and improved upon in future efforts.

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6.0 Tables

This section contains tables that were too large to include in the text of this document.

Table 6-1. All species observed during the San Diego Bay avian surveys with their Federal and State of California listing status if any and the species assemblage for which they were analyzed in this report. The total count of 175 species does not include domestic duck from the list.

Common Name	Scientific Name	Status[1]	Species Assemblage
American avocet	*Recurvirostra americana*		Shorebird
American coot	*Fulica americana americana*		Waterfowl
American crow	*Corvus brachyrhynchos hesperis*		Terrestrial
American golden-plover	*Pluvialis dominica*		Shorebird
American kestrel	*Falco sparverius sparverius*		Terrestrial
American pipit	*Anthus rubescens pacificus*		Terrestrial
American white pelican	*Pelecanus erythrorhynchos*	SSC	Seabird
American wigeon	*Anas americana*		Waterfowl
Anna's hummingbird	*Calypte anna*		Terrestrial
Baird's sandpiper	*Calidris bairdii*		Shorebird
barn swallow	*Hirundo rustica erythrogaster*		Terrestrial
Barrow's goldeneye	*Bucephala islandica*	SSC	Waterfowl
Belding's Savannah sparrow	*Passerculus sandwichensis beldingi*	SE	Marshbird
belted kingfisher	*Megaceryle alcyon*		Terrestrial
black oystercatcher	*Haematopus bachmani*	BCC	Shorebird
black phoebe	*Sayornis nigricans semiatra*		Terrestrial
black scoter	*Melanitta nigra americana*		Waterfowl
black skimmer	*Rynchops niger niger*	BCC, SSC	Seabird
black tern	*Chlidonias niger surinamensis*	SSC	Seabird
black turnstone	*Arenaria melanocephala*		Shorebird
black-bellied plover	*Pluvialis squatarola*		Shorebird
black-crowned night-heron	*Nycticorax nycticorax hoactli*		Marshbird
black-necked stilt	*Himantopus mexicanus mexicanus*		Shorebird
blue-gray gnatcatcher	*Polioptila caerula obscura*		Terrestrial
blue-winged teal	*Anas discors*		Waterfowl
Bonaparte's gull	*Chroicocephalus philadelphia*		Seabird
Brandt's cormorant	*Phalacrocorax penicillatus*		Seabird
brant	*Branta bernicla*	SSC	Waterfowl
Brewer's blackbird	*Euphagus cyanocephalus*		Terrestrial
Brewer's sparrow	*Spizella breweri breweri*	BCC	Terrestrial
brown pelican	*Pelecanus occidentalis californicus*	SP	Seabird
bufflehead	*Bucephala albeola*		Waterfowl
Bullock's oriole	*Icterus bullockii*		Terrestrial
burrowing owl	*Athene cunicularia*	BCC, SSC	Terrestrial
bushtit	*Psaltriparus minimus melanurus*		Terrestrial
California gull	*Larus californicus californicus*		Seabird
California least tern	*Sternula antillarum browni*	FE, SE, SP	Seabird
California thrasher	*Toxostoma redivivum redivivum*		Terrestrial
Canada goose	*Branta canadensis*		Waterfowl
canvasback	*Aythya valisineria*		Waterfowl

Common Name	Scientific Name	Status[1]	Species Assemblage
Caspian tern	*Hydroprogne caspia*		Seabird
Cassin's kingbird	*Tyrannus vociferans vociferans*		Terrestrial
cedar waxwing	*Bombycilla cedrorum*		Terrestrial
chipping sparrow	*Spizella passerina arizonae*		Terrestrial
cinnamon teal	*Anas cyanoptera septentrionalium*		Waterfowl
Clark's grebe	*Aechmophorus clarkii transitionalis*		Waterfowl
cliff swallow	*Petrochelidon pyrrhonota tachina*		Terrestrial
common goldeneye	*Bucephala clangula*		Waterfowl
common loon	*Gavia immer*	SSC	Seabird
common merganser	*Mergus merganser*		Waterfowl
common raven	*Corvus corax clarionensis*		Terrestrial
common tern	*Sterna hirundo hirundo*		Seabird
common yellowthroat	*Geothlypis trichas*		Terrestrial
Cooper's hawk	*Accipiter cooperii*		Terrestrial
Costa's hummingbird	*Calypte costae*	BCC	Terrestrial
domestic duck	multiple species		Waterfowl
double-crested cormorant	*Phalacrocorax auritus*		Seabird
dunlin	*Calidris alpinia pacifica*		Shorebird
eared grebe	*Podiceps nigricollis californicus*		Waterfowl
elegant tern	*Thalasseus elegans*		Seabird
Eurasian collared dove	*Streptopelia decaocto*		Terrestrial
Eurasian wigeon	*Anas penelope*		Waterfowl
European starling	*Sturnus vulgaris vulgaris*		Terrestrial
Forster's tern	*Sterna forsteri*		Seabird
gadwall	*Anas strepera strepera*		Waterfowl
glaucous-winged gull	*Larus glaucescens*		Seabird
golden-crowned sparrow	*Zonotrichia atricapilla*		Terrestrial
great blue heron	*Ardea herodias wardi*		Marshbird
great egret	*Ardea alba egretta*		Marshbird
greater scaup	*Aythya marila nearctica*		Waterfowl
greater yellowlegs	*Tringa melanoleuca*		Shorebird
green heron	*Butorides virescens anthonyi*		Marshbird
green-winged teal	*Anas crecca carolinensis*		Waterfowl
gull-billed tern	*Gelochelidon nilotica vanrossemi*	BCC, SSC	Seabird
Heermann's gull	*Larus heermanni*		Seabird
hermit warbler	*Dendroica occidentalis*		Terrestrial
herring gull	*Larus argentatus smithsonianus*		Seabird
hooded merganser	*Lophodytes cucullatus*		Waterfowl
hooded oriole	*Icterus cucullatus nelsoni*		Terrestrial
horned grebe	*Podiceps auritus cornutus*		Waterfowl
horned lark	*Eremophila alpestris*		Terrestrial
house finch	*Carpodacus mexicanus frontalis*		Terrestrial
house sparrow	*Passer domesticus domesticus*		Terrestrial
house wren	*Troglodytes aedon parkmanii*		Terrestrial
killdeer	*Charadrius vociferus vociferus*		Shorebird
large-billed Savannah sparrow	*Passerculus sandwichensis rostratus*	SSC	Terrestrial
least sandpiper	*Calidris minutilla*		Shorebird

Common Name	Scientific Name	Status[1]	Species Assemblage
lesser goldfinch	*Spinus psaltria*		Terrestrial
lesser scaup	*Aythya affinis*		Waterfowl
lesser yellowlegs	*Tringa flavipes*		Shorebird
light-footed clapper rail	*Rallus longirostris levipes*	FE, SE, SP	Marshbird
Lincoln's sparrow	*Melospiza lincolnii*		Terrestrial
little blue heron	*Egretta caerulea*		Marshbird
loggerhead shrike	*Lanius ludovicianus*	BCC, SSC	Terrestrial
long-billed curlew	*Numenius americanus*	BCC	Shorebird
long-billed dowitcher	*Limnodromus scolopaceus*		Shorebird
long-tailed duck	*Clangula hyemalis*		Waterfowl
mallard	*Anas platyrhynchos platyrhynchos*		Waterfowl
marbled godwit	*Limosa fedoa fedoa*	BCC	Shorebird
marsh wren	*Cistothorus palustris*	SSC	Marshbird
merlin	*Falco columbarius columbarius*		Terrestrial
mew gull	*Larus canus brachyrhynchus*		Seabird
mourning dove	*Zenaida macroura marginella*		Terrestrial
myrtle warbler (yellow-rumped)	*Dendroica coronata hooveri*		Terrestrial
Nashville warbler	*Oreothlypis ruficapilla ridgwayi*		Terrestrial
northern flicker	*Colaptes auratus collaris*		Terrestrial
northern harrier	*Circus cyaneus hudsonius*	SSC	Terrestrial
northern mockingbird	*Mimus polyglottos polyglottos*		Terrestrial
northern pintail	*Anas acuta*		Waterfowl
northern rough-winged swallow	*Stelgidopteryx serripennis*		Terrestrial
northern shoveler	*Anas clypeata*		Waterfowl
orange-crowned warbler	*Oreothlypis celata*		Terrestrial
osprey	*Pandion haliaetus carolinensis*		Seabird
Pacific golden-plover	*Pluvialis fulva*		Shorebird
Pacific Loon	*Gavia pacifica*		Seabird
parasitic jaeger	*Stercorarius parasiticus*		Seabird
pectoral sandpiper	*Calidris melanotos*		Shorebird
pelagic cormorant	*Phalacrocorax pelagicus resplendens*		Seabird
peregrine falcon	*Falco peregrinus anatum*	BCC, SP	Terrestrial
pied-billed grebe	*Podilymbus podiceps podiceps*		Waterfowl
red knot	*Calidris canutus roselaari*	BCC	Shorebird
red-breasted merganser	*Mergus serrator*		Waterfowl
red-crowned parrot	*Amazona viridigenalis*		Terrestrial
reddish egret	*Egretta rufescens dickey*		Marshbird
redhead	*Aythya americana*	SSC	Waterfowl
red-necked grebe	*Podiceps grisegena*		Waterfowl
red-necked phalarope	*Phalaropus lobatus*		Shorebird
red-tailed hawk	*Buteo jamaicensis*		Terrestrial
red-throated loon	*Gavia stellata*		Seabird
ring-billed gull	*Larus delawarensis*		Seabird
ringed turtle dove	*Streptopelia risoria*		Terrestrial
ring-necked duck	*Aythya collaris*		Waterfowl
rock pigeon	*Columba livia*		Terrestrial
rock wren	*Salpinctes obsoletus*		Terrestrial

Common Name	Scientific Name	Status[1]	Species Assemblage
royal tern	*Thalasseus maximus*		Seabird
ruby-crowned kinglet	*Regulus calendula calendula*		Terrestrial
ruddy duck	*Oxyura jamaicensis rubida*		Waterfowl
ruddy turnstone	*Arenaria interpres*		Shorebird
sanderling	*Calidris alba*		Shorebird
San Diego cactus wren	*Campylorhyncus brunneicapillus sandiegensis*	SSC	Terrestrial
Savannah sparrow	*Passerculus sandwichensis*		Terrestrial
Say's phoebe	*Sayornis saya saya*		Terrestrial
semipalmated plover	*Charadrius semipalmatus*		Shorebird
semipalmated sandpiper	*Calidris pusilla*		Shorebird
sharp-shinned hawk	*Accipiter striatus velox*		Terrestrial
short-billed dowitcher	*Limnodromus griseus caurinus*	BCC	Shorebird
short-eared owl	*Asio flammeus flammeus*	SSC	Terrestrial
snowy egret	*Egretta thula thula*		Marshbird
song sparrow	*Melospiza melodia*	SSC	Terrestrial
sora	*Porzana carolina*		Marshbird
spotted sandpiper	*Actitis macularius*		Shorebird
surf scoter	*Melanitta perspicillata*		Waterfowl
surfbird	*Aphriza virgata*		Shorebird
Thayer's gull	*Larus thayeri*		Seabird
tree swallow	*Tachycineta bicolor*		Terrestrial
tropical kingbird	*Tyrannus melancholicus satrapa*		Terrestrial
turkey vulture	*Cathartes aura meridionalis*		Terrestrial
Vaux's swift	*Chaetura vauxi vauxi*	SSC	Terrestrial
violet-green swallow	*Tachycineta thalassina thalassina*		Terrestrial
wandering tattler	*Tringa incana*		Shorebird
western grebe	*Aechmophorus occidentalis occidentalis*		Waterfowl
western gull	*Larus occidentalis wymani*		Seabird
western meadowlark	*Sturnella neglecta*		Terrestrial
western sandpiper	*Calidris mauri*		Shorebird
western scrub-jay	*Aphelocoma californica*		Terrestrial
western snowy plover	*Charadrius alexandrinus nivosus*	FT, SSC	Shorebird
whimbrel	*Numenius phaeopus hudsonicus*	BCC	Shorebird
white-crowned sparrow	*Zonotrichia leucophrys*		Terrestrial
white-faced ibis	*Plegadis chihi*		Shorebird
white-winged scoter	*Melanitta fusca deglandi*		Waterfowl
willet	*Tringa semipalmata inornatus*		Shorebird
Wilson's phalarope	*Phalaropus tricolor*		Shorebird
Wilson's plover	*Charadrius wilsonia beldingi*		Shorebird
yellow-billed loon	*Gavia adamsii*		Seabird
yellow warbler	*Dendroica petechia*	SSC	Terrestrial
yellow-rumped warbler	*Dendroica coronata audubonii*		Terrestrial
Total number of unique species:	175		

[1] FE: Federally Endangered; FT: Federally Threatened; BCC: USFWS Bird of Conservation Concern; SE: CA State Endangered, ST: CA State Threatened; SP: CA Fully Protected Species; SSC: CA State Species of Special Concern

Table 6-2. Species and number of birds observed per month during the San Diego Bay shorebird surveys. In April, August, November, and February, peaking and falling tide surveys were performed; these data are presented separately in the table. Species are organized from greatest to least total number; peak abundance for each species is highlighted in bold.

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
western sandpiper	80386	7191	1491	1866	28	1382	5759	**12866**	6629	8305	5311	11110	8301	9478	669
surf scoter	41448	2352	89	86	6	1	7	4	5	**11663**	10638	5971	3544	2925	4157
peep sp.	32813	1602	114	12	0	6	7559	2474	11	3843	78	1486	4751	2173	**8704**
western gull	27342	1493	1642	1752	1541	2792	2528	**3244**	3215	2085	1479	1357	1637	1434	1143
marbled godwit	19282	**2314**	663	884	449	940	1771	1411	978	1807	1633	1800	1808	1347	1477
eared grebe	18007	1152	29	38	8	0	146	670	1673	4261	2625	2345	1667	1571	1822
elegant tern	16188	1438	937	323	**7414**	1606	3028	1169	272	0	0	0	0	0	1
red-necked phalarope	15534	0	0	0	0	1	6729	**8725**	77	0	2	0	0	0	0
western grebe	15219	2084	818	676	101	2	3	2	516	3408	**4432**	2051	449	231	446
Brandt's cormorant	14312	524	969	468	698	1	252	**2036**	866	1707	1287	1280	1900	608	1716
black-bellied plover	12006	306	175	140	80	475	736	901	886	1482	896	**2077**	**2079**	794	979
willet	11879	904	160	118	202	381	1971	**1215**	717	1195	1133	**1215**	1145	798	725
sanderling	11039	861	794	896	12	515	757	791	1110	865	645	961	**1187**	879	766
brown pelican	10794	561	430	364	458	1660	**2028**	1818	788	449	516	442	529	377	374
lesser scaup	9582	2015	27	4	0	0	0	0	8	430	945	1504	1113	1313	**2223**
Heermann's gull	9432	129	116	102	336	1413	1163	**1920**	899	1086	591	732	574	229	142
double-crested cormorant	9088	463	224	520	658	**2309**	1835	915	526	278	408	274	228	182	268
rock pigeon	7526	286	429	489	530	474	**976**	518	645	577	516	618	571	461	436
brant	7309	775	107	84	13	2	1	2	1	661	994	1091	1185	**1213**	1180
American wigeon	6654	241	4	4	0	0	0	0	355	**1328**	444	1629	997	836	816
California gull	5948	290	120	48	8	13	40	19	41	473	452	959	**1534**	1265	686
short-billed dowitcher	5850	211	110	65	6	835	841	601	244	570	178	661	437	949	142
dunlin	4615	510	211	190	0	0	1	7	282	**841**	342	828	806	569	28
semipalmated plover	4612	461	214	208	65	188	239	337	547	281	78	**715**	616	408	255
dowitcher sp.	4563	464	168	219	6	1	299	203	512	**705**	656	275	414	429	212
least sandpiper	4425	486	36	18	0	110	370	596	367	200	772	440	612	142	276
bufflehead	4181	**969**	20	25	0	0	0	0	0	279	277	767	619	569	656
red knot	3738	234	**594**	49	13	129	220	415	411	446	232	217	401	213	164
ring-billed gull	3565	326	28	35	5	28	19	24	32	543	180	599	**845**	542	359
Forster's tern	3263	234	174	255	349	119	162	82	82	344	242	386	512	236	86

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
black-necked stilt	2688	291	0	1	21	214	279	464	114	140	136	222	289	243	274
western snowy plover	2567	150	83	100	82	197	243	233	245	132	206	237	305	184	170
European starling	2141	140	81	164	180	123	233	278	199	259	181	100	48	68	87
house finch	1917	194	189	234	271	70	357	17	82	80	68	139	29	94	93
Belding's Savannah sparrow	1892	163	77	76	158	41	288	178	96	100	150	140	133	89	203
northern shoveler	1877	32	0	0	0	0	37	220	1	280	49	282	505	326	145
scaup sp.	1858	3	18	16	0	0	0	0	0	578	206	593	203	158	83
black skimmer	1848	105	103	1	78	10	1065	40	8	62	30	131	61	89	65
royal tern	1815	107	45	30	73	279	188	220	134	180	148	89	157	86	79
mallard	1675	66	91	94	131	59	198	168	88	189	229	157	82	56	67
killdeer	1262	38	30	36	48	36	10	93	105	91	216	131	181	109	138
snowy egret	1159	78	72	87	121	97	108	148	52	92	46	70	67	73	48
greater scaup	1144	169	0	0	0	0	0	0	0	17	77	377	230	96	178
American coot	1116	155	23	26	0	0	0	3	14	117	78	159	194	177	170
northern pintail	1108	12	0	0	2	0	0	2	0	72	221	421	154	66	158
western/Clark's grebe	1083	0	0	0	0	0	0	0	0	7	34	0	1024	17	1
horned lark	1056	157	96	74	107	38	80	34	52	69	39	53	104	64	89
long-billed curlew	966	89	14	16	55	47	77	81	66	110	63	98	90	90	70
great egret	930	27	21	16	32	13	32	52	497	68	56	30	48	22	16
redhead	912	13	0	0	0	0	0	0	0	20	172	243	240	97	127
house sparrow	904	43	46	41	95	74	112	55	79	66	95	39	72	49	38
ruddy turnstone	882	43	62	52	23	50	83	75	150	67	45	87	37	65	43
cliff swallow	862	18	11	82	309	3	431	8	0	0	0	0	0	0	0
barn swallow	851	53	64	130	103	76	192	143	86	0	0	0	4	0	0
great blue heron	822	53	61	61	78	59	69	47	74	74	63	59	47	44	33
caspian tern	796	64	158	95	90	75	242	50	2	2	4	4	2	4	4
long-billed dowitcher	727	1	0	0	0	0	0	0	0	198	218	12	60	112	126
American avocet	717	135	10	5	4	32	50	71	5	16	14	65	68	116	126
whimbrel	688	531	10	48	5	18	28	5	6	4	6	11	8	5	3
California least tern	675	0	23	106	539	3	4	0	0	0	0	0	0	0	0
Brewer's blackbird	604	24	13	28	114	29	27	34	18	39	96	51	61	26	44
black turnstone	547	92	21	20	5	1	46	53	23	26	62	38	101	24	35
white-crowned sparrow	511	45	0	0	0	0	0	0	33	67	58	89	95	73	51

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
American pipit	453	76	0	1	0	3	1	0	3	71	43	52	96	90	17
horned grebe	444	1	0	0	0	0	0	0	3	24	27	118	247	13	11
osprey	426	37	21	16	19	17	16	39	36	47	37	34	36	33	38
surfbird	399	225	4	75	4	11	10	17	10	2	0	15	13	5	8
ruddy duck	394	12	0	0	0	0	0	0	5	32	42	62	50	93	98
American crow	384	40	43	56	30	22	42	15	20	27	29	12	18	8	22
mourning dove	375	7	23	61	44	2	20	23	39	21	56	47	1	7	24
greater yellowlegs	361	31	3	4	34	10	47	45	34	36	10	29	38	30	10
spotted sandpiper	358	32	18	31	0	22	14	36	42	36	41	28	16	20	22
gadwall	323	24	0	18	26	0	28	7	0	19	47	62	21	33	38
red-breasted merganser	310	29	5	3	0	0	0	0	0	31	36	53	64	19	70
western meadowlark	285	73	3	2	0	0	0	0	35	2	16	17	65	24	48
gull-billed tern	255	15	94	92	45	2	7	0	0	0	0	0	0	0	0
tern sp.	245	12	0	0	23	0	6	0	204	0	0	0	0	0	0
gull sp.	235	41	0	2	24	0	0	0	3	54	0	2	10	52	47
Savannah sparrow	229	31	0	0	0	0	0	16	28	20	26	45	21	16	26
Audubon's yellow-rumped warbler	229	4	0	1	0	0	0	0	2	36	89	54	18	9	16
black phoebe	206	9	5	6	14	5	9	11	12	23	25	20	35	12	20
Wilson's phalarope	202	16	2	0	0	1	80	103	0	0	0	0	0	0	0
tree swallow	193	5	0	0	0	0	3	4	6	1	1	20	1	44	108
pied-billed grebe	191	30	2	1	3	7	6	14	19	25	22	14	24	11	13
Say's phoebe	170	1	1	2	4	1	1	7	41	22	36	16	18	9	11
green-winged teal	165	11	0	0	0	0	0	3	0	0	11	23	91	21	5
Anna's hummingbird	146	10	5	5	2	1	6	9	15	12	36	12	17	7	9
American white pelican	132	0	25	26	0	0	0	2	1	3	3	72	0	0	0
common tern	128	2	0	0	0	61	49	16	0	0	0	0	0	0	0
Bonaparte's gull	126	0	3	3	0	0	0	0	0	2	0	60	51	2	5
cormorant sp.	124	1	14	60	0	0	7	0	0	1	0	25	4	9	3
common loon	123	24	4	5	2	0	0	0	0	8	22	10	8	24	16
common goldeneye	109	14	0	0	0	0	0	0	0	1	1	24	26	22	21
song sparrow	104	10	3	1	0	0	5	12	18	12	2	12	12	6	11
herring gull	92	1	2	1	2	2	2	0	1	13	18	28	8	6	8
red-throated loon	89	5	6	7	0	0	0	0	0	6	15	14	4	13	19

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
Clark's grebe	84	18	4	4	0	0	0	0	0	8	13	12	10	9	6
blue-winged teal	76	15	8	15	0	0	1	0	0	11	8	1	12	5	0
northern harrier	74	3	0	0	3	1	6	9	3	9	8	9	8	7	8
belted kingfisher	61	3	0	0	0	0	5	8	7	6	7	7	9	2	7
large-billed Savannah sparrow	60	0	0	0	0	1	6	2	1	10	15	8	5	7	5
northern mockingbird	60	13	8	10	5	4	5	1	2	0	2	2	4	1	3
Pacific loon	59	9	1	4	0	0	0	0	0	1	3	11	15	7	8
black-crowned night heron	55	0	2	13	15	3	8	1	3	1	1	3	3	1	1
canvasback	54	0	0	0	0	0	0	0	0	12	33	6	1	1	1
American kestrel	52	3	0	0	1	4	8	9	7	6	4	3	3	1	3
little blue heron	50	0	1	2	6	6	6	6	3	6	3	3	4	1	3
bushtit	49	10	0	0	0	0	0	0	0	0	1	10	0	0	28
common raven	48	7	9	8	1	1	0	0	6	1	2	3	1	5	4
peregrine falcon	47	3	0	0	0	0	4	6	4	4	1	10	6	8	1
red-tailed hawk	45	3	1	0	1	0	1	0	4	5	4	7	9	4	6
lesser yellowlegs	43	6	0	0	0	0	5	1	6	5	0	13	2	3	2
western/least sandpiper	43	0	0	0	0	0	0	0	20	0	0	0	23	0	0
glaucous-winged gull	37	16	2	4	0	0	2	1	1	1	1	3	2	3	1
duck sp.	35	0	0	4	0	3	3	3	5	5	3	3	1	3	2
common yellowthroat	31	2	0	0	0	0	5	4	4	3	5	1	3	1	3
cedar waxwing	30	0	0	0	0	0	0	0	0	0	30	0	0	0	0
cinnamon teal	29	2	0	3	0	0	0	2	0	0	0	0	10	1	11
black scoter	28	0	0	25	0	0	0	0	0	0	1	0	0	0	2
northern rough-winged swallow	28	21	0	0	0	1	2	4	0	0	0	0	0	0	0
swallow sp.	27	0	0	0	0	0	0	6	0	0	0	0	0	1	20
sandpiper sp.	25	0	0	0	0	0	25	0	0	0	0	0	0	0	0
Eurasian collared-dove	23	0	0	0	0	1	11	2	0	0	0	0	2	2	5
green heron	22	1	2	1	2	5	3	1	0	4	2	1	0	0	0
Vaux's swift	20	0	0	0	0	0	0	0	20	0	0	0	0	0	0
American golden-plover	18	0	2	2	14	0	0	0	0	0	0	0	0	0	0
wandering tattler	18	0	8	7	0	0	1	1	1	0	0	0	0	0	0
orange-crowned warbler	16	0	1	2	0	0	0	0	0	1	12	0	0	0	0
mew gull	15	1	0	0	0	0	0	0	0	1	9	2	2	0	0

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
hooded oriole	14	0	1	4	5	0	4	0	0	0	0	0	0	0	0
marsh wren	14	2	0	0	0	0	0	1	4	2	1	0	3	1	0
ring-necked duck	13	0	0	0	0	0	0	0	0	5	4	0	0	2	2
yellow warbler	13	0	0	0	0	0	0	0	0	0	0	1	9	2	1
black oystercatcher	12	3	0	0	0	0	0	0	0	0	4	0	0	0	5
violet-green swallow	12	12	0	0	0	0	0	0	0	0	0	0	0	0	0
house wren	9	0	0	0	0	1	1	1	4	0	0	1	1	0	0
Cooper's hawk	8	0	1	0	0	0	2	1	0	1	1	0	1	1	0
Barrow's goldeneye	6	0	0	0	0	0	0	0	0	0	0	0	3	3	0
burrowing owl	6	0	0	0	0	0	0	0	1	0	1	2	1	1	0
common merganser	6	0	1	0	0	0	0	0	0	0	0	3	2	0	0
domestic duck	6	0	0	0	0	0	0	0	0	1	1	1	2	0	1
loggerhead shrike	6	0	0	0	0	0	0	0	0	0	0	1	3	0	2
parasitic jaeger	6	1	0	0	0	0	0	0	3	1	0	0	0	1	0
Thayer's gull	6	0	0	0	0	0	0	0	0	3	0	1	0	0	2
Wilson's plover	6	0	0	0	0	0	0	6	0	0	0	0	0	0	0
Cassin's kingbird	5	1	0	0	0	0	1	0	2	0	0	1	0	0	0
light-footed clapper rail	5	0	0	0	5	0	0	0	0	0	0	0	0	0	0
pelagic cormorant	5	0	0	0	1	0	3	0	0	0	0	1	0	0	0
red-crowned parrot	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0
reddish egret	5	0	0	0	1	1	1	1	1	0	0	0	0	0	0
Baird's sandpiper	4	0	1	0	0	0	0	3	0	0	0	0	0	0	0
hermit warbler	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0
hummingbird sp.	4	0	0	0	0	2	2	0	0	0	0	0	0	0	0
long-tailed duck	4	1	0	0	0	0	0	0	0	0	0	1	1	1	0
black tern	3	0	0	0	0	0	3	0	0	0	0	0	0	0	0
blue-gray gnatcatcher	3	0	0	0	0	0	0	0	1	0	1	0	1	0	0
hooded merganser	3	0	0	0	0	0	0	0	0	0	1	1	1	0	0
Selasphorus sp.	3	0	0	0	0	0	2	1	0	0	0	0	0	0	0
semipalmated sandpiper	3	0	0	0	0	0	1	1	1	0	0	0	0	0	0
sora	3	0	0	0	0	0	0	1	1	0	0	0	1	0	0
turkey vulture	3	0	0	0	0	0	1	2	0	0	0	0	0	0	0
chipping sparrow	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
Costa's hummingbird	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0
lesser goldfinch	2	0	0	0	0	0	0	0	1	0	1	0	0	0	0
Lincoln's sparrow	2	0	0	0	0	0	0	0	0	0	1	1	0	0	0
loon sp.	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0
merlin	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0
ringed turtle-dove	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0
ruby-crowned kinglet	2	0	0	0	0	0	0	0	0	0	2	0	0	0	0
sharp-shinned hawk	2	1	0	0	0	0	0	0	1	0	0	0	0	0	0
short-eared owl	2	0	0	0	0	0	0	0	0	1	0	1	0	0	0
teal sp.	2	0	0	1	0	0	0	0	0	0	1	0	0	0	0
tropical kingbird	2	1	0	0	0	0	0	1	0	0	0	0	0	0	0
Brewer's sparrow	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Bullock's oriole	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
California thrasher	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Canada goose	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Eurasian wigeon	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
golden-crowned sparrow	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
myrtle yellow-rumped warbler	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Nashville warbler	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Pacific golden-plover	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0
pectoral sandpiper	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0
red-necked grebe	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
rock wren	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0
San Diego cactus wren	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
sparrow sp.	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
western scrub-jay	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
white-faced ibis	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0
white-winged scoter	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
yellow-billed loon	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
yellowlegs sp.	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Grand Total	470815	34958	12656	12176	16049	17229	44406	46204	25622	54037	41928	49035	46338	35617	34560

Table 6-3. Species and number of birds observed per month during the San Diego Bay shorebird surveys. In April, August, November, and February, peaking and falling tide surveys were performed; these data are presented separately in the table. Species are organized alphabetically; peak abundance for each species is highlighted in bold.

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
American avocet	717	135	10	5	4	32	50	71	5	16	14	65	68	116	126
American coot	1116	155	23	26	0	0	0	3	14	117	78	159	194	177	170
American crow	384	40	43	56	30	22	42	15	20	27	29	12	18	8	22
American golden-plover	18	0	2	2	14	0	0	0	0	0	0	0	0	0	0
American kestrel	52	3	0	0	1	4	8	9	7	6	4	3	3	1	3
American pipit	453	76	0	1	0	3	1	0	3	71	43	52	96	90	17
American white pelican	132	0	25	26	0	0	0	2	1	3	3	72	0	0	0
American wigeon	6654	241	4	4	0	0	0	0	355	1328	444	1629	997	836	816
Anna's hummingbird	146	10	5	5	2	1	6	9	15	12	36	12	17	7	9
Baird's sandpiper	4	0	1	0	0	0	0	3	0	0	0	0	0	0	0
barn swallow	851	53	64	130	103	76	192	143	86	0	0	0	4	0	0
Barrow's goldeneye	6	0	0	0	0	0	0	0	0	0	0	0	3	3	0
Belding's Savannah sparrow	1892	163	77	76	158	41	288	178	96	100	150	140	133	89	203
belted kingfisher	61	3	0	0	0	0	5	8	7	6	7	7	9	2	7
black oystercatcher	12	3	0	0	0	0	0	0	0	0	4	0	0	0	5
black phoebe	206	9	5	6	14	5	9	11	12	23	25	20	35	12	20
black scoter	28	0	0	25	0	0	0	0	0	0	1	0	0	0	2
black skimmer	1848	105	103	1	78	10	1065	40	8	62	30	131	61	89	65
black tern	3	0	0	0	0	0	3	0	0	0	0	0	0	0	0
black turnstone	547	92	21	20	5	1	46	53	23	26	62	38	101	24	35
black-bellied plover	12006	306	175	140	80	475	736	901	886	1482	896	2077	2079	794	979
black-crowned night heron	55	0	2	13	15	3	8	1	3	1	1	3	3	1	1
black-necked stilt	2688	291	0	1	21	214	279	464	114	140	136	222	289	243	274
blue-gray gnatcatcher	3	0	0	0	0	0	0	0	1	0	1	0	1	0	0
blue-winged teal	76	15	8	15	0	0	1	0	0	11	8	1	12	5	0
Bonaparte's gull	126	0	3	3	0	0	0	0	0	2	0	60	51	2	5
Brandt's cormorant	14312	524	969	468	698	1	252	2036	866	1707	1287	1280	1900	608	1716
brant	7309	775	107	84	13	2	1	2	1	661	994	1091	1185	1213	1180
Brewer's blackbird	604	24	13	28	114	29	27	34	18	39	96	51	61	26	44

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
Brewer's sparrow	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
brown pelican	10794	561	430	364	458	1660	2028	1818	788	449	516	442	529	377	374
bufflehead	4181	969	20	25	0	0	0	0	0	279	277	767	619	569	656
Bullock's oriole	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
burrowing owl	6	0	0	0	0	0	0	0	1	0	1	2	1	1	0
bushtit	49	10	0	0	0	0	0	0	0	0	1	10	0	0	28
California gull	5948	290	120	48	8	13	40	19	41	473	452	959	1534	1265	686
California least tern	675	0	23	106	539	3	4	0	0	0	0	0	0	0	0
California thrasher	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Canada goose	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
canvasback	54	0	0	0	0	0	0	0	0	12	33	6	1	1	1
caspian tern	796	64	158	95	90	75	242	50	2	2	4	4	2	4	4
Cassin's kingbird	5	1	0	0	0	0	1	0	2	0	0	1	0	0	0
cedar waxwing	30	0	0	0	0	0	0	0	0	0	30	0	0	0	0
chipping sparrow	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
cinnamon teal	29	2	0	3	0	0	0	2	0	0	0	0	10	1	11
Clark's grebe	84	18	4	4	0	0	0	0	0	8	13	12	10	9	6
cliff swallow	862	18	11	82	309	3	431	8	0	0	0	0	0	0	0
common goldeneye	109	14	0	0	0	0	0	0	0	1	1	24	26	22	21
common loon	123	24	4	5	2	0	0	0	0	8	22	10	8	24	16
common merganser	6	0	1	0	0	0	0	0	0	0	0	3	2	0	0
common raven	48	7	9	8	1	1	0	0	6	1	2	3	1	5	4
common tern	128	2	0	0	0	61	49	16	0	0	0	0	0	0	0
common yellowthroat	31	2	0	0	0	0	5	4	4	3	5	1	3	1	3
Cooper's hawk	8	0	1	0	0	0	2	1	0	1	1	0	1	1	0
cormorant sp.	124	1	14	60	0	0	7	0	0	1	0	25	4	9	3
Costa's hummingbird	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0
domestic duck	6	0	0	0	0	0	0	0	0	1	1	1	2	0	1
double-crested cormorant	9088	463	224	520	658	2309	1835	915	526	278	408	274	228	182	268
dowitcher sp.	4563	464	168	219	6	1	299	203	512	705	656	275	414	429	212
duck sp.	35	0	0	4	0	3	3	3	5	5	3	3	1	3	2
dunlin	4615	510	211	190	0	0	1	7	282	841	342	828	806	569	28

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
eared grebe	18007	1152	29	38	8	0	146	670	1673	4261	2625	2345	1667	1571	1822
elegant tern	16188	1438	937	323	7414	1606	3028	1169	272	0	0	0	0	0	1
Eurasian collared-dove	23	0	0	0	0	1	11	2	0	0	0	0	2	2	5
Eurasian wigeon	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
European starling	2141	140	81	164	180	123	233	278	199	259	181	100	48	68	87
Forster's tern	3263	234	174	255	349	119	162	82	82	344	242	386	512	236	86
gadwall	323	24	0	18	26	0	28	7	0	19	47	62	21	33	38
glaucous-winged gull	37	16	2	4	0	0	2	1	1	1	1	3	2	3	1
golden-crowned sparrow	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
great blue heron	822	53	61	61	78	59	69	47	74	74	63	59	47	44	33
great egret	930	27	21	16	32	13	32	52	497	68	56	30	48	22	16
greater scaup	1144	169	0	0	0	0	0	0	0	17	77	377	230	96	178
greater yellowlegs	361	31	3	4	34	10	47	45	34	36	10	29	38	30	10
green heron	22	1	2	1	2	5	3	1	0	4	2	1	0	0	0
green-winged teal	165	11	0	0	0	0	0	3	0	0	11	23	91	21	5
gull sp.	235	41	0	2	24	0	0	0	3	54	0	2	10	52	47
gull-billed tern	255	15	94	92	45	2	7	0	0	0	0	0	0	0	0
Heermann's gull	9432	129	116	102	336	1413	1163	1920	899	1086	591	732	574	229	142
hermit warbler	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0
herring gull	92	1	2	1	2	2	2	0	1	13	18	28	8	6	8
hooded merganser	3	0	0	0	0	0	0	0	0	0	1	1	1	0	0
hooded oriole	14	0	1	4	5	0	4	0	0	0	0	0	0	0	0
horned grebe	444	1	0	0	0	0	0	0	3	24	27	118	247	13	11
horned lark	1056	157	96	74	107	38	80	34	52	69	39	53	104	64	89
house finch	1917	194	189	234	271	70	357	17	82	80	68	139	29	94	93
house sparrow	904	43	46	41	95	74	112	55	79	66	95	39	72	49	38
house wren	9	0	0	0	0	1	1	1	4	0	0	1	1	0	0
hummingbird sp.	4	0	0	0	0	2	2	0	0	0	0	0	0	0	0
killdeer	1262	38	30	36	48	36	10	93	105	91	216	131	181	109	138
large-billed Savannah sparrow	60	0	0	0	0	1	6	2	1	10	15	8	5	7	5
least sandpiper	4425	486	36	18	0	110	370	596	367	200	772	440	612	142	276
lesser goldfinch	2	0	0	0	0	0	0	0	1	0	1	0	0	0	0

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
lesser scaup	9582	2015	27	4	0	0	0	0	8	430	945	1504	1113	1313	2223
lesser yellowlegs	43	6	0	0	0	0	5	1	6	5	0	13	2	3	2
light-footed clapper rail	5	0	0	0	5	0	0	0	0	0	0	0	0	0	0
Lincoln's sparrow	2	0	0	0	0	0	0	0	0	0	1	1	0	0	0
little blue heron	50	0	1	2	6	6	6	6	3	6	3	3	4	1	3
loggerhead shrike	6	0	0	0	0	0	0	0	0	0	0	1	3	0	2
long-billed curlew	966	89	14	16	55	47	77	81	66	110	63	98	90	90	70
long-billed dowitcher	727	1	0	0	0	0	0	0	0	198	218	12	60	112	126
long-tailed duck	4	1	0	0	0	0	0	0	0	0	0	1	1	1	0
loon sp.	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0
mallard	1675	66	91	94	131	59	198	168	88	189	229	157	82	56	67
marbled godwit	19282	2314	663	884	449	940	1771	1411	978	1807	1633	1800	1808	1347	1477
marsh wren	14	2	0	0	0	0	0	1	4	2	1	0	3	1	0
merlin	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0
mew gull	15	1	0	0	0	0	0	0	0	1	9	2	2	0	0
mourning dove	375	7	23	61	44	2	20	23	39	21	56	47	1	7	24
myrtle yellow-rumped warbler	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Nashville warbler	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
northern harrier	74	3	0	0	3	1	6	9	3	9	8	9	8	7	8
northern mockingbird	60	13	8	10	5	4	5	1	2	0	2	2	4	1	3
northern pintail	1108	12	0	0	2	0	0	2	0	72	221	421	154	66	158
northern rough-winged swallow	28	21	0	0	0	1	2	4	0	0	0	0	0	0	0
northern shoveler	1877	32	0	0	0	0	37	220	1	280	49	282	505	326	145
orange-crowned warbler	16	0	1	2	0	0	0	0	0	1	12	0	0	0	0
osprey	426	37	21	16	19	17	16	39	36	47	37	34	36	33	38
Pacific golden-plover	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Pacific loon	59	9	1	4	0	0	0	0	0	1	3	11	15	7	8
parasitic jaeger	6	1	0	0	0	0	0	0	3	1	0	0	0	1	0
pectoral sandpiper	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0
peep sp.	32813	1602	114	12	0	6	7559	2474	11	3843	78	1486	4751	2173	8704
pelagic cormorant	5	0	0	0	1	0	3	0	0	0	0	1	0	0	0
peregrine falcon	47	3	0	0	0	0	4	6	4	4	1	10	6	8	1

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
pied-billed grebe	191	30	2	1	3	7	6	14	19	25	22	14	24	11	13
red knot	3738	234	594	49	13	129	220	415	411	446	232	217	401	213	164
red-breasted merganser	310	29	5	3	0	0	0	0	0	31	36	53	64	19	70
red-crowned parrot	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0
reddish egret	5	0	0	0	1	1	1	1	1	0	0	0	0	0	0
redhead	912	13	0	0	0	0	0	0	0	20	172	243	240	97	127
red-necked grebe	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
red-necked phalarope	15534	0	0	0	0	1	6729	8725	77	0	2	0	0	0	0
red-tailed hawk	45	3	1	0	1	0	1	0	4	5	4	7	9	4	6
red-throated loon	89	5	6	7	0	0	0	0	0	6	15	14	4	13	19
ring-billed gull	3565	326	28	35	5	28	19	24	32	543	180	599	845	542	359
ringed turtle-dove	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0
ring-necked duck	13	0	0	0	0	0	0	0	0	5	4	0	0	2	2
rock pigeon	7526	286	429	489	530	474	976	518	645	577	516	618	571	461	436
rock wren	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0
royal tern	1815	107	45	30	73	279	188	220	134	180	148	89	157	86	79
ruby-crowned kinglet	2	0	0	0	0	0	0	0	0	0	2	0	0	0	0
ruddy duck	394	12	0	0	0	0	0	0	5	32	42	62	50	93	98
ruddy turnstone	882	43	62	52	23	50	83	75	150	67	45	87	37	65	43
San Diego cactus wren	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
sanderling	11039	861	794	896	12	515	757	791	1110	865	645	961	1187	879	766
sandpiper sp.	25	0	0	0	0	0	25	0	0	0	0	0	0	0	0
Savannah sparrow	229	31	0	0	0	0	0	16	28	20	26	45	21	16	26
Say's phoebe	170	1	1	2	4	1	1	7	41	22	36	16	18	9	11
scaup sp.	1858	3	18	16	0	0	0	0	0	578	206	593	203	158	83
Selasphorus sp.	3	0	0	0	0	0	2	1	0	0	0	0	0	0	0
semipalmated plover	4612	461	214	208	65	188	239	337	547	281	78	715	616	408	255
semipalmated sandpiper	3	0	0	0	0	0	1	1	1	0	0	0	0	0	0
sharp-shinned hawk	2	1	0	0	0	0	0	0	1	0	0	0	0	0	0
short-billed dowitcher	5850	211	110	65	6	835	841	601	244	570	178	661	437	949	142
short-eared owl	2	0	0	0	0	0	0	0	0	1	0	1	0	0	0
snowy egret	1159	78	72	87	121	97	108	148	52	92	46	70	67	73	48

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
song sparrow	104	10	3	1	0	0	5	12	18	12	2	12	12	6	11
sora	3	0	0	0	0	0	0	1	1	0	0	0	1	0	0
sparrow sp.	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
spotted sandpiper	358	32	18	31	0	22	14	36	42	36	41	28	16	20	22
surf scoter	41448	2352	89	86	6	1	7	4	5	11663	10638	5971	3544	2925	4157
surfbird	399	225	4	75	4	11	10	17	10	2	0	15	13	5	8
swallow sp.	27	0	0	0	0	0	0	6	0	0	0	0	0	1	20
teal sp.	2	0	0	1	0	0	0	0	0	0	1	0	0	0	0
tern sp.	245	12	0	0	23	0	6	0	204	0	0	0	0	0	0
Thayer's gull	6	0	0	0	0	0	0	0	0	3	0	1	0	0	2
tree swallow	193	5	0	0	0	0	3	4	6	1	1	20	1	44	108
tropical kingbird	2	1	0	0	0	0	0	1	0	0	0	0	0	0	0
turkey vulture	3	0	0	0	0	0	1	2	0	0	0	0	0	0	0
Vaux's swift	20	0	0	0	0	0	0	0	20	0	0	0	0	0	0
violet-green swallow	12	12	0	0	0	0	0	0	0	0	0	0	0	0	0
wandering tattler	18	0	8	7	0	0	1	1	1	0	0	0	0	0	0
western grebe	15219	2084	818	676	101	2	3	2	516	3408	4432	2051	449	231	446
western gull	27342	1493	1642	1752	1541	2792	2528	3244	3215	2085	1479	1357	1637	1434	1143
western meadowlark	285	73	3	2	0	0	0	0	35	2	16	17	65	24	48
western sandpiper	80386	7191	1491	1866	28	1382	5759	12866	6629	8305	5311	11110	8301	9478	669
western scrub-jay	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
western snowy plover	2567	150	83	100	82	197	243	233	245	132	206	237	305	184	170
western/Clark's grebe	1083	0	0	0	0	0	0	0	0	7	34	0	1024	17	1
western/least sandpiper	43	0	0	0	0	0	0	0	20	0	0	0	23	0	0
whimbrel	688	531	10	48	5	18	28	5	6	4	6	11	8	5	3
white-crowned sparrow	511	45	0	0	0	0	0	0	33	67	58	89	95	73	51
white-faced ibis	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0
white-winged scoter	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
willet	11879	904	160	118	202	381	1971	1215	717	1195	1133	1215	1145	798	725
Wilson's plover	6	0	0	0	0	0	0	6	0	0	0	0	0	0	0
Wilson's phalarope	202	16	2	0	0	1	80	103	0	0	0	0	0	0	0
yellow warbler	13	0	0	0	0	0	0	0	0	0	0	1	9	2	1

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
yellow-billed loon	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
yellowlegs sp.	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Audubon's yellow-rumped warbler	229	4	0	1	0	0	0	0	2	36	89	54	18	9	16
Grand Total	470815	34958	12656	12176	16049	17229	44406	46204	25622	54037	41928	49035	46338	35617	34560

Table 6-4. Data collection problems occurring during the point count surveys are presented in the following list. While four counts were missed overall, the surveys were much more complete than those from the 2006-07 surveys. Improvements in communication and planning, along with experienced surveyors, have allowed us to compile a solid baseline for each of these locations, making them comparable for future point count efforts.

Station	Data Problems
1	No Problems
2	No Problems
3	No Problems
4	No peaking survey for August or February
5	No Problems
6	No Problems
7	No Problems
8	No Problems
9	No Problems
10	No Problems
11	No June survey
12	No peaking survey for February
13	No Problems
14	No Problems
15	No June survey
16	No Problems
17	No Problems
18	No Problems
19	No Problems
20	No Problems
21	No Problems
22	No peaking survey for February

Table 6-5. Species and number observed during the San Diego Bay avian point count surveys during peaking and falling tides. The total column indicates totals for all 22 point count stations organized from greatest to least number.

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
western sandpiper	18038	1948	944	27	20	536	68	3674	2103	3087	6	973	1683	2969	
surf scoter	17422	340	5	3	1				4	5419	7196	1259	851	1470	874
peep sp.	14929	643	823	49		2965	10	706		31	2	6146	2650	902	2
eared grebe	7487	70	157	323	2			146	2	1913	2111	1185	252	269	1057
elegant tern	7428	694	423	101	1227	2463	1679	738	103						
marbled godwit	6822	388	518	124	73	807	166	463	597	537	985	521	625	497	521
western gull	4954	167	233	186	218	430	421	472	1661	287	177	166	143	285	108
black-bellied plover	4612	123	70	30	55	500	41	387	541	495	411	637	798	458	66
red-necked phalarope	3975			6		586	148	2960	275						
brant	3648	224	76	40	1	1	1			475	593	348	795	562	532
willet	3360	261	102	21	101	238	95	510	304	293	474	278	323	284	76
sanderling	2962	183	71	26	7	64	83	83	255	168	259	336	354	608	465
short-billed dowitcher	2671	49	17	8	1	647	313	747	197	309	111	22	130	83	37
American wigeon	2337	0							1	46	140	1209	438	401	102
brown pelican	2183	54	46	29	67	583	772	167	111	50	60	73	59	66	46
western grebe	2153	38	1	90	34				100	329	420	1024	10	39	68
semipalmated plover	1812	110	113	51	52	123	41	175	228	101	17	372	275	154	
dunlin	1789	327	130	12				2	141	364	10	201	339	263	
lesser scaup	1703	212	17	3						101	288	238	264	221	359
red knot	1609	117	532		11	42	32	209	182	120	96	24	71	140	33
double-crested cormorant	1506	9	20	65	115	143	751	60	175	22	31	16	12	38	49
Heermann's gull	1162	3	4	3	10	196	147	154	320	82	79	80	40	29	15
royal tern	1068	20	17	31	41	243	86	132	199	127	11	26	66	64	5
Forster's tern	1064	49	95	74	193	64	4	50	37	128	23	189	83	69	6
western snowy plover	1048	21	8	7	5	55	68	53	140	90	99	137	197	126	42
scaup sp.	970	8		7						260	295	130	261		9
dowitcher sp.	924	53	46	52			40	19	136	162	155	74	112	57	18
gull SP.	888				46		130	3	33	186	6		419		65
rock pigeon	791	95	28	50	43	66	84	41	53	61	78	48	40	67	37
Caspian tern	765	30	77	161	218	112	159	1	2				2	3	
cormorant sp.	750	1		29	47	301	317					52			3

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
California gull	707	102	68	34	67	6	12		12	25	32	16	39	277	17
bufflehead	616	57	1	3						46	63	104	120	139	83
ring-billed gull	603	79	10	6		12				54	38	103	114	129	58
Brandt's cormorant	579	1	10	2	0		1	115	1	1	8	282	20	135	3
northern shoveler	540										50	78	17	389	6
house finch	414	56	45	43	35	25	22	2	24	18	13	90	20	9	12
long-billed curlew	414	25	4	1	35	22	24	46	53	30	42	37	34	27	34
Belding's savannah sparrow	371	20	36	31	40	22	28	62	23	14	20	23	13	14	25
greater scaup	358	50								17		30	226	27	8
egret sp.	350								350						
least sandpiper	341	11				23	20	27	57	21		11	48	74	49
California least tern	309		9	18	282										
great blue heron	297	14	20	16	22	37	28	30	26	28	19	29	14	7	7
snowy egret	295	16	34	6	35	51	43	26	11	9	10	16	13	20	5
redhead	266	2		1						26	13	110	71	26	17
northern pintail	246				2				0		164	41	22	15	2
ruddy turnstone	245	19		13	2	5	8	21	18	8	23	53	13	47	15
killdeer	199	5	4	9	7	21	6	11	15	18	28	8	22	40	5
black skimmer	196		6		37	66	75	1					1	10	
horned lark	178	14	21	22	11	6	11	2	13			62		13	3
great egret	176		8	5	13	1	24	32	15	29	7	10	20	6	6
European starling	167		17	10	9	60	46				7			16	2
horned grebe	164									6	9	37	88	7	17
swallow sp.	152					130		12							10
American coot	144	16	7	8						50	2	4		6	51
whimbrel	133	78	5	19	1	6	5	2	2	1	3	3	2	4	2
mallard	120		23	13	35	5	6				10		10		18
osprey	117	4	7	3	12	3	8	8	4	9	23	10	5	9	12
white-crowned sparrow	111								4	3	21	39	3	21	20
cliff swallow	108		2		100		6								
barn swallow	101	16	18	18	17	6	23	2						1	
greater yellowlegs	98	8			17	2		8	10	9	2	13	15	12	2
American crow	90	2	15	18	7	2	3	2	7	4	12	1	5	2	10

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
gadwall	88			3	3					11		24	10	11	26
black turnstone	86	27	4	1				3	4	4	25	7	6		5
gull-billed tern	85	7	17	53	8										
Western/Clarke's Grebe	80												80		
American pipit	62								2	41	4	9	2	2	2
tern sp.	60	6				19	33	2							
common tern	57	1				40		16							
Bonaparte's gull	50		3	3								34	10		
spotted sandpiper	49	3	6	5		6		4	2	7	4	6	3	2	1
red-breasted merganser	46	13		1						1		8	12	2	9
duck sp.	41									41					
ruddy duck	40									18	22				
black-necked stilt	37			4	30		3								
black phoebe	36	2	1	1	3		1		6	5	4	4	4	3	2
white pelican	36			14								22			
yellow-rumped warbler	35	4								7	15	4	3		2
blue-winged teal	30		4	6			6				8		3	3	
cedar waxwing	30										30				
green-winged teal	28	2											13	1	12
common loon	27	3								3	3	2	2	11	3
American avocet	25	2	9	4	10										
Say's phoebe	23							1	2	4	6	4	2	1	3
teal sp.	23	23													
western meadowlark	21	6		1					2		6		3	3	
mourning dove	20			5	3	6	2	1	1		2				
tree swallow	20						1							11	8
herring gull	19			2						1	1	5		10	
Anna's hummingbird	17	2			1			1	1	1	6	4			1
red-throated loon	16	1								1		7	1	4	2
Brewer's blackbird	15		2	2	5			6							
pelagic cormorant	15						15								
red-tailed hawk	15			1	1	1	1	1		3	2	2	1	2	
pied-billed grebe	14	2			1			1		3	2	1	1	1	2

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
American white pelican	13		13												
northern harrier	12	1		2	3					2	2	1	1		
pacific loon	11		4									1	3	2	1
glaucous-winged gull	10	4	1	1	1							2		1	
house sparrow	10	2	2								4		2		
large-billed savannah sparrow	10						1			3	1	2		3	
common raven	8		1	1	1				4				1		
Eurasian collared-dove	8						6								2
song sparrow	8	2		2					3		1				
American kestrel	7	1					1	2		1	1				1
Cassin's kingbird	7	3		2	1		1								
common merganser	7											4			3
peregrine falcon	7						3		1			2		1	
wandering tattler	7		6	1											
canvasback	6									6					
northern mockingbird	6		2	3	1				0						
black scoter	5						3				0			2	
Clark's grebe	5											4			1
light-footed clapper rail	5				5										
surfbird	5					2		2					1		
orange-crowned warbler	4									1	3				
yellow warbler	4										2				2
black-crowned night heron	3			2			1								
cinnamon teal	3													3	
hooded merganser	3											1	2		
lesser yellowlegs	3	1											1	1	
marsh wren	3								1				2		
reddish egret	3					1	1		1						
white-throated swift	3				3										
belted kingfisher	2						1				1				
common yellowthroat	2				2										
mew gull	2									1			1		
northern rough-winged swallow	2							2							

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
Savannah sparrow	2								0	1					1
Thayer's gull	2									2					
Wilson's phalarope	2		2												
yellowlegs sp	2						2								
American golden plover	1		1												
bushtit	1				1										
Cooper's hawk	1										1				
Eurasian wigeon	1													1	
glaucous-winged gull x western gull	1												1		
green heron	1						1								
hooded oriole	1	1													
little blue heron	1				1										
loggerhead shrike	1												1		
loon sp.	1											1			
northern flicker	1													1	
ringed turtle dove	1						1								
rough-winged swallow	1			1											
white-tailed kite	1										1				
white-winged scoter	1	1													
Grand Total	133498	6952	5021	2028	3458	11751	6139	12403	8575	15837	14909	17135	12419	11688	5183

Table 6-6. Bird abundance at point count station 1 during each survey month. This station is located on the ocean shore of NASNI. Species are organized from greatest to lowest abundance.

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
sanderling	1631	113	29	11		35	80	66	186	48	258	95	186	61	463
marbled godwit	1539	84	42	53		131	65	133	133	129	165	166	156	125	157
black-bellied plover	691			8		45	5	56	84	95	132	157	107	2	
western snowy plover	617	5	6	5	5	51	66	23	79	58	99	73	87	18	42
western gull	192	3	10	6	52	46	17	30	6	9	2		3	6	2
elegant tern	153				3		2	66	82						
house finch	128	4	4		4	6			9	13		80		2	6
willet	123	14		5		18	15		18	1	6		8	12	26
semipalmated plover	119					14	31	13	1		17	26	17		
red knot	92								2	8	51		25	2	4
surf scoter	90	6	3	3						1	32	7	13	12	13
western sandpiper	72						46	1			5	11	9		
Heermann's gull	71		1		2	27	17	17				5		1	1
ruddy turnstone	66	1		6			7	9	1	2	10	4	2	14	10
Forster's tern	64				1		1	2	11	28	15	1	4		1
ring-billed gull	52		6	4						2	9	2	3	7	19
black turnstone	48	13		1					2		18	5	5		4
brown pelican	48	1	1	10	1		25		3	1		1	3	2	
tern sp.	46					19	27								
California gull	45		8			6	7			4	2			18	
western grebe	31				31										
gull-billed tern	24	3		21											
horned lark	22	4		7	2				3					3	3
Caspian tern	19		1		1	12	3	1	1						
cormorant sp.	16						16								
whimbrel	14			14											
brant	13		12												1
black phoebe	10				1				3	1		1	1	1	2
royal tern	9					2	1			5	1		0		
white-crowned sparrow	9													9	
double-crested cormorant	8			7	1										
eared grebe	8	3		3	2										
American pipit	6										1	1	1	2	1
pacific loon	6		4									1		1	
barn swallow	4				3		1								
common loon	4	2											2		
killdeer	4			2		1									1
red-throated loon	4	1										1		2	
Say's phoebe	4									1	1	1			1
European starling	3			3											
California least tern	2				2										
mew gull	2									1			1		
short-billed dowitcher	2							2							

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
American kestrel	1									1					
Brandt's cormorant	1						1								
Cassin's kingbird	1				1										
least sandpiper	1						1								
northern mockingbird	1			1											
osprey	1	1													
red-tailed hawk	1									1					
surfbird	1												1		
yellow-rumped warbler	1														1
Grand Total	6120	258	127	170	112	413	434	419	624	409	824	638	634	300	758

Table 6-7. Bird abundance at point count station 2 during each survey month. This station is located on the bay shore of NASNI, near the weapons pier. Species are organized from greatest to lowest abundance.

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
cormorant sp.	647				47	300	300								
brown pelican	561	36	6	1	45	185	97	75	19	23	28	7	10	14	15
western gull	217	15	21	24	28	11	11	36	9	7	12	13	10	10	10
Heermann's gull	146	3		2		39	32	42		15	11			2	
great blue heron	63	4	3		5	17	12	3	3	3	3	3	1	4	2
rock pigeon	62	7	2	11	5		7		7		7	2	4	3	7
killdeer	59			2		17	4			9	19	2	4		2
double-crested cormorant	58	2		3		9		12	9	4	6	2	2	8	1
barn swallow	50	16	6	6	7	2	13								
house finch	48	4	3	4			14		6	1			13		3
great egret	38		3		9		15		1	1		1	3	3	2
black turnstone	26	8	4					1		4	7		1		1
snowy egret	19				4	1	12		1					1	
surf scoter	16												1	4	11
black-bellied plover	13							3	1	1	1		5	1	1
willet	13	1					1	3	1	1	3	1		1	1
royal tern	10	1								5	2	1			1
spotted sandpiper	10		1	1				1		2	1	2		1	1
Caspian tern	9		1	4	1	2	1								
elegant tern	8						6	2							
European starling	8		2	3							3				
osprey	8		1	1	1	1	1		1	1	1				
black phoebe	7	2	1	1								1	1	1	
bufflehead	7	4												1	2
brant	6														6
horned lark	6		2											4	
whimbrel	6	1	1			1	1			1				1	
gull-billed tern	5		3	2											
peep sp.	4						4								
semipalmated plover	4					3	1								
white-crowned sparrow	4														4
Brandt's cormorant	3			2										1	
mourning dove	3				1		2								
wandering tattler	3		3												
California least tern	2				2										
common raven	2		1						1						
long-billed curlew	2									2					
song sparrow	2								2						
American kestrel	1														1
belted kingfisher	1										1				
California gull	1										1				
Cassin's kingbird	1						1								
common loon	1													1	
eared grebe	1	1													
Forster's tern	1				1										

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
herring gull	1											1			
marbled godwit	1	1													
red-tailed hawk	1										1				
Savannah sparrow	1									1					
Say's phoebe	1										1				
western sandpiper	1						1								
yellow-rumped warbler	1											1			
Grand Total	2169	106	64	67	156	588	536	178	61	81	108	37	55	61	71

Table 6-8. Bird abundance at point count station 3 during each survey month. This station is located on the bay side of the Point Loma shoreline. This station is missing August falling and April peaking tide data. Species are organized from greatest to lowest abundance.

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
double-crested cormorant	853		2	1	36	81	640	13	70		8	1	1		
brown pelican	832	3	2		1	270	517	26	2		6	1	1	2	1
Heermann's gull	544	0			6	83	90	36	284	5	39	1			
western gull	336	5	2	6	29	47	186	6	24	7	13	5	3	2	1
great blue heron	149	6	12	8	13	14	14	20	15	15	12	11	9		
Brandt's cormorant	139	1	10		0			115	1	1	8		1	1	1
gull SP.	130						130								
surf scoter	95									4		9	17	36	29
western grebe	77									9	2	12	7	29	18
snowy egret	66		3	1	9	23	19	1			6		1	2	1
great egret	54		3	2	1		5	18	12	3	2	2	5		1
rock pigeon	34	4		5	7				9			7			2
bufflehead	33									8	4	5	5	3	8
cormorant sp.	29			29											
red-breasted merganser	18	8										5	2	1	2
pelagic cormorant	15						15								
eared grebe	9	1								2		1	1	1	3
California least tern	6				6										
Caspian tern	5			1		4									
elegant tern	5				4	1									
ring-billed gull	5											2		1	2
Say's phoebe	5								1			2	1		1
Forster's tern	2					1	1								
house finch	2														2
osprey	2			1										1	
yellow-rumped warbler	2											1			1
California gull	1									1					
northern harrier	1									1					
spotted sandpiper	1			1											
Grand Total	3450	28	34	55	112	524	1617	235	418	56	100	65	54	79	73

Table 6-9. . Bird abundance at point count station 4 during each survey month. This station is located on the NASNI bay shoreline and is missing peaking tide data for August and February. Species are organized from greatest to lowest abundance.

		2009										2010	
		Mar	Apr		Jun	Aug	Sept	Oct	Nov		Dec	Jan	Feb
Species	Total	fall	fall	peak	fall	fall	fall	fall	fall	peak	fall	fall	fall
western gull	191	5	29	11	10	39	33	15	5	9	6	18	11
brown pelican	83		8			13	31	5	1	7	3	11	4
Heermann's gull	62					20	41					1	
sanderling	56	4	12				1		30			9	
marbled godwit	46	17	4			1	4	1	3			10	6
brant	34	6									1	25	2
spotted sandpiper	32	2	4	3		6	3	2	3	3	3	2	1
surf scoter	25									5	1	9	10
semipalmated plover	24	6	7						2			4	5
black-bellied plover	21						4	1	7		1	3	5
double-crested cormorant	21	1	1	1		7	2	4	1	1	3		
house finch	20	1			13			1		5			
willet	18	5	1			3	1	3	1			2	2
snowy egret	17				1	3	3	7	1			1	1
ruddy turnstone	13	3		5					4			1	
bufflehead	9										1	5	3
horned lark	7		3	4									
killdeer	7								7				
great blue heron	6		2	1	1				1	1			
yellow-rumped warbler	6								1	2		3	
black turnstone	5	3					1	1					
California gull	5			4							1		
black phoebe	4							1	1	1	1		
Caspian tern	4				3	1							
great egret	4				2				1			1	
royal tern	4						1		2		1		
wandering tattler	4		3	1									
California least tern	3				3								
long-billed curlew	3						1		1			1	
rock pigeon	3			3									
western meadowlark	3									3			
whimbrel	3	2	1										
Anna's hummingbird	2				1					1			
common loon	2								1	1			
Say's phoebe	2									1			1
white-crowned sparrow	2									1			1
barn swallow	1				1								
Brandt's cormorant	1										1		
eared grebe	1									1			
lesser scaup	1												1
loggerhead shrike	1											1	
mourning dove	1			1									
osprey	1										1		
Grand Total	758	55	75	34	35	93	126	41	73	42	24	107	53

Table 6-10. Bird abundance at point count station 5 during each survey month. This station is located on shore north of Harbor Island, near the Old San Diego River Mouth. Species are organized from greatest to lowest abundance.

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
American crow	24		2	2		2	1		2	3	1	1	3		7
Anna's hummingbird	1									1					
black-bellied plover	2								1	1					
black-crowned night heron	3			2			1								
Brewer's blackbird	1		1												
brown pelican	14		1			5					3	1	4		
bufflehead	46	2		1							8	7	2	8	18
Caspian tern	2			1		1									
cliff swallow	6				6										
cormorant sp.	1	1													
double-crested cormorant	10		1		1			2	1	1	1	1		1	1
eared grebe	16	3		1								6	1	3	2
European starling	28		2	1	2		1				4			16	2
great blue heron	2				1				1						
Heermann's gull	11					2		2			1	4	2		
house finch	1														1
lesser scaup	94	20										2	21	16	35
mallard	1			1											
marbled godwit	49	1						1	6	3	29	9			
no birds seen	0												0		
orange-crowned warbler	1										1				
osprey	1													1	
pied-billed grebe	1									1					
red-breasted merganser	5												4	1	
redhead	17												7	7	3
ring-billed gull	7									2	2	1		2	
ringed turtle dove	1						1								
rock pigeon	180	4	4			20	25	6	13	23	51	15		7	12
snowy egret	10		2		2	1	3	1		1					
spotted sandpiper	3	1	1							1					
surf scoter	1														1
western grebe	7	2									2		2		1
western gull	200	15	6	9	16	28	8	24	17	32	7	16	4	5	13
whimbrel	2												2		
willet	31	1						1	2	3	17	6		1	
yellow warbler	2														2
yellow-rumped warbler	3										3				
Grand Total	784	50	20	18	28	59	40	37	43	72	130	69	52	68	98

Table 6-11. Bird abundance at point count station 6 during each survey month. This station is located near the Coast Guard Station in the north-east corner of the bay, near Convair Lagoon. Species are organized from greatest to lowest abundance.

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
lesser scaup	204	20										21	39	46	78
marbled godwit	172	7				34	33	23	12	3	27	21	11	1	
surf scoter	132	10										21	48	32	21
western gull	132	14	12	10	3	16	11	7	7	5	3	4	7	2	31
bufflehead	75	6	1							5	9	17	16	12	9
redhead	43	2										11	3	15	12
European starling	37		4				33								
double-crested cormorant	30			2	2	1	6	3	1	4	2	2		4	3
least sandpiper	28					6				13			9		
western grebe	23	1												9	13
black-bellied plover	20						8	1	2	4			4	1	
rock pigeon	16	16													
California least tern	15				15										
eared grebe	14											1	4	5	4
willet	12	1						1	2	1		2	4	1	
California gull	11									1			3	4	3
brown pelican	9					2	1		1		2			3	
snowy egret	8		1	1			1			3		1		1	
Eurasian collared-dove	6						6								
Heermann's gull	6									3	1	2			
great blue heron	4								1	1	1	1			
Brandt's cormorant	3												2		1
house finch	3	3													
Brewer's blackbird	2			1	1										
common loon	2									1	1				
Forster's tern	2					1						1			
killdeer	2							2							
northern mockingbird	2			1	1										
spotted sandpiper	2									1			1		
yellow warbler	2										2				
greater scaup	1														1
green heron	1						1								
horned grebe	1														1
peep sp.	1										1				
pied-billed grebe	1												1		
red-breasted merganser	1												1		
ring-billed gull	1													1	
royal tern	1											1			
Grand Total	1025	80	18	15	22	60	100	37	26	45	49	106	153	137	177

Table 6-12. Bird abundance at point count station 7 during each survey month. This station is located on the cruise ship terminal pier. Species are organized from greatest to lowest abundance.

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
rock pigeon	231	2	12	24	7	28	17	17	16	36	15	21	8	12	16
Heermann's gull	173		1	1		17	2	11	23	34	12	28	14	19	11
western gull	161	3	15	10	9	11	13	2	23	9	27	2	19	10	8
surf scoter	48											7	20	3	18
ring-billed gull	26									2		9	9	1	5
house finch	13		6	2	2					1	2				
lesser scaup	10														10
California gull	4													3	1
American crow	2										2				
brown pelican	2					1							1		
great blue heron	2	1			1										
house sparrow	2	2													
mallard	2		2												
black phoebe	1				1										
double-crested cormorant	1			1											
eared grebe	1														1
Grand Total	679	8	36	38	20	57	32	30	62	82	58	67	71	48	70

Table 6-13. Bird abundance at point count station 8 during each survey month. This station is located just offshore of the Convention Center south the Embarcadero Marina Park South. Species are organized from greatest to lowest abundance.

		2009											2010		
		Mar	Apr		Jun	Aug	Sept		Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
western gull	535	52	34	32	25	51	51	51	62	54	52	29	13	22	7
surf scoter	189											38	76	75	
ring-billed gull	183		3	2						26	24	62	8	58	
rock pigeon	122		7	6	22	5	31	10	7	2	1	3	18	10	
Brandt's cormorant	75											74		1	
European starling	74		2	2		60	10								
Heermann's gull	51					1		1	5	6	11	11	13	3	
California gull	27	7							11		1		4	4	
brown pelican	24				1		1	1	2	1		8	6	4	
double-crested cormorant	23		2	2	1	2		3	4	5	2	1	1		
American crow	15	2	4	2	4			1						2	
Brewer's blackbird	12		1	1	4			6							
mallard	6			6											
house sparrow	4		2										2		
barn swallow	3			2	1										
black phoebe	2									1	1				
glaucous-winged gull	2	2													
great blue heron	2		2												
snowy egret	2		1											1	
Anna's hummingbird	1											1			
herring gull	1			1											
osprey	1											1			
white-throated swift	1				1										
Grand Total	1355	63	58	56	59	119	93	73	91	95	92	228	141	180	7

Table 6-14. Bird abundance at point count station 9 during each survey month. This station is located in the center of the bay front of the 10th Avenue Marine Terminal. Species are organized from greatest to lowest abundance.

		2009											2010		
		Mar	Apr		Jun	Aug	Sept		Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
western gull	160	14	5	5	8	23	9	6	7	10	4	13	8	40	8
surf scoter	77	30											30	3	14
Heermann's gull	45		1		2	4	3	2	4	7	1	14	5	1	1
Brandt's cormorant	16												15		1
ring-billed gull	8	1										1	1	5	
brown pelican	7		2									1	1	2	1
rock pigeon	5	2	3												
great blue heron	3								1	1		1			
American crow	1														1
California gull	1									1					
common raven	1				1										
double-crested cormorant	1			1											
snowy egret	1							1							
white-winged scoter	1	1													
no birds seen	0										0				
Grand Total	327	48	11	6	11	27	12	9	12	19	5	30	60	51	26

Table 6-15. Bird abundance at point count station 10 during each survey month. This station is located at the base of the Coronado Bridge on Coronado. Species are organized from greatest to lowest abundance.

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
surf scoter	310	56	2									163	15	6	68
marbled godwit	256		224									2	30		
lesser scaup	159	131		3								24			1
bufflehead	118	25		2						10	9	48	12	8	4
scaup sp.	115										103		12		
western gull	98	13	29			12	3	6	2	7	10	6	6	4	
rock pigeon	71					13	1	8			4		10	35	
cliff swallow	58				58										
royal tern	44						2			40	1		1		
American pipit	40									40					
western sandpiper	39		39												
mallard	35		20		5	5					2				3
ring-billed gull	35												29	6	
Heermann's gull	31					1		1		10	2	11	3	3	
snowy egret	31	4	12	1						1	3	8	2		
cedar waxwing	30										30				
willet	25	1	9			2				1		3	6	3	
eared grebe	23	12		4						1			3	2	1
American crow	21		4	4					5	1	3		2		2
brown pelican	19	3				3				6	4			3	
yellow-rumped warbler	15									6	9				
Forster's tern	11									4	4	1			2
California least tern	9			3	6										
house finch	9									3	6				
double-crested cormorant	7						1			1	5				
Brandt's cormorant	6											6			
great blue heron	5								1			3	1		
horned grebe	5										5				
house sparrow	4										4				
western grebe	4				2						2				
white-crowned sparrow	4										4				
orange-crowned warbler	3									1	2				
Anna's hummingbird	2							1			1				
black phoebe	2									1	1				
lesser yellowlegs	2												1	1	
long-billed curlew	2											1	1		
osprey	2	1						1							
black-bellied plover	1											1			
greater yellowlegs	1											1			
mourning dove	1					1									
redhead	1			1											
Say's phoebe	1									1					
spotted sandpiper	1											1			
whimbrel	1											1			
Grand Total	1657	246	339	18	71	37	7	17	8	134	214	280	134	71	81

Table 6-16. Bird abundance at point count station 11 during each survey month. This station is located in Glorietta Bay on a small sandy shore of the Coronado Golf Course. This station is missing June data. Species are organized from greatest to lowest abundance.

		2009										2010		
		Mar	Apr		Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
American coot	49										3			46
American crow	22		4	10		2				6				
American kestrel	1									1				
Anna's hummingbird	1													1
barn swallow	2		2											
Brandt's cormorant	120												120	
brant	34												7	27
brown pelican	8		1							2		4		1
bufflehead	19										1		10	8
California gull	3									1		1		1
Cassin's kingbird	2			2										
common loon	1								1					
double-crested cormorant	21			1	2		14			1		3		
eared grebe	6										3	2	1	
European starling	3		1			2								
Forster's tern	1					1								
great blue heron	3		1			1						1		
great egret	1								1					
Heermann's gull	7					1		1			2	1		2
house finch	2			2										
lesser scaup	293	9									19	181	8	76
long-billed curlew	1					1								
marbled godwit	135				21	10	85					16	3	
mourning dove	2									2				
osprey	4					2		1		1				
red-breasted merganser	1													1
redhead	25											23		2
ring-billed gull	37								13	1	1	15	4	3
rock pigeon	3					3								
royal tern	1										1			
Say's phoebe	2									1	1			
snowy egret	4	1							1	1		1		
surf scoter	99									10	36	36	3	14
western grebe	2													2
western gull	193		10	8	41	33	23	7	20	5	21	6	19	
whimbrel	75	75												
willet	12					1							6	5
yellow-rumped warbler	2										2			
Grand Total	1197	85	19	23	64	57	122	9	36	32	90	290	181	189

Table 6-17. Bird abundance at point count station 12 during each survey month. This station is located on Delta Beach North and is peaking tide data from February. Species are organized from greatest to lowest abundance.

		2009											2010	
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall
surf scoter	1142	120								22	24	100	125	751
western sandpiper	396	89	81						41	2		3	170	10
western gull	214		32	46	7		15	1	2	4	2	26	3	76
brown pelican	211		17	10	2		89	1	70	6		2		14
royal tern	209			2		195	4							8
Brandt's cormorant	205											200		5
black-bellied plover	194					175		3	3	1			7	5
greater scaup	192									17		30	118	27
double-crested cormorant	141	2	2	18	6		30	7	56		1	1		18
marbled godwit	132	7		1		13		1	29	27			29	25
American wigeon	122												35	87
semipalmated plover	117					64		4	1			2	46	
redhead	106									10		91	1	4
short-billed dowitcher	106							2	3				71	30
bufflehead	96	2								6	4	4	5	75
red knot	67							43	7				15	2
sanderling	63	14								3			45	1
brant	33		1	1									31	
California least tern	33			4	29									
dunlin	27								3				11	13
horned grebe	27											2	18	7
horned lark	26				2		10		6			2		6
killdeer	25			4				4	14				2	1
ruddy turnstone	25	9						1		1			2	12
lesser scaup	23											5	8	10
willet	21	1					1	2	8	3		1	3	2
Forster's tern	20	1		3		1			2	5		2	5	1
California gull	19											6		13
eared grebe	16	1	1	1								2	2	9
elegant tern	15			2			8		5					
herring gull	14			1								4		9
common loon	11	1									1			9
Belding's savannah sparrow	9				1			2	4			2		
tree swallow	9													9
house finch	8				2		6							
great blue heron	7			1			1	1		1		1	1	1
long-billed curlew	7							1	1	1			1	3
barn swallow	4		2	1		1								
Bonaparte's gull	3			3										
Caspian tern	3		2			1								
European starling	3		3											
greater yellowlegs	3									1	1		1	
Heermann's gull	3		1				1	1						
mourning dove	3			3										
osprey	3					1					1	1		
pied-billed grebe	3							1		1				1
snowy egret	3							1					1	1

		2009											2010	
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall
black scoter	2													2
great egret	2												1	1
red-throated loon	2													2
surfbird	2							2						
western grebe	2		1								1			
western snowy plover	2							2						
white-crowned sparrow	2													2
American kestrel	1							1						
black phoebe	1									1				
black skimmer	1				1									
black turnstone	1								1					
glaucous-winged gull	1											1		
gull-billed tern	1			1										
little blue heron	1				1									
red-breasted merganser	1									1				
Grand Total	4141	247	143	102	51	451	165	81	256	113	35	488	757	1252

Table 6-18. Bird abundance at point count station 13 during each survey month. This station is located on the Silver Strand Oceanside beach across from Fiddler's Cove. Species are organized from greatest to lowest abundance.

		2009											2010		
		Mar	Apr		Jun	Aug		Sep	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
western grebe	1926	35		90	1				100	300	400	1000			
surf scoter	1703				1				4	4	24	600	355	383	332
western gull	180	1		8	10	32	24	44	23	5	1	9	1	10	12
sanderling	134	3	2	14		29	3	1	59	7	1			15	
brown pelican	41	5	3	3			3	4	5	4	4	4	1		5
elegant tern	30		1	7	17			5							
marbled godwit	29				3	26									
California least tern	27				27										
double-crested cormorant	25		2	2	10	1	6		2				1		1
willet	16			1		4	4	2	2		1			1	1
tern sp.	14	6					6	2							
Forster's tern	13			4				1	2					6	
royal tern	13						6			2	2			2	1
brant	11										5	6			
white-crowned sparrow	10														10
western snowy plover	9	2		2			2		2				1		
western sandpiper	8			1					6		1				
barn swallow	7			3	3		1								
European starling	7				7										
Heermann's gull	7						1		3	2	1				
house finch	7				7										
black-bellied plover	6						2	2	2						
gull sp.	6										6				
cormorant sp.	5					1	1								3
American pipit	4									1	2		1		
California gull	4				1					1					2
common loon	4											1		1	2
ruddy turnstone	4							2						2	
American crow	3				3										
horned lark	3								3						
killdeer	3	1			2										
long-billed curlew	3				2		1								
ring-billed gull	3													1	2
Belding's savannah sparrow	2		1												1
black phoebe	2											1	1		
mourning dove	2				2										
red-throated loon	2									1		1			
black skimmer	1				1										
pacific loon	1													1	
Say's phoebe	1										1				
semipalmated plover	1			1											
Grand Total	4277	53	9	136	97	93	60	63	213	327	449	1622	361	422	372

Table 6-19. Bird abundance at point count station 14 during each survey month. This station is located on the north end of Delta Beach South. Species are organized from greatest to lowest abundance.

		2009											2010		
		Mar	Apr		Jun	Aug		Sep	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
western sandpiper	1248	74	49	25	10	20	18	151	94	130		140	410	127	
sanderling	986	49	28	1	7				5	80		225	106	483	2
black-bellied plover	959	19	31	22	19	4	1	65	146	65	277	63	175	7	65
elegant tern	649	42	130	44	20		2	405	6						
semipalmated plover	451	86	18		50		9	38	36	10		42	73	89	
royal tern	420	14	16	8	22	3	10	91	135	45	1	14	36	25	
brant	414	61		1						14	45	92	71	57	73
short-billed dowitcher	339	11	4	8			3	1	63	5	111	20	57	36	20
dunlin	274	28	13	12					19	25	10	55	51	61	
marbled godwit	242	9	4	1	8	35		3	18	12	28	26	39	22	37
surf scoter	223									18	3	17		35	150
Forster's tern	148	8	23	11	2			8	9	45		28	6	8	
red knot	128				6		6	36	40	20		8	9		3
western snowy plover	124	14	2					12	20	31		8	15	22	
brown pelican	84	2	2	1	3	61	2	7	2		2	2			
ruddy turnstone	84	3		1	2	2		5	15	1	12	21	3	15	4
Belding's savannah sparrow	83	4	8	4	18		1	10	4	4	10	8	2	5	5
long-billed curlew	81	10	2		2		3	3	23	2	5	7	7	8	9
greater scaup	79	50											29		
California gull	69	20		12						1		3	13	16	4
western gull	40	4	1	1	5	11	4	3	2		2	3		4	
bufflehead	36									3			6	5	22
gull-billed tern	35	2	7	26											
California least tern	34		7	5	22										
lesser scaup	31	30											1		
American wigeon	27													25	2
dowitcher sp.	27											27			
greater yellowlegs	26	1			6			1	6	1		4	3	2	2
willet	26	3		2	6	3	1	1	1	1	2		2		4
double-crested cormorant	23				5	12	1			1	2	1	1		
killdeer	22	1	3							1			3	12	2
eared grebe	15		2	1								1		3	8
horned grebe	13										1	1			11
snowy egret	12				1		6					1		2	2
barn swallow	10		7	1				2							
tree swallow	8														8
whimbrel	8			1	1		1	1	0		1	1		1	1
osprey	7		1					1		1	1				3
great blue heron	6					2				2	1				1
horned lark	6				6										
red-breasted merganser	6	2													4
house finch	5		5												
least sandpiper	5							5							
ring-billed gull	5	1								2		1	1		
great egret	4							1		1	1	1			
European starling	3		3												
red-throated loon	3											1			2

		2009											2010		
		Mar	Apr		Jun	Aug		Sep	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
cliff swallow	2				2										
Eurasian collared-dove	2														2
herring gull	2									1	1				
mallard	2		1								1				
red-tailed hawk	2									2					
Say's phoebe	2									1	1				
surfbird	2					2									
American pipit	1										1				
black phoebe	1													1	
black skimmer	1												1		
Caspian tern	1						1								
common loon	1											1			
common raven	1			1											
common tern	1							1							
Cooper's hawk	1										1				
loon sp.	1											1			
northern harrier	1									1					
western grebe	1									1					
white-crowned sparrow	1													1	
Grand Total	7554	548	367	189	223	155	69	851	644	527	520	823	1120	1072	446

Table 6-20. Bird abundance at point count station 15 during each survey month. This station is located off the dock front of the National City Marine Terminal and is missing June data. Species are organized from greatest to lowest abundance.

		2009										2010		
		Mar	Apr		Aug		Sep	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
surf scoter	604	12							58	284	114	58	27	51
western gull	75	4	4	4	7	2	5	2	30	1	3	5	6	2
brant	51											51		
least sandpiper	25													25
osprey	21		1						2	11	2	3		2
brown pelican	14				1		2				2	2	4	3
Brandt's cormorant	9										1	1	7	
great blue heron	7						2				4	1		
ring-billed gull	5									2	1			2
double-crested cormorant	3						1			1				1
snowy egret	3												3	
California gull	2												1	1
marbled godwit	2		2											
bufflehead	1												1	
pied-billed grebe	1													1
rock pigeon	1							1						
Grand Total	824	16	7	4	8	2	10	3	90	299	127	121	49	88

Table 6-21. Bird abundance at point count station 16 during each survey month. This station is located on the shore of D Street Fill. Species are organized from greatest to lowest abundance.

		2009											2010		
		Mar	Apr		Jun	Aug		Sep	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
surf scoter	10860	70								5000	5700		14		76
western sandpiper	1931		15				1	140	620	185		280	140	550	
peep sp.	1043	640	403												
marbled godwit	830	54	93		2	2	8	34	46	75		66	91	119	240
willet	731	106	43		5	2	27	71	35	33	1	80	198	112	18
red knot	564	70	380					25	39	33		10	4	1	2
black-bellied plover	468				4	16	1	63	29	56		122	112	65	
brant	307	22								30		13	88	88	66
western snowy plover	238					4		1	14			56	94	69	
dunlin	143								16	27		26	59	15	
dowitcher sp.	116	40						11	1	64					
California least tern	106			6	100										
greater scaup	78												73		5
least sandpiper	70	10				4	7	7	20	2		4	5	11	
sanderling	65								2			10	8	45	
California gull	63												16	42	5
long-billed curlew	58	5	1		7	2	2	7	2	3		5	3	4	17
semipalmated plover	48	6	11					5		4		15	7		
Forster's tern	44		4	4	11			1	1			5	15	3	
ring-billed gull	39	1	1							1		2	4	7	23
short-billed dowitcher	38					4							2	15	17
Belding's savannah sparrow	36	2		8	1	2	3	2	3	6		5	3		1
ruddy turnstone	29											25	4		
cliff swallow	26		2		18		6								
horned lark	25	3	4	7	1	6	1	2				1			
western gull	19	1	2	3	1	3	1	1		1				4	2
lesser scaup	18	2								8			2		6
royal tern	15		1						2				3	9	
house finch	14	2	2	10											
snowy egret	13	1	2	1	3			5	1						
greater yellowlegs	10	1							2			1	5	1	
American pipit	9											8			1
barn swallow	8			4	2		2								
osprey	8	1			3		1	1				1			1
great blue heron	7	2		3					1			1			
northern shoveler	7												7		
great egret	6		1	3				1					1		
whimbrel	6		1	3				1				1			
bufflehead	5												5		
large-billed savannah sparrow	5						1			3		1			
northern pintail	4											2		2	
Caspian tern	3				1								2		
double-crested cormorant	3			2	1										
killdeer	3				3										
rock pigeon	3			1	2										
American wigeon	2												2		
black skimmer	2				2										

		2009											2010		
		Mar	Apr		Jun	Aug		Sep	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
black turnstone	2											2			
brown pelican	2														2
eared grebe	2	1													1
glaucous-winged gull	2		1									1			
northern harrier	2				2										
European starling	1			1											
glaucous-winged gull x western gull	1												1		
herring gull	1													1	
pied-billed grebe	1										1				
Savannah sparrow	1														1
Say's phoebe	1								1						
tree swallow	1						1								
western meadowlark	1	1													
black scoter	0										0				
Grand Total	18144	1041	967	56	169	45	62	378	835	5531	5702	743	968	1163	484

Table 6-22. Bird abundance at point count station 17 during each survey month. This station is located north of the Chula Vista Marina. Species are organized from greatest to lowest abundance.

		2009											2010		
		Mar	Apr		Jun	Aug		Sep	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
western sandpiper	2759	405	98			35		76	127	850			268	900	
marbled godwit	1067	44	36	10		201	36		95	101	231	97	61	107	48
short-billed dowitcher	988		13			280	190	168	76	261					
willet	759	16	11	4	4	73	29	76	64	101	212	87	15	63	4
brant	599	0	3	4		1	1			75	75	96	166	120	58
American wigeon	334											23	102	209	
surf scoter	324	13									189	114			8
red knot	298					14	26	49	3	7	45			130	24
peep sp.	239			1		48							190		
scaup sp.	181	8											164		9
dowitcher sp.	149			14							119				16
semipalmated plover	84		23			2		12	10	5			4	28	
lesser scaup	68									13		55			
ring-billed gull	68	5								3		16	15	29	
cormorant sp.	52											52			
black-bellied plover	51					7	4	8	4	12	1	7	7	1	
brown pelican	37				1							35			1
long-billed curlew	35	1			5			2	3	4		7	7	3	3
dunlin	34		1							13				20	
western gull	20	1	3	1	5	2		5			1	1			1
greater yellowlegs	17				6	1		2		2			1	5	
cliff swallow	16				16										
least sandpiper	14														14
snowy egret	12		2		3	1	1					4	1		
killdeer	11					2					7		2		
northern pintail	11											3	6	2	
Forster's tern	10		2	1	3			1					3		
bufflehead	8	4													4
great egret	5									3		2			
redhead	5												5		
whimbrel	5								2					2	1
California least tern	4				4										
osprey	4		2					1	1						
pied-billed grebe	4	2									1	1			
ruddy turnstone	4			1			1				1				1
yellow-rumped warbler	4	4													
Caspian tern	3				2									1	
Cassin's kingbird	3	3													
common merganser	3											2			1
eared grebe	3														3
horned grebe	3														3
Anna's hummingbird	2	2													
California gull	2	2													
common yellowthroat	2				2										
double-crested cormorant	2	1			1										
house finch	2	2													
mallard	2														2

		2009											2010		
		Mar	Apr		Jun	Aug		Sep	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
northern shoveler	2													2	
rock pigeon	2	2													
song sparrow	2	2													
white-throated swift	2				2										
barn swallow	1		1												
belted kingfisher	1						1								
black phoebe	1						1								
black skimmer	1				1										
bushtit	1				1										
common loon	1														1
common tern	1	1													
Eurasian wigeon	1													1	
gadwall	1													1	
great blue heron	1									1					
green-winged teal	1													1	
hooded oriole	1	1													
lesser yellowlegs	1	1													
reddish egret	1								1						
Say's phoebe	1									1					
Grand Total	8330	520	195	36	56	667	290	400	386	1452	882	602	1017	1625	202

Table 6-23. Bird abundance at point count station 18 during each survey month. This station is located just north of the South Bay Power Plant. Species are organized from greatest to lowest abundance.

		2009											2010		
		Mar	Apr		Jun	Aug		Sep	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
peep sp.	2050	0				585		700				125	640		
western sandpiper	1680		370						875	430				5	
American wigeon	1650	0							1	41	85	1165	255	28	75
gull sp.	751				46			3	33	186			419		64
willet	548	81	19	7	48	60	7	105	68	50	37	22	4	30	10
semipalmated plover	513		20			6		2	45	44		280	116		
marbled godwit	436	34	9	55	16	86	6	29	66	57	13		21	14	30
short-billed dowitcher	354					113	30	114	55	42					
California gull	283	73	58	3			1							148	
western gull	182	11	7		4	33		83		21				23	
northern shoveler	141										50	78	7		6
elegant tern	125	25	24		15	60		1							
lesser scaup	115										108				7
black-bellied plover	105	0				66	7	4	20			7	1		
American coot	95	16	7	8						50	2	1		6	5
ring-billed gull	86	70				11								5	
dunlin	84		7							77					
Caspian tern	80	23	37	5	3	7	3							2	
least sandpiper	79						2			3			33	41	
gadwall	74			1	3					4		24	10	6	26
brant	72		1		1									54	16
Forster's tern	62		10		2	50									
northern pintail	59				2				0		14	32	9	2	
rock pigeon	58	58													
mallard	57			4	30		6				7		10		
redhead	50									6	13	4	27		
dowitcher sp.	48			38										10	
long-billed curlew	42			1	5		2	5	9	2	1	4	4	6	3
blue-winged teal	30		4	6			6				8		3	3	
green-winged teal	27	2											13		12
western grebe	27														27
teal sp.	23	23													
snowy egret	13	1	1	2	4	1				1				2	1
black skimmer	11				10	1									
American avocet	9	2	7												
black-necked stilt	9				6		3								
great egret	9						1	1	1	1	2			1	2
California least tern	8				8										
gull-billed tern	8	2	2		4										
great blue heron	7				1				2					1	3
scaup sp.	7			7											
barn swallow	6						6								
brown pelican	6					1							4	1	
eared grebe	5										2				3
greater yellowlegs	5				4						1				
common merganser	4											2			2
peregrine falcon	4								1			2		1	

		2009											2010		
		Mar	Apr		Jun	Aug		Sep	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
black scoter	3						3								
pied-billed grebe	3				1					1					1
red knot	3								3						
glaucous-winged gull	2	2													
Heermann's gull	2					2									
osprey	2									1				1	
reddish egret	2					1	1								
Thayer's gull	2									2					
bufflehead	1										1				
horned grebe	1										1				
house finch	1	1													
killdeer	1									1					
pacific loon	1												1		
Grand Total	10121	424	583	137	213	1083	84	1047	1179	1020	345	1746	1577	390	293

Table 6-24. Bird abundance at point count station 19 during each survey month. This station is located on the Chula Vista Wildlife Refuge. Species are organized from greatest to lowest abundance.

		2009											2010		
		Mar	Apr		Jun	Aug		Sep	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
surf scoter	1263	23								244	840	18	19	89	30
lesser scaup	666		17							80	180	112	4	140	133
marbled godwit	507	9		1							492		1		4
brant	367	5	51	19						71	188		4	4	25
Forster's tern	252	1	19	44	167					4		15	2		
willet	178	5	1	1	4	3	2	4	1		156	1	0		
elegant tern	154	2		2	124	26									
northern pintail	150										148		2		
American wigeon	103										44	7	16	36	
peep sp.	102	3	40	10		9		6		31		1		2	
bufflehead	82	14									27	7	19	11	4
long-billed curlew	71	1			3	5	12	3		5	36	2	1	1	2
horned grebe	68									6		22	40		
brown pelican	59	1				3	8	14		6	2	4	2	11	8
Belding's savannah sparrow	55	3	4	4	5	6	11	1	2	4	5	4	1	3	2
dowitcher sp.	49	13									36				
duck sp.	41									41					
ruddy duck	40									18	22				
western gull	40		4	1		2	16	2		7		1	1	3	3
osprey	32	1	1	1	7		4	3		2	4	3	2	2	2
California least tern	29				29										
least sandpiper	23					8	2	2	6	2		3			
Caspian tern	22	1	8	4	4	4	1								
eared grebe	19										8	4	2	4	1
black-bellied plover	18					3	2	2		10			1		
great blue heron	14	1		2		4		2		2		2			1
Bonaparte's gull	13											13			
royal tern	10	1			1	2	1	1				2		2	
western grebe	9											3	1	1	4
double-crested cormorant	8		3		1	1						1	2		
gadwall	7									7					
canvasback	6									6					
great egret	6						2	1			2	1			
snowy egret	6		1		3			2							
large-billed savannah sparrow	5										1	1		3	
red-breasted merganser	5	3											2		
red-throated loon	5											4	1		
California gull	4									4					
greater yellowlegs	4							3	1						
redhead	4												4		
barn swallow	3					3									
northern harrier	3			2	1										
pacific loon	3												2		1
ring-billed gull	3											2		1	
mallard	2			2											
northern shoveler	2												2		
peregrine falcon	2						2								

		2009											2010		
		Mar	Apr		Jun	Aug		Sep	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
ruddy turnstone	2													2	
whimbrel	2										2				
yellowlegs sp	2						2								
American kestrel	1						1								
black skimmer	1				1										
black turnstone	1							1							
glaucous-winged gull	1			1											
gull sp.	1														1
horned lark	1	1													
red-tailed hawk	1												1		
Grand Total	4527	88	149	94	350	79	66	47	10	550	2193	233	132	315	221

Table 6-25. Bird abundance at point count station 20 during each survey month. This station is located at the Marine Biological Study Area south of Emory Cove. Species are organized from greatest to lowest abundance.

		2009											2010		
		Mar	Apr		Jun	Aug		Sep	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
western sandpiper	4653	620	287		10	480	2	504	340	590		440	680	700	
elegant tern	2188	450	255	7	300	850	60	256	10						
brant	1704	130	6	14						285	280	140	359	230	260
dunlin	957	297	100					1	40	131		113	210	65	
marbled godwit	865	56	55	2	16	187	2	100	146	80		45	106	65	5
short-billed dowitcher	839	38			1	250	90	460							
scaup sp.	667									260	192	130	85		
black-bellied plover	549	85	39		25	35	11	27	37	18		82	140	50	
willet	488	10	6	1	8	46	3	144	95	50	1	30	61	30	3
dowitcher sp.	417		38						125	80		47	90	35	2
Forster's tern	347	33	33	5	2	11	1	26	12	40		114	43	27	
red knot	254	47	89		5	28		40	8	8		6	18	5	
semipalmated plover	208	12	24	4	2	34		96	2	1			7	26	
royal tern	190	2		1	8	1		39	62	25	1	4	26	18	3
surf scoter	172									68	85	8	8	1	2
Belding's savannah sparrow	166	8	22	14	15	14	10	46	6		2	2	7	6	14
eared grebe	82								2			55	19	1	5
Western/Clarke's Grebe	80												80		
American wigeon	78									2	11	12	28		25
bufflehead	72									14	1	10	45	2	
western snowy plover	58							15	25	1				17	
common tern	55					40		15							
least sandpiper	55	1				5	8	12	4	1		4	1	9	10
brown pelican	51	3	3	4		16	10	6	1				7		1
long-billed curlew	51	5			2	9	3	14	8	1		4	4	1	
double-crested cormorant	50		3	7	4	8	9	2	10			3	1		3
horned grebe	45										2	12	30		1
western grebe	41									19	13	9			
western gull	41	5	4	1		5		5	6	2			6	4	3
Bonaparte's gull	34		3									21	10		
killdeer	30	3	1	1	2	1	2	5	1		2	4	8		
snowy egret	30		2		2	14		4	1	1		1	3	1	1
sanderling	27							15	3			6		3	
lesser scaup	21												8		13
black skimmer	19		6			1	1	1						10	
Caspian tern	18	2	9	3	4										
white-crowned sparrow	18								2			5		5	6
greater yellowlegs	16	1			1	1		2	1	3		4	2	1	
ruddy turnstone	16	3				3		4				3	1	2	
redhead	15									10		4	1		
house finch	14	7	5										2		
American white pelican	13		13												
horned lark	13		12						1						
great egret	10							3		1			4	1	1
swallow sp.	10														10
whimbrel	10		1	1		5	3								

		2009											2010		
		Mar	Apr		Jun	Aug		Sep	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
red-breasted merganser	9			1								3	3		2
ring-billed gull	9	1				1				1		1	3		2
California gull	8		2							1	3	1	1		
greater scaup	8												6		2
gull-billed tern	8		4	3	1										
northern pintail	8											4		2	2
great blue heron	6							2	1	1	1	1			
Clark's grebe	5											4			1
light-footed clapper rail	5				5										
osprey	5							1	1	1				2	0
California least tern	4				4										
black phoebe	3				1						1		1		
black turnstone	3	3													
hooded merganser	3											1	2		
American pipit	2								2						
Heermann's gull	2											1	1		
marsh wren	2												2		
northern rough-winged swallow	2							2							
Wilson's phalarope	2		2												
American golden plover	1		1												
American kestrel	1							1							
Anna's hummingbird	1										1				
Brandt's cormorant	1												1		
northern shoveler	1												1		
Say's phoebe	1														1
Grand Total	15837	1822	1025	69	418	2045	215	1848	952	1695	596	1334	2121	1319	378

Table 6-26. Bird abundance at point count station 21 during each survey month. This station is located on the north shore of the salt ponds, between ponds 14 and 15. Species are organized from greatest to lowest abundance.

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
peep sp.	11490		380	38		2323	6				1	6020	1820	900	2
eared grebe	7266	48	154	313				146		1910	2100	1112	218	240	1025
western sandpiper	5236	760	5	1		1		2802		900		99	6	662	
red-necked phalarope	3975			6		586	148	2960	275						
elegant tern	3874		4	30	714	1526	1600								
western gull	1723	1	3		6	10	15	99	1445	52	25	8	30	24	5
black-bellied plover	1495				7	149		149	211	225		197	236	321	
Caspian tern	593	3	18	143	199	80	149		1						
marbled godwit	470	65	49	1	28	26	6	50	45	47		89	54	10	
willet	359	16	12		26	24	4	99	4	47	38	45	20	20	4
egret sp.	350								350						
dunlin	270	2	9					1	63	91		7	8	89	
red knot	203		63					16	80	44					
semipalmated plover	197		10					5	133	35		7	1	6	
black skimmer	159				21	64	74								
California gull	155			15	66		4		1	11	24	5	1	28	
double-crested cormorant	155	2	3	13	32	17	40		1	1				7	39
swallow sp.	142					130		12							
royal tern	141	2		20	10	40	62			3	2	2			
dowitcher sp.	106		8				40	8	10	18			22		
Forster's tern	84	6	2	2	4			11		2	3	22	5	24	3
brown pelican	60				11	18	16			2		1	2	2	8
long-billed curlew	58	3	1		9	6		10	7	9		7	5	1	
surf scoter	49											6	7		36
snowy egret	45	9	7		3	7	1	8	1			1	3	5	
great egret	37		1		1	1	1	7	1	17		3	5		
American white pelican	36			14								22			
least sandpiper	32							1	27					4	
ring-billed gull	31									2		2	26	1	
black-necked stilt	28			4	24										
California least tern	27		2		25										
American avocet	16		2	4	10										
Belding's savannah sparrow	15						3	1	4		3	2			2
osprey	15		1		1	1				1	4	1		2	4
mallard	13														13
northern pintail	11										2		5	4	
greater yellowlegs	10	1								2		2	2	3	
American wigeon	9									3		2		4	
bufflehead	8											4			4
short-billed dowitcher	5									1		2		2	
northern harrier	3										2	1			
western grebe	3														3
gadwall	2			2											
glaucous-winged gull	2				1									1	
ruddy turnstone	2								2						
barn swallow	1			1											

		2009											2010		
		Mar	Apr		Jun	Aug		Sept	Oct	Nov		Dec	Jan	Feb	
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall	peak
brant	1			1											
great blue heron	1													1	
gull-billed tern	1				1										
Heermann's gull	1											1			
horned grebe	1														1
peregrine falcon	1						1								
Grand Total	38967	918	734	608	1199	5009	2170	6385	2661	3423	2204	7670	2476	2361	1149

Table 6-27. Bird abundance at survey station 22 during each survey month. This station is located upland on the Naval Radio Receiving Facility on the south end of the Coronado peninsula. This station is missing peak data for February. Species are organized from greatest to lowest abundance.

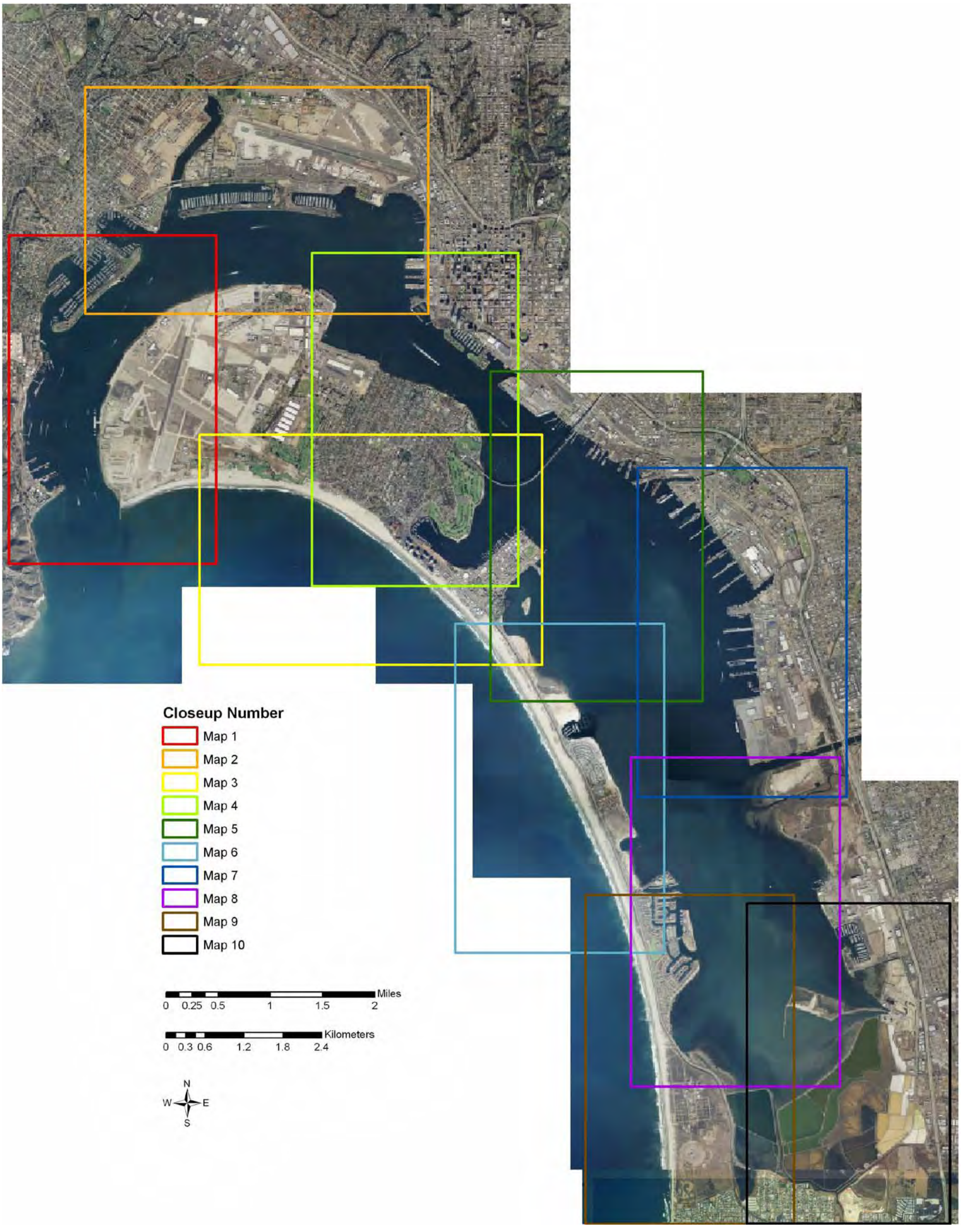
		2009											2010	
		Mar	Apr		Jun	Aug		Sep	Oct	Nov		Dec	Jan	Feb
Species	Total	fall	fall	peak	fall	fall	peak	fall	fall	fall	peak	fall	fall	fall
northern shoveler	387													387
elegant tern	227	175	9	9	30		1	3						
house finch	137	32	20	25	7	19	2	2	8		0	10	5	7
horned lark	69	6		4								59		
double-crested cormorant	63	1	1	4	14	2	18	1	17	4	1			
white-crowned sparrow	61								2	3	16	34	3	3
semipalmated plover	46			46										
marbled godwit	44					44								
killdeer	32								0			2	3	27
black-bellied plover	19	19												
western meadowlark	17	5		1					2		3		3	3
western sandpiper	15													15
American wigeon	12													12
dowitcher sp.	12													12
brown pelican	11				2	4	3		1			1		
red-tailed hawk	10			1	1	1	1	1			1	2		2
least sandpiper	9													9
mourning dove	8			1		5		1	1					
Anna's hummingbird	7								1		3	3		
greater yellowlegs	6	4										1	1	
Belding's savannah sparrow	5	3	1	1										
western gull	5						2		2		1			
common raven	4								3				1	
gadwall	4													4
song sparrow	4			2					1		1			
Caspian tern	3	1	1				1							
cinnamon teal	3													3
Forster's tern	3		2								1			
gull-billed tern	3		1		2									
northern mockingbird	3		2	1					0					
northern pintail	3													3
American crow	2		1					1						
black phoebe	2								2					
brant	2		2											
great blue heron	2			1								1		
northern harrier	2	1											1	
Say's phoebe	2							1					1	
tree swallow	2													2
American kestrel	1	1												
barn swallow	1													1
marsh wren	1								1					
northern flicker	1													1
rough-winged swallow	1			1										
royal tern	1										1			
whimbrel	1		1											
white-tailed kite	1										1			
yellow-rumped warbler	1										1			
Savannah sparrow	0								0					
Grand Total	1255	248	41	97	56	75	28	10	41	7	30	113	18	491

Table 6-28. Species and number observed during the waterbird portion of the 2009-2010 San Diego Bay avian surveys. Species are organized from greatest to least total number observed. Peak abundances are in bold.

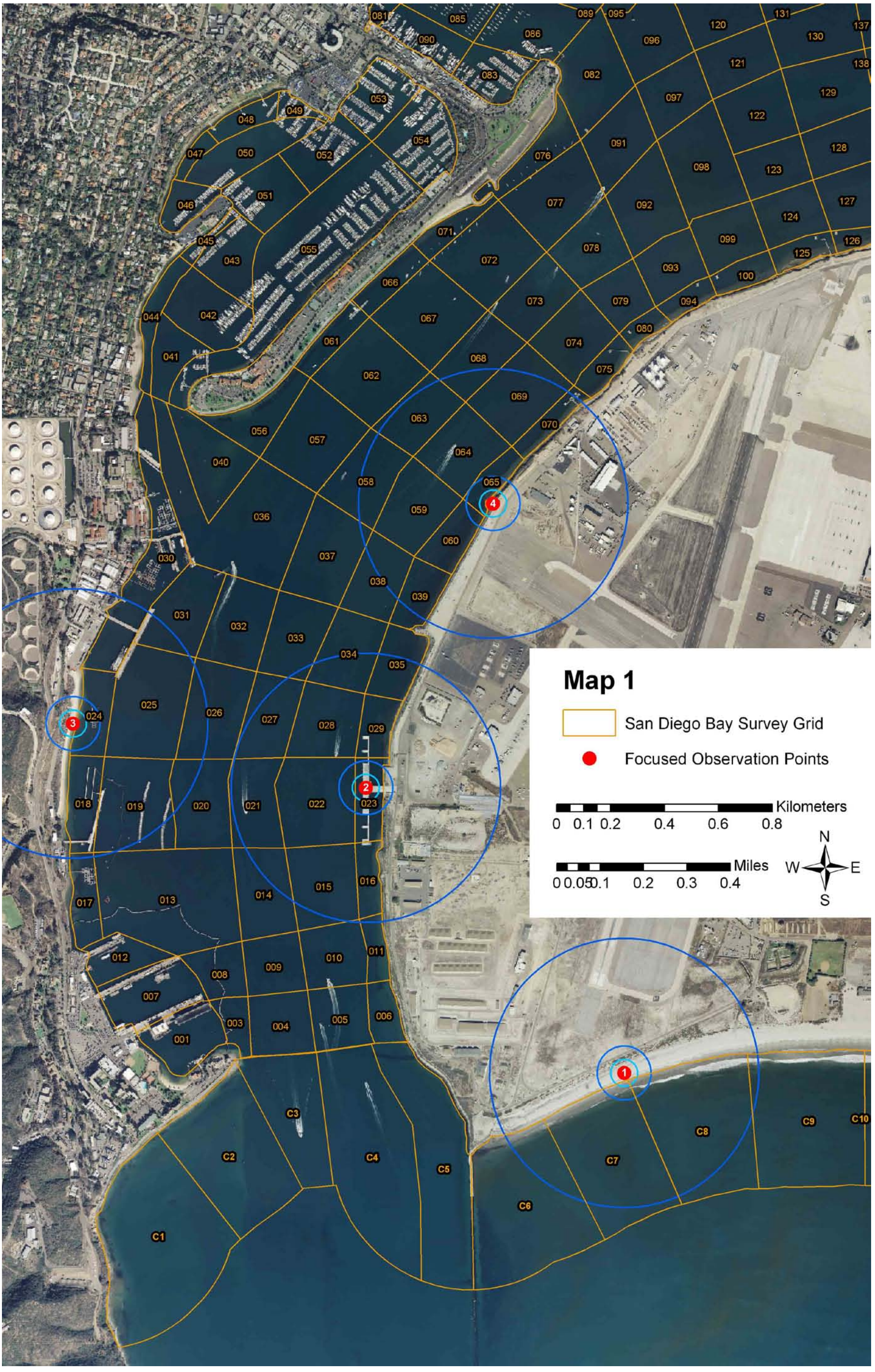
		Month			
Species	Total	Nov	Dec	Jan	Feb
surf scoter	14327	2706	5209	4385	2027
lesser scaup	2236	44	651	1006	535
Brandt's cormorant	844	9	481	293	61
bufflehead	740	5	307	360	68
western gull	404	94	77	140	93
double-crested cormorant	325	9	26	284	6
brant	316	32	94	145	45
brown pelican	213	24	103	46	40
Heermann's gull	205	82	83	30	10
redhead	134	54	80	0	0
eared grebe	105	8	84	1	12
least sandpiper	86	1	85	0	0
sanderling	72	0	0	72	0
short-billed dowitcher	60	0	0	0	60
western grebe	58	20	29	2	7
Forster's tern	52	1	44	7	0
willet	52	0	48	4	0
western sandpiper	51	0	0	5	46
marbled godwit	29	0	10	10	9
horned grebe	24	0	0	24	0
scaup sp.	20	0	20	0	0
ring-billed gull	19	0	6	12	1
royal tern	18	7	4	4	3
great blue heron	18	0	10	7	1
California gull	17	3	7	6	1
elegant tern	17	0	0	17	0
common loon	10	0	0	7	3
American crow	6	0	6	0	0
osprey	5	0	1	2	2
Pacific loon	4	0	4	0	0
cormorant sp.	4	0	4	0	0
great egret	4	0	4	0	0
pied-billed grebe	4	1	0	3	0
caspian tern	4	3	0	1	0
Bonaparte's gull	3	0	3	0	0
long-billed curlew	3	0	0	3	0
snowy egret	2	0	1	1	0
mallard	2	0	0	0	2
Clark's grebe	1	1	0	0	0
black-crowned night heron	1	0	0	0	1
common tern	1	0	0	1	0
Canada goose	1	0	0	1	0
black scoter	1	1	0	0	0
loon sp.	1	0	1	0	0
red-throated loon	1	0	1	0	0
herring gull	1	1	0	0	0
long-tailed duck	1	0	1	0	0
Total	20502	3106	7484	6879	3033

7.0 Oversize Figures

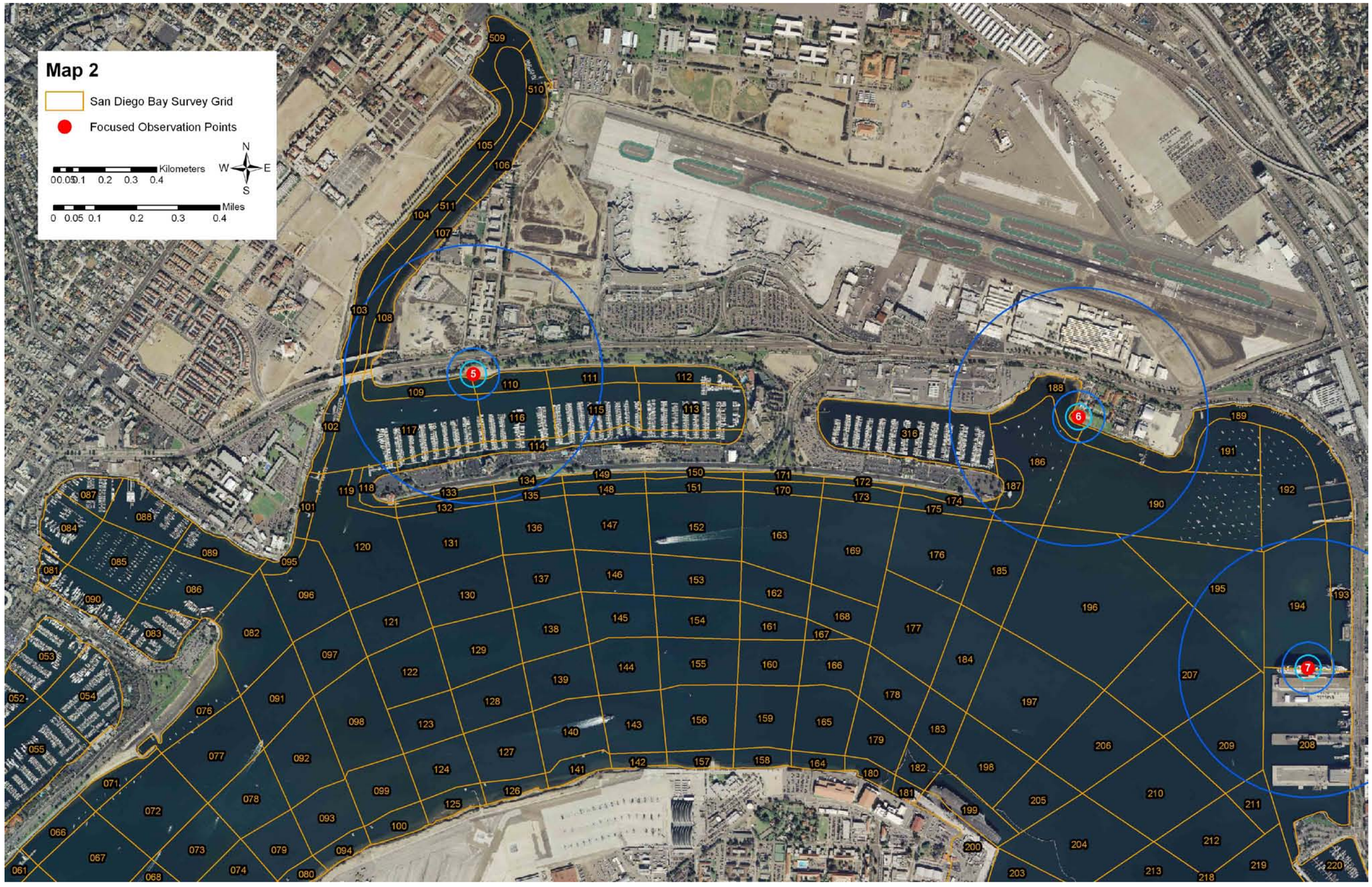
This section contains figures and maps that were too large to include in the text of the document.



Map 7-1. Overview map of San Diego Bay indicating the location of the grid cell close-up maps.

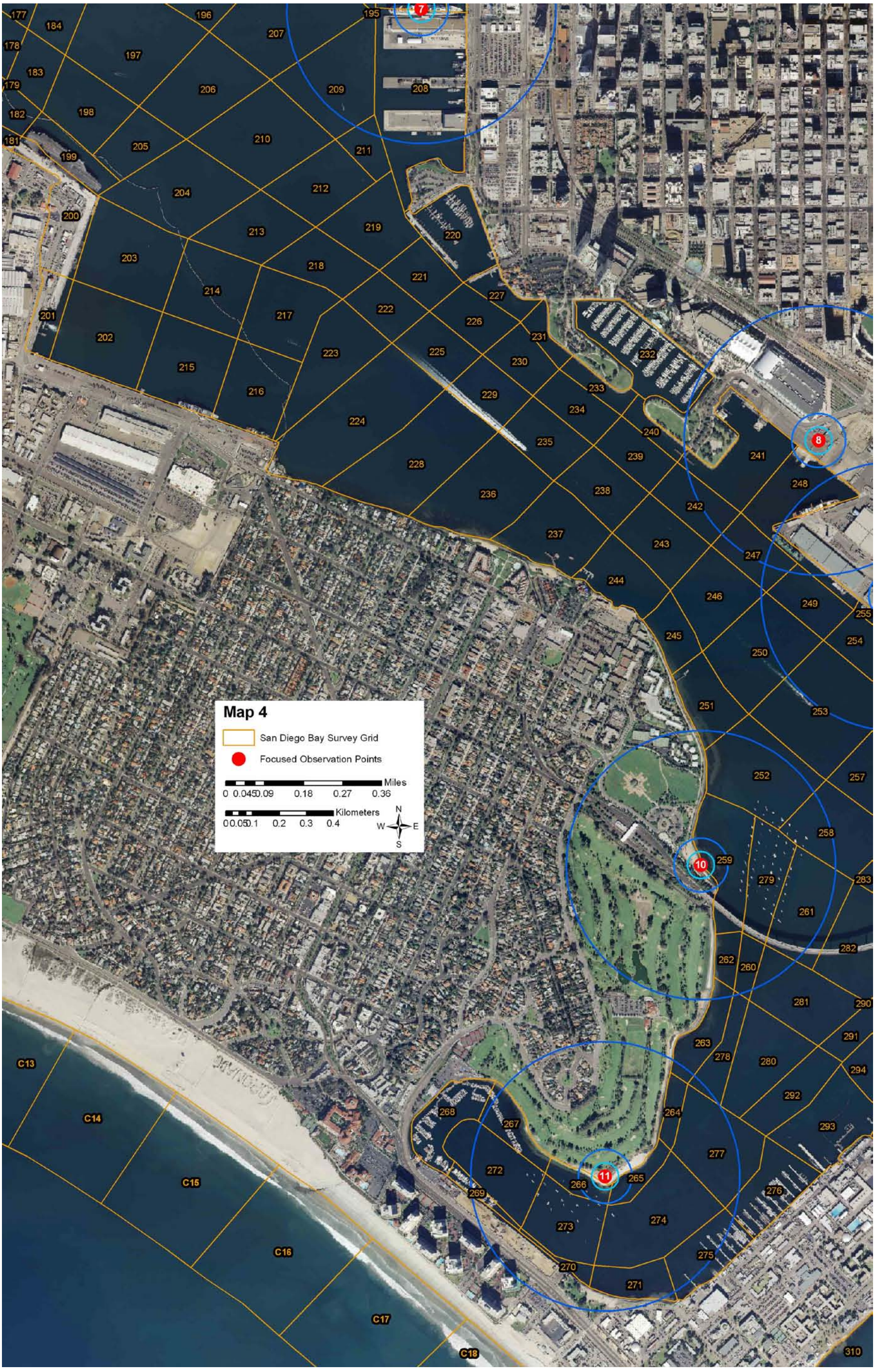


Map 7-2. Grid cell close-up Map 1.

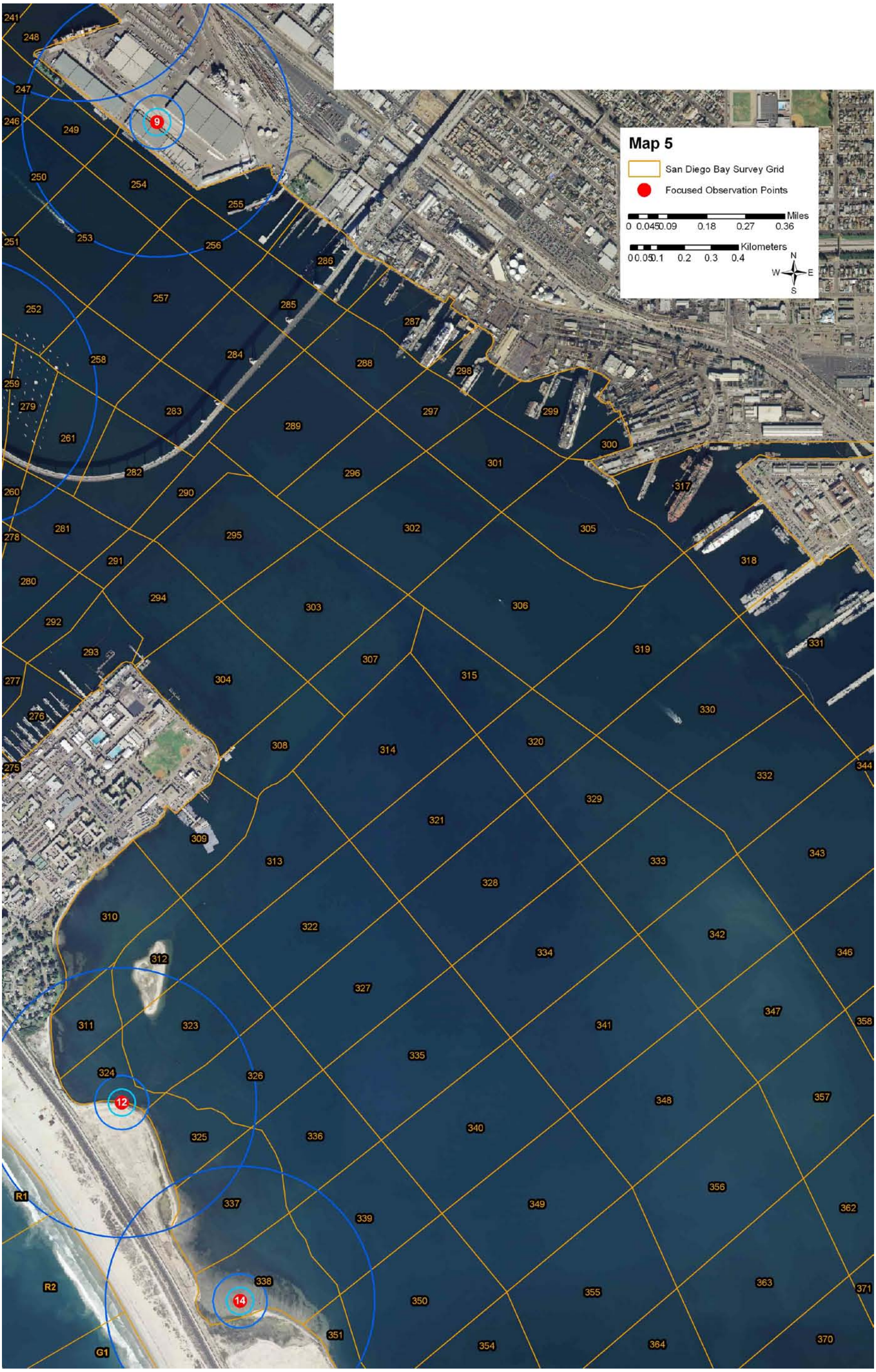


Map 7-3. Grid cell close-up Map 2.

Map 7-4. Grid cell close-up Map 3.

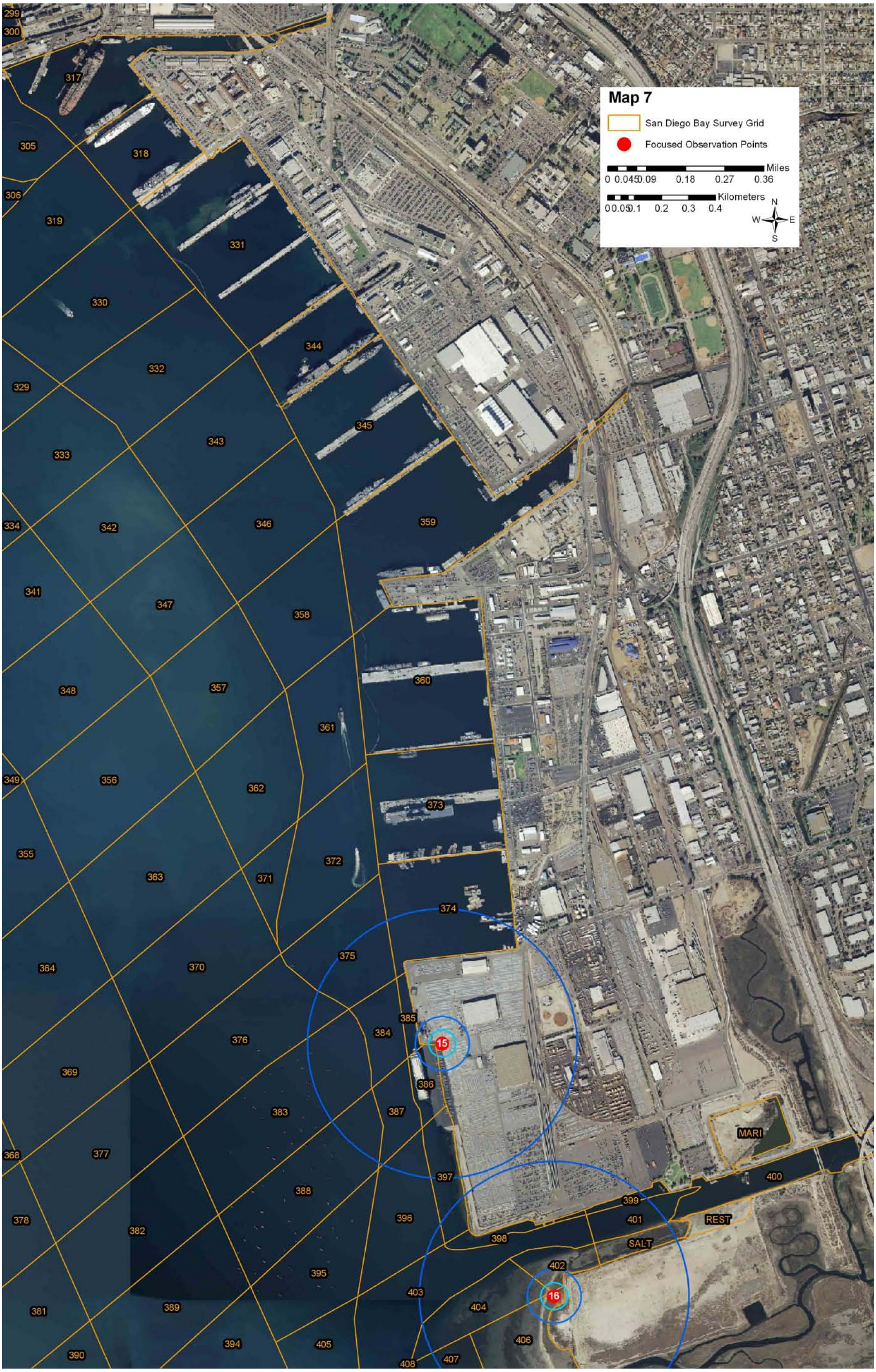


Map 7-5. Grid cell close-up Map 4.

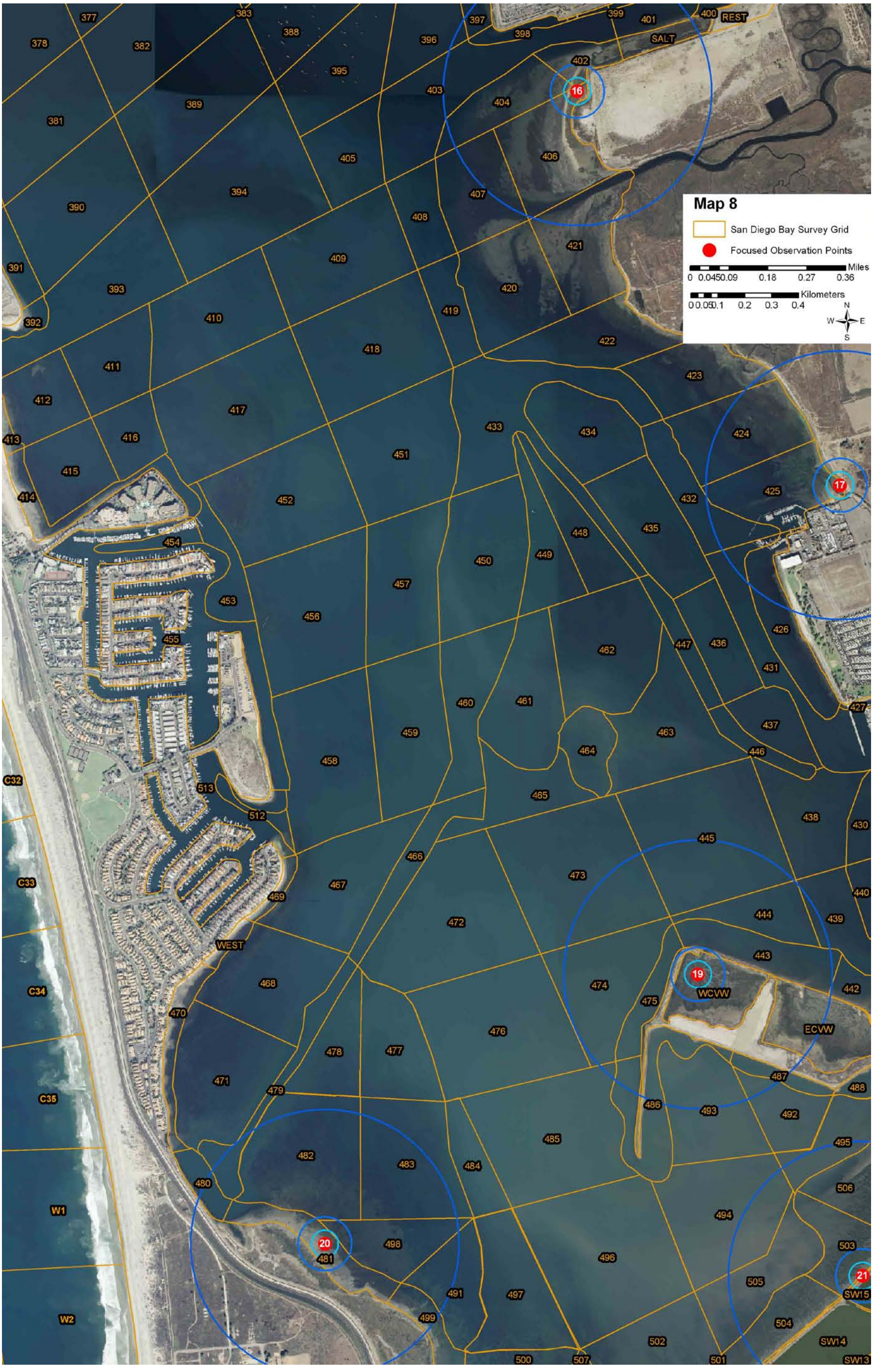


Map 7-6. Grid cell close-up Map 5.

Map 7-7. Grid cell close-up Map 6.

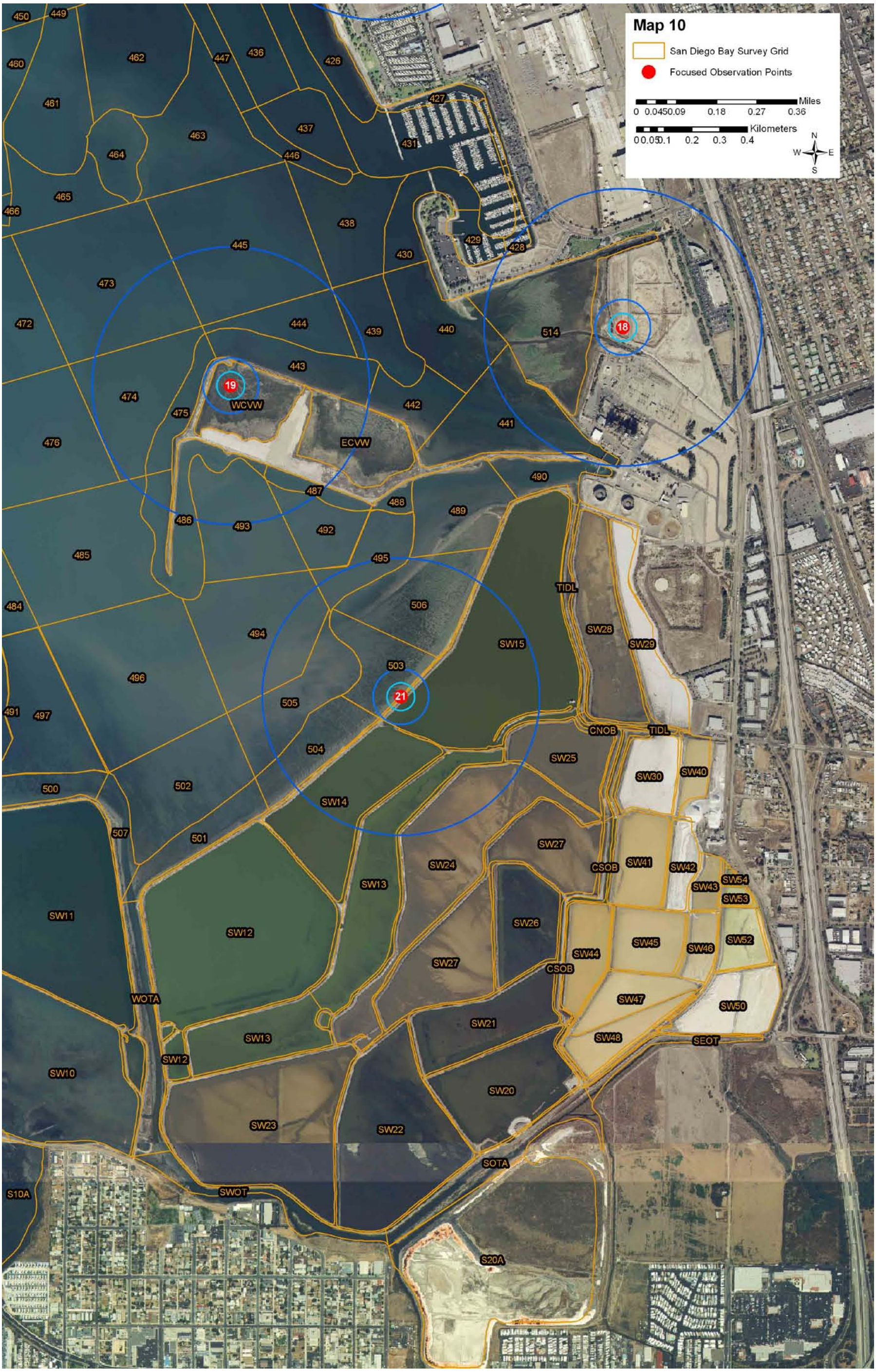


Map 7-8. Grid cell close-up Map 7.



Map 7-9. Grid cell close-up Map 8.

Map 7-10. Grid cell close-up Map 9.



Map 7-11. Grid cell close-up Map 10.

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Appendix A: Example Security Form and Protocol

Natural Resource Survey Form

NAVFAC Naval Facilities Engineering Command

January 31 through February 2, 2009

Special Instructions:

Project Title		**Contract No**	
Survey Date(s)		**Duration of Survey**	
January 31-February 2, 2009			
Location	**Activity**	**Vehicle Type**	**Vehicle ID**
1:		Water ☒ Land ☐	
2:		Water ☒ Land ☐	
3:		Water ☒ Land ☐	
4:		Water ☐ Land ☒	
Operator Name		**Operator Contact Information**	
Jim Kellogg/Harry Smead		*Cell No.: 760-xxx-xxxx/ 760-xxx-xxxx VHF: 14 & 16*	
Primary Contacts			
		Cell No.:	
		Cell No.:	
		Office No.:	
Other Participants			
		Cell No.:	
		Cell No.:	
		Cell No.:	
		Cell No.:	
		Cell No.:	
		Cell No.:	
		Cell No.:	
		Cell No.:	
Navy Contact Representatives		**Title**	
Office Number: *Cell Number:*			
Office Number: *Cell Number:*			

Protocol consisted of sending in a completed security form (as shown above) to the Navy project manager one week prior to surveys; this form was forwarded to the appropriate parties in the Navy.

On the actual survey date the on-water survey crew telephoned Navy security dispatch with the time and location of the day's surveys. Surveyors reported to the Navy on the water radio frequencies, while the survey was in progress, and when the boat reached a Navy security zone, radioed on-water Navy security informing of entry into the zone.

Appendix B: Species Profiles

Species observed during the 2009-10 San Diego Bay Bird Survey (shorebird and waterbird) are presented below, organized by Order then by Family. Naming convention (except for capitalization) follows the American Ornithologists' Union (AOU) Check-list of North American Birds (AOU 1998) supplemented by Unitt (2004) when subspecies not covered in the check-list, but important locally, are discussed. Species observed during this survey were cross referenced with the San Diego Bay INRMP (Navy 2000) species list. Five additional species to the INRMP list were noted, the yellow-billed loon, American golden-plover, ringed turtle-dove, Brewer's sparrow, and Bullock's oriole. Species not observed are discussed under each Family's section. The San Diego Bay INRMP incorporated all major bird survey information prior to 2000 for the bay.

Species descriptions contain a brief discussion of the location where the species was found and total number of birds observed during the waterbird and shorebird surveys. The information presented is discussed in the context of historical observations, relying heavily on the Bay INRMP and Unitt's 2004 San Diego County Bird Atlas.

Anseriformes

Of the 35 Anseriformes listed on the San Diego Bay INRMP's species list, eight were not found during this survey effort: snow goose (*Chen caerulescens*), Ross's goose (*Chen rossii*), wood duck (*Aix sponsa*), tufted duck (*Aythya fuligula*), fulvous whistling-duck (*Dendrocygna bicolor*), harlequin duck (*Histrionicus histrionicus*), brant Atlantic subspecies (*Branta bernicla hrota*), and king eider (*Somateris spectabilis*.

Anatidae (Swans, Geese, and Ducks)

Brant (Branta bernicla)

Since the collapse of the brant population in San Diego Bay prior to 1970, the species has been increasing in the bay, likely feeding on eelgrass (Unitt 2004). Brant were seen in all months of the survey, but were most abundant between November and March. Overall, 7,309 were seen on the shorebird surveys and an additional 316 on the waterbird surveys. The overwhelming majority were in the south bay; with smaller numbers seen in every other. The black brant (*Branta bernicla nigricans*) is the brant subspecies regularly occurring in San Diego County because of its migration route along the Pacific coast (Unitt 2004). No brant from the Atlantic subspecies were noted during the surveys.

Canada goose (Branta canadensis)

Approximately 5,000 to 8,000 of these geese normally spend the winter in San Diego County, congregating in a few large flocks. They usually frequent fresh or brackish water and have not been historically seen in very high numbers around San Diego Bay (Unitt 2004). Only one was noted in the north-central bay in November in these surveys.

American wigeon (Anas americana)

The American wigeon is a common winter visitor in San Diego County, second only to the mallard in distribution. Wigeons typically arrive in September and usually depart by April. This bird can be seen where other ducks are seldom found due to its habit of grazing on terrestrial vegetation. In San Diego Bay, eelgrass is a favorite food (Unitt 2004). During this effort, American wigeons were observed in March and April, and again from October through February, 6654 in total, only half as many as seen in the 2006-07 surveys. Almost all birds were in the south bay and salt works.

Gadwall (Anas strepera strepera)

The gadwall is an abundant winter visitor to San Diego County and has extended its breeding range to include the county. Nesting birds can typically be found in the coastal lagoons of North County, which is also where higher numbers of wintering birds can be seen (Unitt 2004). During this effort, gadwalls were observed in almost all survey months, with a peak in November and December. All but 5 of the 323 records were from the south bay and salt works, with the remaining in an ocean grid adjacent to the south bay.

Eurasion wigeon (Anas penelope)
The Eurasian wigeon is a yearly winter visitor in San Diego County, usually found within groups of American wigeons. They are typically present from November through March (Unitt 2004). Only one was seen during these surveys, in the south bay in February.

Mallard (Anas platyrhynchos platyrhynchos)
The mallard is a common, locally abundant, year-round resident, and the most widespread duck in San Diego County. The mallard has a widespread breeding distribution in the county and is known to nest in the bay's salt ponds and at the Chula Vista Wildlife Refuge (Unitt 2004). Mallards were observed in all regions of the bay during every survey month, 1677 in total. Only two of these records were during the waterbird survey.

Blue-winged teal (Anas discors)
The blue-winged teal is a regular, although in low numbers, migrant and winter visitor in San Diego County from October to April. Blue-winged teals can typically be found at the San Diego River flood-control channel and at Famosa Slough (Unitt 2004). A total of 76 blue-winged teal were seen, predominately in the south bay and with highest numbers occurring during migration in March, April, and November.

Cinnamon teal (Anas cyanoptera septentrionalium)
The cinnamon teal is a common migrant and winter visitor, and an uncommon summer breeding resident in San Diego County. Breeding birds are scattered in the coastal lagoons and lowlands, as well as inland (Unitt 2004). During this survey, birds were noted primarily during late winter and spring migration in the north-central and south bay, 29 in total.

Northern shoveler (Anas clypeata)
The northern shoveler is a common winter visitor in San Diego County typically present from August to April (Unitt 2004). Northern shovelers were observed in the late summer through the winter and early spring. All 1877 birds were seen in the south bay and salt ponds.

Northern pintail (Anas acuta)
The northern pintail is a locally common winter visitor in San Diego County. Occasionally, northern pintails have been recorded nesting in the county; none have been recorded since 1978. It frequents shallow water inland and along the coast (Unitt 2004). All but one of the 1108 northern pintails were recorded in the salt ponds and south bay, with the outlier found in the south-central bay. All but 16 were recorded between November and February.

Green-winged teal (Anas crecca carolinensis)
The green-winged teal is a rare winter visitor in San Diego County. It frequents the fresh and brackish waters on inland lakes and coastal wetlands. They are typically present from August through April (Unitt 2004). Green-winged teals were observed in March, September, and November through February, 165 in total. Most were found in the south bay, though other records came from the salt ponds, north bay, and ocean grids.

Canvasback (Aythya valisineria)
The canvasback is irregular during the winter in San Diego County, sometimes showing up in large flocks between November and March. They are often found in the brackish lagoons along the north coast, but rarely in San Diego bay (Unitt 2004). A total of 54 canvasback were recorded during this survey in the south bay and saltworks between November and February, including a count of 45 in November in the south bay. This species was not recorded during the 2006-07 surveys.

Redhead (Aythya americana)
The redhead is mainly a winter visitor to San Diego County; however, it does breed along the county's northern coast, which is the south end of its breeding range on the Pacific Coast. It is quite common during the winter in Mission Bay, with inconsistent numbers at sites such as San Diego Bay, Buena Vista, and Bataquitos Lagoons (Unitt 2004). Redheads were observed in all regions except for the ocean grids during

the shoreline survey, with 919 total observations. An additional 134 were recorded during the waterbird surveys, with observations occurring from November to March.

Ring-necked duck (Aythya collaris)
Another species recorded during these surveys that was not recorded during the 2006-07 surveys is the ring-necked duck. This species is widespread in San Diego county during the winter, but prefers small ponds and lakes inland (Unitt 2004). Thirteen ring-necked duck observations were recorded during these surveys, four individuals in the north bay in February and another nine in the salt ponds in November.

Greater scaup Aythya marila nearctica)
The greater scaup is an uncommon to rare winter visitor in San Diego County. It is usually found within flocks of lesser scaups. The two species are extremely similar, and thus the species' status in the county is poorly known. It is typically present from November through March. In San Diego County, it is most likely to be found in south San Diego Bay (Unitt 2004). Greater scaups were seen between November and March during the shorebird surveys in all grids. A total of 1144 greater scaups were recorded, along with an additional 1878 records of scaup sp., including both this species and lesser scaup.

Lesser scaup (Aythya affinis)
In southern California, wintering lesser scaups can be found in highest concentration on San Diego Bay. They are second only in abundance to the surf scoter in south bay (Unitt 2004). Lesser scaups were observed in March and April, and again in October through February in all regions of the bay, 9582 during the shorebird surveys and another 2236 during the waterbird surveys. An additional 1858 birds were recorded as scaup sp., including both this species and great scaup. This indicated a large increase over the number seen during the 2006-07 surveys.

Surf scoter (Melanitta perspicillata)
San Diego Bay is one of the surf scoter's key winter habitats, supporting the largest concentration of these birds in their winter range. Concentrated mainly in the south central and south bay, the scoter is the most abundant bird species on the bay (Unitt 2004). A total of 41,448 birds were seen during the shorebird surveys, with an additional 14,327 bird recorded during the waterbird survey. Surf scoters were observed during every survey month, but the peak occurred in the late fall and winter, including over 22,000 recorded in November alone. They were well-represented in all grids except for the salt ponds, but were most common in the south region.

White-winged scoter (Melanitta fuscai deglandi)
The white-winged scoter was previously a common winter visitor in San Diego County; however, since the 1970s it has almost disappeared from the area. It is believed that the wintering range of the white-winged scoter has shifted north, no longer including San Diego County (Unitt 2004). Similar to the 2006-07 surveys, only one white-winged scoter was observed during these surveys. This individual was found in March in the north-central region.

Black scoter (Melanitta nigra americana)
The black scoter is a rare winter visitor to San Diego County typically found in San Diego Bay or along the near-shore ocean (Unitt 2004). A total of 29 black scoters were observed between the waterbird and shorebird surveys, all in the south and south-central regions. The largest concentration was a count of 25 in the south bay in April.

Long-tailed duck (Clangula hyemalis)
As San Diego Bay represents the southern tip of the long-tailed duck's winter range; it is a rare but almost annual occurrence in the bay (Unitt 2004). A total of five records were made, each of a single individual in the ocean or north bay from December to March.

Bufflehead (Bucephala albeola)
The bufflehead is a common migrant and winter visitor in San Diego County. On San Diego Bay, it is the third most common diving duck behind the surf scoter and lesser scaup. Buffleheads are typically present

from November to April (Unitt 2004). This bird was seen in March and April, and again in November through February in all portions of the bay. In total 4,181 were observed during the shoreline surveys and another 740 during the waterbird portion.

Common goldeneye (Bucephala clangula)
In San Diego County, the common goldeneye is an uncommon winter visitor in the San Diego Bay salt ponds and a rare winter visitor elsewhere (Unitt 2004). A total of 109 common goldeneye were observed; all in the salt ponds between November and March.

Barrow's goldeneye (Bucephala islandica)
Barrow's goldeneye is an extremely rare species in San Diego; with very few documented records at the southern extreme of its winter range along the Pacific coast (Unitt 2004). A total of six observations were recorded of this species, a group of three in January and a group of three in February from adjacent grids (030 and 036) in the north bay.

Hooded merganser (Lophodytes cucullatus)
The hooded merganser is an uncommon winter visitor in San Diego County. It is most frequently seen on small freshwater ponds rather than in coastal wetlands. They are typically present from November through March (Unitt 2004). Three total records of hooded mergansers were recorded: one from the ocean grid P1 in November and one each from the southwest corner of the bay in December and January.

Common merganser (Mergus merganser)
The common merganser is a common winter visitor in San Diego County. It is more often seen on inland lakes than in coastal wetlands and is typically present from November through March (Unitt 2004). A total of six observations of common mergansers were made, one in April, three in December, and two in January, predominately from the Chula Vista Wildlife Refuge in the south bay.

Red-breasted merganser (Mergus serrator)
The only San Diego County merganser with a preference for salt water, the red-breasted is common during the winter on San Diego Bay. Its numbers can vary considerably from year to year with no clear trend (Unitt 2004). Red-breasted mergansers were seen in March and April, and again in November through February in all regions of the bay and ocean grid, totaling 310 birds.

Ruddy duck (Oxyura jamaicensis rubida)
The ruddy ducks is an abundant winter visitor and a locally common breeder in San Diego County. It frequents brackish lagoons and freshwater lakes and ponds. Wintering birds are typically present from October to April (Unitt 2004). Ruddy ducks were seen in March and again in October through February, 394 in total, half of what was observed in 2006-07. By far the most ruddy ducks were observed in the salt ponds, with the south bay also an important site for the species.

Galliformes

Neither of the birds in this Order listed in the species list found in the San Diego Bay INRMP was observed during this survey effort; this includes the California quail (*Callipepla californica californica*) and ring-necked pheasant (*Phasianus colchicus*). While the California quail is common year-round in San Diego County, and even on Point Loma, it rapidly disappears from developing urban areas and has limited available habitat where bay bird survey observations took place. Ring-necked pheasants are rarer in the county, but also have no potential habitat around San Diego Bay.

Gaviiformes

Gaviidae (Loons)

Red-throated loon (Gavia stellata)
The red-throated loon is considered an uncommon winter visitor to the county. The birds arrive in October and are usually gone by April. Almost all records are coastal and only a few individuals venture inland (Unitt 2004). The vast majority of the red-throated loons observed were on the open ocean, though the species was seen in all grids. A total of 90 red throated loons were found; primarily in late winter/early spring, with peak numbers in February.

Pacific loon (Gavia pacifica)
The Pacific loon is a common winter visitor to San Diego County's ocean, but is uncommon to rare in the county's bays and lagoons. Birds may arrive in October and usually depart March through June (Unitt 2004). True to their nature, the majority of Pacific loon records were from the ocean grids, with the south bay also contributing a number of records to the total of 63. Birds were found from November to April.

Common loon (Gavia immer)
The common loon is a fairly common winter visitor to the county along the shore, in bays and estuaries, and on occasion on inland lakes. Birds usually start to arrive in October and depart in late March and early April (Unitt 2004). A total of 133 common loons were observed during these surveys. They were noted from all grids except the salt ponds, but were most numerous in the ocean grids and in the north bay. Sightings were evenly dispersed from November to March, with a few sightings from April and even a couple from June.

Yellow-billed loon (Gavia adamsii)
This species was not recorded during the 2006-07 surveys and in fact appears to have not been recorded from San Diego county at all in the past. The yellow-billed loon breeds in the far north Arctic and its normal winter range is in southeast Alaska and along the coast of British Columbia, though it has been known to irregularly winter south to Baja California. Recent observations of this species south of its normal winter range, including in many inland areas of the US may indicate a shift in non-breeding habitat use (North 1994). The one individual observed here was recorded in grid 421 of the south bay in November.

Podicipediiformes

Podicipedidae (Grebes)

Pied-billed grebe (Podilymbus podiceps podiceps)
The pied-billed grebe is a breeder and winter resident in San Diego County. Birds can also be seen in the county during migration, although it is uncertain if these sightings represent arrival and departure of migrants or movement of local birds. San Diego Bay is used as a wintering site for the pied-billed grebe, but this species has not been reported as breeding on the bay (Unitt 2004). The pied-billed grebe was recorded throughout the bay each month surveys were conducted, except for the ocean grids, and the highest numbers were in the salt ponds with over half of the 195 observations. The species was evenly distributed from August to March, with a small peak in November.

Horned grebe (Podiceps auritus cornutus)
The horned grebe is a fairly common winter visitor in San Diego County, usually arriving in November and staying through March. San Diego Bay and Mission Bay support the highest number of birds in the county (Unitt 2004). The majority of the birds seen during this survey were observed November through February in all areas of the bay; 468 in total. While distributed in every region except the ocean, the majority were found in the south bay.

Red-necked grebe (Podiceps grisegena)
Listed as an accidental observation in the Bay INRMP, there have only been three well supported records in San Diego County (Unitt 2004). However, one red-necked grebe was reported from grid 421 in the south bay in March.

Eared grebe (Podiceps nigricollis californicus)
The eared grebe is a rare breeder and a common winter visitor in San Diego County. Breeding birds nest around fresh or brackish water and non-breeding birds use hypersaline waters. San Diego Bay, especially the south bay, supports thousands of wintering birds. Some non-breeding birds may also be seen on the bay during the summer months (Unitt 2004). Eared grebes were recorded in every month ranging from a low count of 8 in June to a high count of 6,886 in November during the shorebird surveys, with a total of 18,112 records from the waterbird and shorebird counts. While they were found throughout the bay and ocean, almost 17,000 of the observations came from the salt ponds.

Western grebe (Aechmophorus occidentalis occidentalis)
The western grebe is both a breeder and a winter visitor in San Diego County (Unitt 2004). It breeds on freshwater lakes and marshes but winters on salt or brackish water; hence, the birds seen on and around the bay would most likely be migrants. Western grebes were observed in every month, but primarily from October to April in all areas of the bay and on the open ocean; 15,277 were recorded in total. This represents a large increase over the 2006-07 totals; however, many of the reports in the earlier survey of grebe sp. (13,349) were most likely this species, rather than Clark's grebe.

Clark's grebe (Aechmophorus clarkii transitionalis)
The Clark's grebe is both a breeder and a winter visitor in San Diego County (Unitt 2004). It breeds on freshwater lakes and marshes but winters on salt or brackish water, hence the birds seen on and around the bay would most likely be migrants. Birds were seen in from November to April primarily from the saltworks. A total of 85 Clark's grebes were recorded and an additional 1,083 birds were not identified between Clark's and western grebe, some of which may have been this species.

Procellariiformes

The only Procellariiform listed on the San Diego Bay INRMP species list is the black storm-petrel (Oceanodroma melania) of the Family Hydrobatidae; it is listed as an accidental observation. This bird nests on Los Coronados Islands and regularly occurs two to three miles offshore of San Diego County, but is rarely seen from land (Unitt 2004). It is therefore not a surprise that it went unobserved during this survey effort. Black-vent shearwaters (*Puffinus opisthomelas*), not listed on the San Diego Bay INRMP species list, were observed offshore during the 2006-07 surveys, but not during this iteration.

Pelecaniformes

Of the birds listed under this Order on the San Diego Bay INRMP species list, the magnificent frigatebird (*Fregata magnificens*) and brown booby (*Sula leucogaster brewsteri*) were not observed during this effort.

Sulidae (Boobies)

The brown booby is listed as an accidental observation on the San Diego Bay INRMP species list and is an uncommon, but increasingly seen, species around the San Diego Bay/northern Baja California region of the eastern Pacific (Unitt 2004).

Pelecanidae (Pelicans)

American white pelican (Pelecanus erythrorhynchos)
American white pelicans winter in varying numbers in San Diego County, using coastal wetlands and inland lakes. On the coast, the Buena Vista lagoon and the southernmost basin of San Diego Bay are sites where pelicans can frequently be seen (Unitt 2004). American white pelicans were observed in April,

September, October, November, and December, with the majority of the 132 observations in April and December. The birds were evenly split between the salt ponds and the south bay.

Brown pelican (Pelecanus occidentalis californicus)
The brown pelican is a common winter visitor to San Diego County, but can be seen year round. It is most often found along the coast and offshore, although birds can regularly be seen on the Sweetwater Reservoir. In San Diego Bay, brown pelicans are usually found in the north and north-central portion of the bay and also roosting on the dikes of the south bay salt ponds (Unitt 2004). During this survey effort, brown pelicans were observed in all portions of the bay and on the open ocean during every month that surveys were conducted. They were most common in the north, ocean and south-central regions. In total, 11,007 were observed.

Phalacrocoracidae (Cormorants)

Brandt's cormorant (Phalacrocorax penicillatus)
Brandt's cormorant is a common winter visitor to San Diego County, although a few birds will stay year-round and some birds have been observed nesting at La Jolla. Brandt's cormorants attempted nesting yearly from 1993 through 1995 on the degaussing pier of the Navy's submarine base on Point Loma. All three attempts failed: the first one from the disturbance of degaussing a minesweeper; no chicks hatched in the two following attempts (Unitt 2004). Brandt's cormorants were observed throughout the bay and on the open ocean during every month that surveys were conducted, but were by far most abundant in the north region where almost 12,000 of the 15,156 total records were observed. Peak numbers occurred between September and February.

Double-crested cormorant (Phalacrocorax auritus)
The double-crested cormorant is a common non-breeding visitor to San Diego County. Since 1988, two breeding colonies have formed in the county: one at the Sweetwater Reservoir and one at the salt ponds of south San Diego Bay, where 77 nests were counted in 2005 (Unitt 2004; USFWS 2006). Double-crested cormorants were observed in all portions of the bay and on the open ocean during every month that surveys were conducted, with the most birds seen in north bay. Interestingly, the highest count occurred in August, when 4,144 birds of the 9,413 total were observed.

Pelagic cormorant (Phalacrocorax pelagicus),
The pelagic cormorant is the least numerous of San Diego County's cormorants and can be easily overlooked among Brandt's cormorants, which are more common. It has been previously recorded in low numbers (6 to 10), with occasional high influxes (up to 127 in 1987), around the rocky shores of Pt. Loma (Unitt 2004). Five birds total were observed in June, August, and December, mostly in the north bay, but also in the ocean grid.

Fregatidae (Frigatebirds)
The magnificent frigatebird is an increasingly uncommon visitor to San Diego County with rare visitors crossing from Mexico after fledging (Unitt 2004). It is listed as an accidental observation on the San Diego Bay INRMP species list and was not observed during this effort.

Ciconiiformes

The American bittern (*Botaurus lentiginosus*), least bittern (*Ixobrychusexilis hesperius*), tricolored heron (*Egretta tricolor ruficollis*), cattle egret (*Bubulcus ibis*), and yellow-crowned night heron (*Nyctansassa violaceus bancrofti*) are listed on the Bay INRMP species list but were not observed during this effort. The American and least bittern are somewhat uncommon in San Diego County and especially in the bay, where limited marsh habitat exists for them. In San Diego County, the cattle egret breeding population has fluctuated greatly over the years, and this species has seen a decline as its preferred habitat of pastures and farmland has been converted to urban sprawl. The yellow-crowned night heron is the rarest of the herons that reach San Diego north from Mexico, and is listed as an accidental observation in San Diego Bay. One did, however, breed on Naval Air Station North Island in 2007 (Shepherd 2008). The tricolored heron is also a

rare winter migrant in San Diego, but when sighted has been seen around San Diego Bay (Unitt 2004). The only Ciconiidae listed on the San Diego Bay INRMP species list, the wood stork (*Mycteria americana*), was not observed during this survey.

Ardeidae (Herons)

Great blue heron (Ardea herodias wardi)
The great blue heron is common year-round in San Diego County. It is mostly a colonial breeder, although some birds might nest as isolated pairs. Breeding birds forage close to the colony and it appears that many wintering birds remain close to the breeding colonies. Some of the largest breeding colonies can be found at O'Neill Lake, Rancho Santa Fe, the Wild Animal Park, Sea World, Point Loma, and Naval Air Station North Island (Unitt 2004). During this effort, great blue herons were observed throughout the bay and on the ocean grid during all survey months, but were most numerous in the north bay. No clear seasonality existed for this species, as the 840 birds were distributed equally throughout the year.

Great egret (Ardea alba egretta)
The great egret is a common winter visitor to San Diego County and since 1988 has become a breeding species in the county with less than 100 pairs. The main breeding colony is at the Wild Animal Park. Other colony locations include Rancho Santa Fe, El Capitan Reservoir, Lindo Lake, the San Dieguito River estuary, the Point Loma naval research laboratory, Lake Wohlford, and Batiquitos Lagoon (Unitt 2004). During this effort, great egrets were seen during every survey month throughout the year, but were most common in the salt ponds. October and November accounted for the highest number of observations, and a total of 934 great egrets were observed.

Snowy egret (Egretta thula thula)
The snowy egret is a common fall and winter visitor to San Diego County, and since 1979, it is also a breeding bird in the county. The colony at Sea World and the one at the Wild Animal Park are two of the biggest colonies in the county (Unitt 2004). During this effort, snowy egrets, 1,161 in total, were observed during every survey month throughout the bay and in the ocean grid. While no seasonality in observations occurred, the birds were most common in the north bay.

Little blue heron (Egretta caerulea)
The little blue heron is a rare year-round resident in San Diego County since the 1980s. It forms breeding colonies in association with the snowy egret and has been seen nesting in the Sea World colony and in the heronry on Naval Air Station North Island (NASNI). San Diego is the northwest corner of this species range (Unitt 2004). A total of 50 little blue herons were observed in small numbers throughout the study area and at all times of the year.

Reddish egret (Egretta rufescens dickey)
The reddish egret is a rare winter visitor to San Diego County. This species does not breed here, although some non-breeding individuals might be observed over the summer. San Diego County is the northern limit of the species range (Unitt 2004). Only five reddish egrets were observed in this survey, primarily in late summer and early autumn in the south bay.

Green heron (Butorides virescens anthonyi)
The green heron can be found year-round in San Diego County. It is a bird of ponds, marshes, riparian woodlands, and channels (Unitt 2004). During this effort, although in low numbers (22 total), green herons were observed during almost every survey month. They were seen in the north, north-central, south-central, and south regions.

Black-crowned night-heron (Nycticorax nycticorax hoactli)
The black-crowned night-heron is common year round in San Diego County. Breeding colonies exist at the Wild Animal Park, in Solana Beach, at Lindo Lake, at the Navy's submarine base on Point Loma, at NASNI, and at the 32nd Street Naval Station. Isolated nesting birds have been observed in several locations

throughout the county (Unitt 2004). Black-crowned night-herons were observed throughout San Diego Bay in most months of the year. The 55 records were concentrated in the north and north-central bay, and no birds were seen in the ocean grid.

Threskiornithidae (Ibises)

White-faced ibis (Plegadis chihi)

The white-faced ibis is a winter visitor and breeder in San Diego County. During the Bird Atlas years (1997-2002), two active nesting colonies were identified: one at Guajome Lake and one in the San Luis Rey River valley (Unitt 2004). During this effort, only one white-faced ibis was noted, in the salt ponds in September.

Ciconiidae (Storks)

The wood stork is listed as an accidental observation in the Bay INRMP, one that does not regularly occur in San Diego Bay; it was not observed during this effort. This bird was formerly much more common in the county but has become exceedingly rare (Unitt 2004).

Falconiformes

Of the Falconiformes listed in the Bay INRMP the white-tailed kite (*Elanus leucurus majusculus*), golden eagle (*Aquila chrysaetos canadensis*), rough-legged hawk (*Buteo lagopus sanctijohannis*), red-shouldered hawk (*Buteo lineatus elegans*), broad-winged hawk (*Buteo platypterus platypterus*), ferruginous hawk (*Buteo regalis*), Swainson's hawk (*Buteo swainsoni*), California condor (*Gymnogyps californianus*), crested caracara (*Caracara plancus auduboni*), and prairie falcon (*Falco mexicanus*) were not observed during this survey effort.

Cathartidae (Vultures)

The California condor is listed as an accidental observation in the San Diego Bay INRMP and was not observed during this survey effort.

Turkey vulture (Cathartes aura meridionalis)

Turkey vultures are not common along the San Diego County coastline, having retreated from its urbanization. They are present in the County year round; however, they are less numerous during fall migration and in the winter (Unitt 2004). Three turkey vultures were noted in August and September flying over the salt ponds.

Accipitridae (Hawks, Kites, and Eagles)

The golden eagle, rough-legged hawk, broad-winged hawk, ferruginous hawk, and Swainson's hawk are all listed as accidental observations in the San Diego Bay INRMP, and were not observed during this survey effort.

Osprey (Pandion haliaetus carolinensis)

Ospreys are present year round in San Diego County, occurring in small numbers along the coast and near inland lakes and reservoirs. They began breeding in the County again, after a decline and resurgence, in 1997 (Unitt 2004). Ospreys were seen during every survey month, 431 in total. They were evenly distributed in all grids, except for the south bay, where a peak number of 223 were observed.

Northern harrier (Circus cyaneus hudsonius)

In San Diego County the northern harrier is present year round; however, it is more widespread during the winter, utilizing marsh and grassland habitat (Unitt 2004). Northern harriers were seen during every survey month in the salt ponds and south bay. Only six of the 74 observations occurred outside these areas in the ocean and south-central regions.

Sharp-shinned hawk (Accipiter striatus velox)
Sharp-shinned hawks are uncommon winter residents and migrants through San Diego County, using a wide variety of habitats (Unitt 2004). Two sharp-shinned hawks were seen during the surveys in the salt ponds, one in March and one in October.

Cooper's hawk (Accipiter cooperi)
The Cooper's hawk is a covered species under San Diego's Multiple Species Conservation Plan. Since the 1980s, its number has increased as the population adapted to urban living (Unitt 2004). Cooper's hawks were seen individually in nearly every month, but only 8 total were observed scattered throughout the bay.

Red-tailed hawk (Buteo jamaicensis)
The red-tailed hawk is the bird of prey most widespread in San Diego County, using all of the County's terrestrial areas. They are present as both a breeding and winter species (Unitt 2004). Red-tailed hawks were seen during every survey month, though most of the 45 total birds were recorded during the winter between November and February. Birds were seen in the ocean grid and in all regions of the bay except for the north-central portion.

Falconidae (Falcons)

The crested caracara is listed as an accidental observation in the San Diego Bay INRMP and was not observed during this survey effort. Prairie falcons breed in San Diego County, albeit in low numbers (20 to 30 pairs) and are an uncommon winter visitor to the county. During the breeding season, prairie falcons are distributed inland. While they can be seen along the coast during the winter, none were observed during this survey effort (Unitt 2004).

American kestrel (Falco sparverius sparverius)
American kestrels are present in San Diego County year-round, but are more common in the winter. They occupy a great variety of habitats are observed widely in the County (Unitt 2004). American kestrels were concentrated in the salt ponds, but were observed low numbers in every region except the north-central bay. The 52 total records were distributed evenly throughout the year.

Merlin (Falco columbarius columbarius)
Occurring occasionally in any habitat save dense woodland, the merlin is a rare winter visitor in San Diego County, seen mainly from October to March. Since they eat smaller birds they tend to occur where those species congregate, and can be seen annually along Point Loma during fall migration (Unitt 2004). Only two merlins were observed, both in October, one each in the south-central and salt pond regions.

Peregrine falcon (Falco peregrinus anatum)
Peregrine falcons were nearly extirpated from San Diego County in the middle of the 20th century due to effects from DDT (dichlorodiphenyltrichloroethane). Since the ban of the chemical they have recovered and a small stable population exists in the County (Unitt 2004). Peregrine falcons were seen during every survey month and were concentrated in the saltworks and south regions, where 40 of the 47 birds were observed.

Gruiformes

Of the birds listed under this Order on the San Diego Bay INRMP species list, the sandhill crane (*Grus canadensis*), black rail (*Laterallus jamaicensis*), sora (*Porzana carolina*), and Virginia rail (*Rallus limicola*), were not observed during this effort.

Rallidae (Coot, gallinules, rails)

The following Rallidae were not observed during this effort: The black rail is listed as an accidental observation on the bay and is labeled as extirpated from the bay in the INRMP. The Virginia rail is a resident and winter visitor in San Diego County. During the breeding season, they are concentrated around north county coastal lagoons and ponds. In winter, Virginia rails can also be seen in tidal salt marshes. The

common moorhen generally avoids salt water, preferring fresh, but it can be sighted along the coast in slightly brackish conditions. The bird is present in the county year round as a non-migrant (Unitt 2004)

Light-footed clapper rail (Rallus longirostris levipes)
Listed as federally endangered since 1970, the light-footed clapper rail was once common in the county's coastal salt marshes; the degradation of its habitat decimated its population (Unitt 2004). All rails typically stay hidden in marshes and are therefore difficult to detect, especially since this survey effort was not targeted in marsh habitat. Five were noted together during June in grid cell 481 in the southwest portion of the bay.

Sora (Porzana carolina)
The sora is an uncommon winter visitor in San Diego County. Soras are concentrated around the north county coastal lagoons and ponds, although some birds may use salt marshes (Unitt 2004). After not being observed during the 2006-07 surveys, three were noted in the salt ponds during this survey; one each in September, October, and January.

American coot (Fulica americana americana)
The American coot is common in San Diego County as both a winter visitor and breeding season species, both inland and near the coast (Unitt 2004). American coots were seen in every survey month, except August, but were most numerous between November and March. Birds were observed in all regions of the bay, but not in the ocean region, with the highest counts of the 1,116 birds in the north-central and south regions.

Gruidae (Cranes)
The sandhill crane is listed as an accidental observation on the San Diego Bay INRMP species list as one was seen flying over the south bay along the Silver Strand in 1999. In the early 20th century it was common in flocks migrating over the county, but its general decline has made recent sightings of only very occasional individuals (Unitt 2004).

Charadriiformes

Of the birds listed under this Order on the San Diego Bay INRMP species list, the mountain plover (*Charadrius montanus*) in the Charadriidae family, the American oystercatcher (*Haematopus palliates frazari*) in the Haematopodidae family, the sooty tern (*Sterna fuscata*), sandwich tern (*Sterna sandvicensis*), laughing gull (*Larus atricilla*), Franklin's gull (*Larus pipixcan*), glaucous gull (*Larus hyperboreus barrovianus*), Sabine's gull (*Xema sabini*), black-legged kittiwake (*Rissa tridactyla*), and arctic tern (*Sterna paradisaea*) in the Laridae family, and the stilt sandpiper (*Calidris himantopus*), Wilson's snipe (*Gallinago delicata*) (previously common snipe), bar-tailed godwit (*Limosa lapponica*), ruff (*Philomachus pugmax*), solitary sandpiper (*Tringa solitaria*), and red phalarope (*Phalaropus fulicarius*) in the Scolopacidae family were not observed during this effort.

Charadriidae (Plovers)
The mountain plover was not observed during this survey effort: The mountain plover is a wintering bird in southern California, but its population has been declining most likely due to habitat change in its breeding and wintering grounds. This species hasn't been wintering in San Diego County since 1991 (the only records in the San Diego Bay area come from birds sighted at the south end of the Silver Strand in 1938) and the only record of a migrant since was that of a single individual at Stuart Mesa on Camp Pendleton in October 1999 (Unitt 2004).

Black-bellied plover (Pluvialis squatarola)
Black-bellied plovers were seen during every survey month, 11,196 in total. They were observed in all regions of the bay and in the ocean grid. They are known as one of the County's more common wintering shorebirds, present mostly along the coast (Unitt 2004). Of the 12,006 total observations of black-bellied plover, most occurred in the south-central, south, and salt pond regions. Though birds were noted in every region and in every month, the highest numbers were seen from November to February.

American golden-plover (Pluvialis dominica)
The American golden-plover has been noted in San Diego County in the past during fall migration, though it has become a less than annual visitor with the decline of agricultural fields in the Tijuana River Valley (Unitt 2004). As it is very similar to the Pacific golden-plover, field identification can be difficult. The American golden-plover was not noted during the 2006-07 surveys, but 18 were reported for this survey effort. These birds were seen in April and June in the south and salt pond regions.

Pacific golden-plover (Pluvialis fulva)
A few Pacific golden-plovers reach coastal San Diego County each winter and migratory season. Similarities between the American golden-plover and the Pacific golden-plover make them difficult to distinguish with certitude. The field characteristics for distinguishing these two species have only been widely known for about a decade; hence, the status of the Pacific golden-plover is uncertain (Unitt 2004). Only one Pacific golden-plover was reported from these surveys: from grid 188 near Harbor Island in November.

Western snowy plover (Charadrius alexandrinus nivosus)
The western snowy plover is listed as federally threatened and is one of San Diego County's scarcest breeding birds. They breed in very limited areas on the coast and are somewhat more widespread during the winter, although not more numerous (Unitt 2004). Western snowy plovers were found in similar numbers to the 2006-07 survey (2,567 total observations in 09-10 vs. 2,400 in 06-07). They were most numerous along the Silver Strand and NASNI in the ocean grids, where the maximum count of 425 in grid C9 occurred. Except for a low of 82 in June, numbers remained consistent throughout every month of the year.

Wilson's plover (Charadrius wilsonia beldingi)
Wilson's plover is listed as an accidental observation on the San Diego Bay INRMP species list; it is a rare vagrant on the Pacific coast north of the Mexican border. There are scattered records for San Diego Bay, in 1998 on the Delta Beaches, 2000 on North Island, and in 2008 on North Island (Unitt 2004; Copper 2008). While no Wilson's plovers were noted in 2006-07, six observations of this species were made during these surveys, all in the south region in September.

Semipalmated plover (Charadrius semipalmatus)
Semipalmated plovers are more common in coastal San Diego County than inland, preferring coastal mudflats. They are mainly winter visitors and migrants although some non-breeders remain year round (Unitt 2004). Semipalmated plovers were seen during every survey month, 4,612 in total. Birds were seen in all regions, but were concentrated in the south-central, south, salt pond, and ocean regions.

Killdeer (Charadrius vociferus vociferous)
The killdeer is common in San Diego County during the winter and breeding seasons, and is San Diego County's most widespread shorebird. They utilize bare ground and are common inland as well as near the coast (Unitt 2004). Killdeers were seen most often in the winter (November through February), but were recorded in every survey month. Almost half of the 1,497 total records were from the salt ponds, though all regions were noted for killdeer.

Haematopodidae (Oystercatchers)

American oystercatchers are rare in southern California and most frequently seen on the Channel Islands (Unitt 2004). While it was noted on the previous survey, none were seen in 2009-10.

Black oystercatcher (Haematopus bachmani)
The black oystercatcher is rare in San Diego County, showing no clear seasonal trend in its sightings. They prefer natural rocky habitats, although they were seen mainly along Zuniga Jetty during these surveys (Unitt 2004). Twelve black oystercatchers were observed; they were seen in March, November, and February. The birds were observed around Zuniga Jetty and off of Point Loma, both areas within the ocean region.

Recurvirostridae (Stilts, avocets)

Black-necked stilt (Himantopus mexicanus mexicanus)
Black-necked stilts are common year round in San Diego County, and this survey found that pattern holding true, with only April and June having low counts (Unitt 2004). A total of 2,688 black-necked stilts were seen during these surveys, all but 20 of which were observed in the salt ponds, with the rest in the south bay. This is consistent with their recorded distribution in the bay (Unitt 2004).

American avocet (Recurvirostra americana)
American avocets are present year round in San Diego County; in coastal south County they concentrate in the salt pond area of south San Diego Bay and in the Tijuana River estuary (Unitt 2004). A total of 717 American avocets were seen during the surveys, with March and February constituting the peak of the observations. Most sightings were in the salt pond region, with small numbers in the south bay and a couple observed along the ocean region.

Scolopacidae (Sandpipers, phalaropes)

A total of 68 sandpiper sp. and 32,813 peeps were recorded during these surveys during every month but June. These were instances where field conditions did not permit identification to species, but that the birds were clearly small sandpipers. A vast majority of these records were from the saltworks (25,742) and the south bay (7,064).

The following birds were not observed during this survey effort:

Stilt sandpipers are rare along the Pacific coast, occurring mainly in the fall (Unitt 2004). They were observed in the 2006-07 surveys in small numbers. The Wilson's snipe (previously common snipe) is mainly a winter visitor to San Diego County, although a few individuals have been seen during the summer. It is mainly a bird of fresh or brackish water and is seldom seen along the seashore (Unitt 2004). The bar-tailed godwit is a casual migrant in California and San Diego County has two confirmed records (Unitt 2004). The ruff is a rare, but regular migrant and winter visitor in North America. One individual returned yearly to the San Diego Bay shore to winter between 1984 and 1991. Birds have also wintered at the salt ponds during the winter of 2002-2003 (Unitt 2004). The solitary sandpiper is a rare to uncommon fall migrant in San Diego County and is found around fresh and brackish water. The red phalarope are rarely seen ashore, although occasional flocks do appear. They usually occur October through May (Unitt 2004). A record of this species occurred during the 2006-07 surveys.

Spotted sandpiper (Actitis macularius)
The spotted sandpiper can be found inland as well as along the coast in San Diego County. They are present in the winter but more common during migration; small numbers also nest in the County (Unitt 2004). Spotted sandpipers were seen in consistent numbers in every survey month with a high of 77 in November. The majority of the records (230 out of 358 total) occurred in the north region, though the species was noted in every area.

Wandering tattler (Tringa incana)
Wandering tattlers are primarily found in rocky habitats; in San Diego County they are present as winter visitors and migrants (Unitt 2004). Only 18 observations were made of this species, scattered in April, August, September, and October during migrations. Most were seen in the north and ocean regions.

Greater yellowlegs (Tringa melanoleuca)
Greater yellowlegs are found both inland and along the County's coast, seldom gathering in flocks (Unitt 2004). A total of 361 greater yellowlegs were seen during these surveys in all months of the year and in most regions. The vast majority were noted from the south-central, south, and salt pond regions, and numbers were consistent monthly, except for a low count of 7 in April.

Willet (Tringa semipalmata inornatus)
Willets are very abundant along San Diego County's shoreline, especially in southern San Diego Bay. They can be seen year-round but are most common during fall migration (Unitt 2004). A total of 11,931 willets were seen during each survey month with a high count of 2,352 in August and a low count of 202 in June. Willets were detected in all regions of the bay and in the ocean grid, but were most numerous in the salt ponds and the south bay.

Lesser yellowlegs (Tringa flavipes)
The lesser yellowlegs is less common in San Diego County than the greater yellowlegs. The lesser is common during migration but rare in the winter; California is just north of the species' main winter range (Unitt 2004). True to the pattern compared to the greater yellowlegs, only 43 lesser yellowlegs were seen during the surveys. Most were found in the south bay and salt ponds, with a few also seen in the north-central and south-central regions. This species was seen in low numbers in all months except April and June with a high count of 13 in December.

Whimbrel (Numenius phaeopus hudsonicus)
July through September, during the whimbrel's fall migration, is when this bird is normally most common along San Diego County's shoreline (Unitt 2004). In contrast to this (but in line with the 2006-07 surveys), these surveys observed a peak in the spring. A total of 688 whimbrels were seen over the survey months with a high count of 531 in March and a low count of five in June and September. While the species was noted throughout the study area, the vast majority were found in the ocean grid, especially along the Silver Strand coastline.

Long-billed curlew (Numenius americanus)
The long-billed curlew inhabits mudflats and open grassland in San Diego County. They can be found year-round but are most common during the winter and migratory seasons (Unitt 2004). A total of 969 long-billed curlews were seen during each survey month, with a high of 173 in November and a low of 30 in April. The majority of the birds were found in the south bay, with the south-central also important for the species.

Marbled godwit (Limosa fedoa fedoa)
The marbled godwit is very common along the County's coast, especially in south San Diego County. Although it is mainly present as a winter visitor, several hundred normally remain through the summer (Unitt 2004). A total of 19,301 marbled godwits were seen during each survey month, with a high count of 3,440 in March and a low count of 449 in June. Marbled godwits were detected in high numbers all regions of the bay and in the ocean grid, with a peak of 9293 birds in the south bay.

Ruddy turnstone (Arenaria interpres)
Ruddy turnstones are common on mudflats and beaches in San Diego County where they can be observed year-round (Unitt 2004). A total of 882 ruddy turnstones were seen during every survey month, with a high count of 150 in October and a low count of 23 in June. They were seen in every region, but were most abundant in the ocean grids.

Black turnstone Arenaria melanocephala
Black turnstones primarily utilize rocky shorelines, although they can also be found on tidal mudflats and beaches; they occur in the County year-round (Unitt 2004). A total of 547 black turnstones were seen in every survey month, with a high count of 101 in January and a low count of 5 in June. They were seen in every region except the north-central.

Surfbird (Aphriza virgata)
Surfbirds are most common on rocky shorelines, sometimes using sandy beaches during spring migration. They are common during the winter in San Diego County and most abundant during spring migration (Unitt 2004). A total of 399 surfbirds were seen with a high count of 225 in March and a low count of 2 in November. The majority of observations were in the north-central bay off of Coronado.

Red knot (Calidris canutus roselaari)
Red knots winter in San Diego Bay; they are present in greater numbers during migration, in groups of hundreds in the bay (Unitt 2004). A total of 3,738 red knots were seen over the survey months with a high count of 678 in November and a low count of 13 in June. The June observations were likely non-breeding birds. Knots were mainly seen in the south, south-central, and especially the salt pond regions of the bay, and a few birds were seen in the north-central bay and in the ocean grid.

Sanderling (Calidris alba)
Sanderlings winter along the County's beaches, utilizing other coastal habitats such as rocky shores and bays when their numbers increase during migration (Unitt 2004). A total of 11,111 sanderlings were seen over the survey months with a high count of 1690 in April and a low count of 12 in June. While they were seen in all habitats, 8,237 were seen in along the Silver Strand in the ocean grids.

Semipalmated sandpiper (Calidris pusilla)
Semipalmated sandpipers are rare in San Diego County, seen during fall migration. They concentrate in fresh and brackish water wetlands, avoiding the mudflats of San Diego Bay (Unitt 2004). Three semipalmated sandpipers were recorded. One in the north bay in October, and one each in the August and September in the salt ponds.

Western sandpiper (Calidris mauri)
The western sandpiper is the most abundant bird on San Diego County's coastline. They are very common in the winter, with even larger numbers during migration (Unitt 2004). As with the previous survey, these birds were the most common species observed; a total of 80,437 were seen over the survey months with a high count of 13,616 in November and a low count of 28 in June. Although a few birds were detected in the north and north-central bay and in the ocean region, the vast majority were seen in the south and salt pond regions of the bay.

Least sandpiper (Calidris minutilla)
The least sandpiper is a migrant and winter visitor in San Diego County, occurring in widespread habitats including San Diego Bay (Unitt 2004). A total of 4,511 least sandpipers were seen during these surveys. Birds were detected during every survey month, except for June. The high count was of 972 birds in November and the low count was of 54 birds in April. Birds were seen in every region, but the salt ponds and south bay regions held the majority of records.

Baird's sandpiper (Calidris bairdii)
Only four Baird's sandpipers were observed during these surveys: three in September in the salt ponds and one in April in the south bay. These birds are somewhat rare in San Diego County, with the majority of them occurring as juveniles during fall migration. The reduction of muddy ponds and irrigated areas has reduced sites available for this bird in the county (Unitt 2004).

Pectoral sandpiper (Calidris melanotos)
The pectoral sandpiper is a yearly visitor, though in low numbers, to the county during migration. They are most common near fresh water, although a few individuals visit the coastal marshes (Unitt 2004). After not being recorded in 2006-07, one individual was noted in the south bay in October during these surveys.

Dunlin (Calidris alpinia pacifica)
The dunlin winters in San Diego County, arriving in September and usually departing by May. They concentrate towards the coast, mainly in San Diego and Mission Bays (Unitt 2004). A total of 4,615 dunlins were seen during the surveys, primarily in the south, salt pond, and south-central regions. Birds were detected during every survey month, except for June, with a high of 1,183 in November.

Short-billed dowitcher (Limnodromus griseus caurinus)
Short-billed dowitchers are common on tidal flats around San Diego Bay, increasing in number during migration (Unitt 2004). This species is not easily distinguished from the long-billed dowitcher; therefore, many observations, 4,583 in total, were recorded simply as dowitcher sp. As the short-billed is much more

common, many of these observations, particularly during the summer most likely represent this species. A total of 5,910 short-billed dowitchers were recorded during every month of the survey, peaking in August and February. Birds were mainly seen in the south bay, with significant numbers also seen in the south-central and the salt pond regions of the bay.

Long-billed dowitcher (Limnodromus scolopaceus)
The long-billed dowitcher is less common on the tidal flats of San Diego Bay than the short-billed dowitcher. They also rarely remain through the summer, unlike the short-billed (Unitt 2004). A total of 727 long-billed dowitchers were recorded during these surveys. Birds were only noted between November and March, though it is possible a few birds recorded as dowitcher sp. during the summer could have been this species. The majority of the birds were seen in the south bay and salt ponds. The graph that follows includes observations of short-billed, long-billed, and dowitcher sp., as the distinction can be hard to make in the field. Dowitcher sp. observations were by far the most common.

Wilson's phalarope (Phalaropus tricolor)
San Diego County is not included in the Wilson's phalarope's main migration route, but the birds are common during fall migration, including at the salt ponds in south San Diego Bay (Unitt 2004). While only five Wilson's phalarope were seen during the previous surveys, 202 were recorded in these surveys. The majority occurred during fall migration in August and September in the salt ponds with a few other birds in the spring and in the south bay.

Red-necked phalarope (Phalaropus lobatus)
These birds are common migrants and winter visitors, concentrating at the San Diego Bay salt ponds during fall migration (Unitt 2004). A total of 15,534 red-necked phalarope were seen during these surveys. Birds were seen in August through November, with most records occurring in the first two months of this time span. Red-necked phalaropes were only observed in the salt ponds.

Laridae (Terns, skimmers, gulls, and jaegers)

The following species, while listed on the Bay INRMP species list, were not observed during this effort. The sooty tern and sandwich tern are listed as accidental sightings in the San Diego Bay INRMP. The laughing gull is considered a rare vagrant to the California coast. The Franklin's gull is considered a rare migrant in San Diego County. One bird was seen at Coronado in February 1997 and one bird was observed at the south bay salt ponds in May 1999 (Unitt 2004). Sabine's gulls migrate through North America between their breeding grounds in the arctic to their wintering grounds in South America, but are mainly seen offshore. In the San Diego Bay area, one bird was seen on the bay in 1908 and one bird at Silver Strand State Beach in 1962. Glaucous gulls are rare winter visitors to San Diego County, which is at the southern end of their range. A few were noted during the 2006-07 surveys. The black-legged kittiwake is a pelagic species and is rarely seen onshore. One bird was spotted on San Diego Bay during migration in November 1962 (Unitt 2004). The arctic tern migrates over the Pacific and Atlantic Ocean between its arctic breeding grounds and its Antarctic wintering grounds. It is very rarely seen onshore.

Bonaparte's gull (Chroicocephalus philadelphia)
The most regularly seen gull in San Diego County, Bonaparte's gull, is most abundant on the ocean. This gull is also common in San Diego Bay as a wintering bird and spring and fall migrant (Unitt 2004). Bonaparte's gulls were seen in April and between November and February, with most birds occurring in December and January. All of the 129 birds were seen in the south-central, south, and salt pond regions.

Heermann's gull (Larus heermannii)
A total of 9,637 observations of Heermann's gulls were made during this survey effort. These gulls are very common along the San Diego coastline with lowest numbers in the spring, increasing in the summer, and then decreasing again in the winter (Unitt 2004). Peak numbers in our survey occurred in August and September when 2,576 and 1,920 birds were recorded, respectively. While this species was observed throughout the study area, it was most abundant in the north, north-central, south-central, and ocean regions.

Mew gull (Larus canus brachyrhynchus)
San Diego County is at the southern end of the mew gull's winter range. They concentrate in two areas along the coast in the County, one of which is along the beach of NASNI and along the shore of the Hotel Del Coronado (Unitt 2004). Only 15 mew gulls were recorded in this survey. Outside of one bird seen in March in the south bay, the species was recorded in the ocean and salt ponds November through January.

Ring-billed gull (Larus delawarensis)
Although not the most numerous, the ring-billed gull is the County's most widespread. They are primarily here as winter visitors but more of them over-summer than other migratory gulls (Unitt 2004). A total of 3,584 ring-billed gulls were seen during the surveys. Birds were recorded during every survey month, peaking November through February. Sightings were scattered in all regions of the bay and in the ocean grid.

Western gull (Larus occidentalis wymani)
The western is one of the most numerous gulls in the County, and the one observed most during these surveys. They are present as both breeding and winter residents, as the only gull nesting in San Diego County (Unitt 2004). A total of 27,746 western gulls were seen in all of the survey months with a high count of 5,320 birds in August and a low count of 1,357 birds in December. Western gulls were widespread throughout the survey area, with highest numbers recorded in the north bay.

California gull (Larus californicus californicus)
California gulls winter in San Diego County primarily along the coast, with a few non-breeding summer residents remaining throughout the year (Unitt 2004). California gulls, 5,965 in total, were seen in all regions of the bay and in the ocean grid during every survey month, peaking November through February. Unlike the western gull, which was more common in the north bay, the California gull is most abundant in the salt pond region.

Herring gull (Larus argentatus smithsonianus)
The herring gull is uncommon to fairly common in San Diego County using beaches and inland wetlands, although being more common along the coast. They are an uncommon to locally common winter visitor in San Diego (Unitt 2004). A total of 93 herring gulls were seen in every month except September. Highest numbers occurred in November and December when two-thirds of the observations occurred. This species was seen in every region, with slightly higher numbers occurring in the salt ponds.

Thayer's gull (Larus thayeri)
Thayer's gulls mainly winter along the coast north of San Diego, but are present in the County annually in low numbers (Unitt 2004). Six Thayer's gulls were seen during these surveys: three in November, one in December, and two in February. All observations were in the south region.

Glaucous-winged gull (Larus glaucescens)
The glaucous-winged gull is uncommon in San Diego County; it is primarily a winter visitor present in low numbers along the coast (Unitt 2004). Glaucous-winged gulls were seen in small numbers in every month except June, with a high of 16 birds in March. These birds were scattered throughout the study area, with the north-central region the only one not represented.

California least tern (Sternula antillarum browni)
The California least tern is listed as endangered by both the federal and California state government but is regularly seen around San Diego Bay where many nest at protected federal, state, and local sites. Only 675 least terns were recorded during these surveys, after over 1,200 observations were made in 2006-07. Birds were recorded in April, June, and August with a high of 539 in June and a low of 7 in August. The terns were observed throughout the bay, but were most concentrated in the south bay and ocean regions.

Gull-billed tern (Gelochelidon nilotica vanrossemi)
The gull-billed tern breeds in San Diego County only at the salt ponds in south San Diego Bay (Unitt 2004). They are recognized as a Bird Species of Special Concern by the California Department of Fish and Game(CDFG). A total of 255 gull-billed terns were seen in March, April, June, and August. The highest

number was seen in April with a count of 186 birds; the lowest count was nine in August. The highest numbers of birds were seen in the ocean region, with other birds being recorded in the south, salt pond, and north regions.

Caspian tern (Sterna caspia)
The south San Diego Bay salt ponds are a major nesting site for Caspian terns; they are generally less common in the winter but present in San Diego Bay (Unitt 2004). These terns began nesting at the salt ponds in 1941; 357 nests were counted in 2005 (USFWS 2006). A total of 800 Caspians were seen during these surveys spread among every region. Caspian terns were seen during every survey month, but were most prevalent from March to September with a high of 317 in August.

Black tern (Chlidonias niger surinamensis)
The black tern does not nest in San Diego County but is present as a migrant (Unitt 2004). Only three black terns were seen during these surveys in the salt ponds in August.

Common tern (Sterna hirundo hirundo)
The common tern is somewhat uncommon in San Diego County (Unitt 2004). A total of 129 terns were seen, mostly in August and September, with two sightings in March, all during migration. Birds were seen primarily in the ocean and south regions, with scattered records for the south-central and north-central bay, as well.

Forster's tern (Sterna forsteri)
The most widespread tern in San Diego County, Forster's tern is common year round. Their oldest nesting site in southern California is at the salt ponds in south San Diego Bay, as many as 415 nests were present in 2005 (Unitt 2004; USFWS 2006). A total of 3,315 Forster's terns were seen during the surveys in all months and in all regions. The highest numbers were found in the south bay and in November.

Royal tern (Thalasseus maximus)
Royal terns are primarily winter visitors to the County, but they do breed in the salt ponds in southern San Diego Bay (Unitt 2004; USFWS 2006). A total of 1,833 royal terns were seen during all of the survey months with a high count of 467 birds in August and a low count of 73 birds in June. Royal terns were abundant in all regions of the bay and in the ocean grid.

Elegant tern (Thalasseus elegans)
The elegant tern breeds in southern San Diego Bay; at one point the colony reached 10,300 nests (in 2003; USFWS 2006). The bird does not normally winter in the County, but they are commonly present in the spring and fall as migrants, when they may be most abundant (Unitt 2004). The most abundant tern, a total of 16,205 elegant terns were recorded. Birds were recorded from March to October, with one outlier seen in February. The high count was of 7,414 birds seen in June. Birds were recorded in all regions of the bay and in the ocean grid, but were most abundant in the salt ponds and south bay.

Black skimmer (Rynchops niger niger)
Black skimmers are present in the County year round, most birds shifting summer and winter habitats between southern San Diego Bay and Mission Bay, respectively (Unitt 2004). They nest in the south bay salt ponds; 752 nests were counted in 2005 (USFWS 2006). Black skimmers were seen during every survey month, with a peak of 1,075 birds seen in August. Birds were seen in the ocean grid and in all the regions of the bay, although in higher numbers in the south bay and salt ponds. In total 1,848 black skimmers were observed.

Stercorariidae (Jaegers)

Parasitic jaeger (Stercorarius parasiticus)
The parasitic jaeger is a winter visitor and migrant in San Diego County (Unitt 2004). Six were seen in March, October, November, and February, all in the ocean region.

Alcidae (Alcids)

Cassin's auklet (*Ptychoramphus aleuticus*) was not observed during this survey effort. During the winter these birds usually remain at least five miles away from the coast, but can sometimes be seen from shore during strong winds (Unitt 2004).

Columbiformes

Of the birds listed under this Order on the San Diego Bay INRMP species list, the spotted dove (*Streptopelia chinensis*) and white-winged dove (*Zenaida asiatica*) were not observed during this effort.

Columbidae (Pigeons, doves)

The spotted dove is listed as an accidental observation in the San Diego Bay INRMP and has been extirpated from the County. The white-winged dove is a bird of desert habitat; eastern San Diego County is the edge of its range, although migrants can venture closer to the coast (Unitt 2004).

Mourning dove (Zenaida macroura marginella)

The mourning dove is common in San Diego County year round, where they are more abundant in developed than in their native habitat (Unitt 2004). A total of 375 mourning doves were seen during the surveys. Birds were seen during every survey month with a high count of 84 in April and a low count of 1 in January. Mourning doves were seen in all regions of the bay and in the ocean grid.

Eurasian collared dove (Streptopelia decaocto)

As implied by their name, the Eurasian collared dove is not native to North America; they first arrived in San Diego County in 2002 (Unitt 2004). A total of 23 Eurasian collared doves were seen over the course of the surveys. Birds were seen in August, September, January, and February; with a high count of 12 birds in August. They were seen mostly in the north and south-central regions.

Ringed turtle-dove (Streptopelia risoria)

The ringed turtle-dove is a domestic form of the African collared dove (*Streptopelia roseogrisea*), and is a common cage bird. It is often seen as an escapee, but no feral population exists in San Diego County (Unitt 2004). Two birds were recorded from grid 193 in the north-central region in June.

Rock pigeon (Columba livia)

Rock pigeons are not native to North America but have been abundant in southern California for decades, where they are mainly confined to developed areas (Unitt 2004). A total of 7,526 rock pigeons were recorded from every region and every survey month. They were recorded most often in the north and north-central regions, and less in the ocean and salt pond regions.

Psittaciformes

Psittacidae (Parrots)

Red-crowned parrot (Amazona viridigenalis)

Five red-crowned parrots were seen in the north bay in April. This region in the bay is one of the centers of its population in San Diego County (Unitt 2004).

Cuculiformes

The two species in this order listed in the San Diego Bay INRMP, the yellow-billed cuckoo (*Coccyzus americanus*) and greater roadrunner (*Geococcyx californianus*), both in the Cuculidae family, were not observed during this effort.

Cuculidae (Cuckoos)

The yellow-billed cuckoo is listed as an accidental observation in the San Diego Bay INRMP. In San Diego County, the greater roadrunner is an uncommon resident of the Anza-Borrego desert and can also be found on coastal slopes (Unitt 2004).

Strigiformes

Of the birds listed under this order in the San Diego Bay INRMP, the great horned owl (*Bubo virginianus*) in the Strigidae family and the barn owl (*Tyto alba*) in the Tyronidae family were not observed during this effort.

Tytonidae (Barn owls)

The barn owl is an uncommon year-round resident in San Diego County. It nests in tree cavities and on cliff ledges as well as in palm trees, buildings, and nest boxes (Unitt 2004). The barn owl is a nocturnal species and its diurnal roosting habit makes it difficult to detect during the day.

Strigidae (Typical owls)

The great horned owl is an uncommon, but widespread year-round resident in San Diego County. It inhabits woodlands and open scrub (Unitt 2004). The great horned owl is a nocturnal species. Its diurnal roosting habit makes it difficult to detect during the day.

Burrowing owl (Athene cunicularia)

Burrowing owls are a CDFG Bird Species of Special Concern. They have been extirpated from many of the areas in which they used to breed and are in danger of disappearing from the County entirely (Unitt 2004). Six observations of burrowing owls were recorded, all in the grid 20A of the salt ponds from October through February.

Short-eared owl (Asio flammeus flammeus)

Short-eared owls are mainly visitors to San Diego County, concentrated around south San Diego Bay and the Tijuana River estuary. They have recently been recorded in the County in the spring (Unitt 2004). Two short-eared owls were recorded in this survey, both from the south bay, one in November and one in December.

Caprimulgiformes

None of the birds listed under this order in the San Diego INRMP, the lesser nighthawk (*Chordeiles acutipennis texinsis*) and the common nighthawk (*Chordeiles minor hesperis*), both in the Caprimulgidae family, were observed during this effort.

Caprimulgidae (Nightjars)

The lesser nighthawk is an uncommon summer visitor in San Diego County. It can be found in the Anza-Borrego Desert and in the coastal lowlands, mainly in the Marine Corps Air Station Miramar area. It inhabits sparsely vegetated areas (Unitt 2004). The common nighthawk is listed as an accidental observation in the Bay INRMP.

Apodiformes

Of the birds listed under this order in the San Diego INRMP, the white-throated swift (*Aeronautes saxatilis*) in the Apodidae family, and the black-chinned hummingbird (*Archilochus alexandri*), rufous hummingbird (*Selasphorus rufus*), Allen's hummingbird (*Selasphorus sasin*), and Calliope hummingbird (*Stellula calliope*), all in the Trochilidae family, were not observed during this effort.

Apodidae (Swifts)

The white-throated swift is common in San Diego County year round and is the only swift that breeds here (Unitt 2004). However, none were noted on this survey after being seen in 2006-07.

Vaux's swift (Chaetura vauxi vauxi)
Vaux's swift is a migrant and winter resident in San Diego County. They are known to winter on Point Loma and pass through as migrants around the rest of the bay (Unitt 2004). Twenty Vaux's swifts were seen, all in the salt ponds in October.

Trochilidae (Hummingbirds)
The black-chinned hummingbird is a fairly common migrant and summer resident in San Diego County (Unitt 2004). The rufous hummingbird is a common migrant in the county and some individuals spend the winter (Unitt 2004). Allen's hummingbird is a common migrant in San Diego County and one individual was confirmed nesting for the first time in 2001 (Unitt 2004). The Calliope hummingbird is considered a rare spring migrant (Unitt 2004). None of these birds, although listed in the INRMP species list, were detected during this survey.

Anna's hummingbird (Calypte anna)
Anna's hummingbirds are well adapted to urban environments although they can still be found in their native habitat. They are present year round, concentrated closer to the coast in the winter (Unitt 2004). A total of 146 Anna's hummingbirds were seen during the surveys in every month and in every grid. Highest numbers were recorded in November and in the north region.

Costa's hummingbird (Calypte costae)
The Costa's hummingbird is a common breeder and winter resident in San Diego County (Unitt 2004). None were seen in 2006-07, but two were noted during these surveys in April in the south region.

Coraciiformes

Alcedinidae (Kingfishers)

Belted kingfisher (Megaceryle alcyon)
Lying at the southern end of the belted kingfisher's breeding range; San Diego County is rarely home to breeding kingfishers. As a winter visitor the bird is more abundant, but still uncommon (Unitt 2004). The only bird of its order listed on the San Diego INRMP species list; a total of 61 belted kingfishers were seen during the surveys. Birds were observed in every month except April and June, with a high count of 13 in November. Birds were widespread throughout the survey area, with the highest numbers in the north bay.

Piciformes

Picidae (Woodpeckers)

Northern flicker (Colaptes auratus collaris)
The northern flicker is San Diego County's largest woodpecker; it is more common during the winter than in the summer when migrants from the north add to the population (Unitt 2004). One was observed at station 22 on the point count surveys.

Passeriformes

Of the birds listed under this order in the San Diego Bay INRMP, the olive-sided flycatcher (*Contopus cooperi*), western wood-pewee (*Contopus sordidulus sordidulus*), western flycatcher (*Empidonax difficilis difficilis*), Hammond's flycatcher (*Empidonax hammondii*), dusky flycatcher (*Empidonax oberholseri*), willow flycatcher (*Empidonax traillii*), gray flycatcher (*Empidonax wrightii*), and ash-throated flycatcher (*Myiarchus cinerascens*) in the Tyrannidae family; the least Bell's vireo (*Vireo bellii pusillus*), warbling vireo (*Vireo gilvus swainsoni*), and solitary (blue-headed) vireo (*Vireo solitarius solitarius*) in the Vireonidae family; the purple martin (*Progne subis subis*) and bank swallow (*Riparia riparia riparia*) in the Hirundinidae family; the Bewick's wren (*Thryomanes bewickii*) in the Troglodytidae family; the golden-crowned kinglet (*Regulus satrapa apache*) in the Regulidae

family; the California gnatcatcher (*Polioptila californica californica*) in the Sylviidae family; the hermit thrush (*Catharus guttatus*), Swainson's trush (*Catharus ustulatus*), mountain bluebird (*Sialia currucoides*), and American robin (*Turdus migratorius propinquus*) in the Turdidae family; the wrentit (*Chamaea fasciata henshawi*) in the Timaliidae family; the sage thrasher (*Oreoscoptes montanus*) in the Mimidae family; the red-throated pipit (*Anthus cervinus*) in the Motacillidae family; the phainopepla (*Phainopepla nitens lepida*) in the Ptilogonatidae family; Virginia's warbler (*Vermivora viginiae*), Lucy's warbler (*Vermivora luciae*), black-throated gray warbler (*Dendroica nigrescens*), Townsend's warbler (*Dendroica townsendi*), hermit warbler (*Dendroica occidentalis*), palm warbler (*Dendroica palmarum palmarum*), American redstart (*Setophaga ruticilla*), MacGillivray's warbler (*Oporornis tolmiei tolmiei*), Wilson's warbler (*Wilsonia pusilla*), and yellow-breasted chat (*Icteria virens auricollis*) in the Parulidae family; the western tanager (*Piranga ludoviciana*) in the Thraupidae family; the green-tailed towhee (*Pipilo chlorurus*), spotted towhee (*Pipilo maculates megalonyx*), California towhee (*Pipilo crissalis senicula*), rufous-crowned sparrow (*Aimophila ruficeps canescens*), vesper sparrow (*Pooecetes gramineus*), lark bunting (*Calamospiza melanocorys*), Nelson's sharp-tailed sparrow (*Ammodramus nelsoni*), fox sparrow (*Passerella iliaca*), swamp sparrow (*Passerella georgiana ericrypta*), golden-crowned sparrow (*Zonotrichia atricapilla*), and dark-eyed junco (*Junco hyemalis*) in the Emberizidae family; black-headed grosbeak (*Pheucticus melanocephalus maculates*), blue grosbeak (*Passerina caerulea salicaria*), and lazuli bunting (*Passerina amoena*) in the Cardinalidae family; red-winged blackbird (*Agelaius phoeniceus neutralis*), tricolored blackbird (*Agelaius tricolor*), yellow-headed blackbird (*Xanthocephalus xanthocephalus*), great-tailed grackle (*Quiscalus mexicanus*), brown-headed cowbird (*Molothrus ater*), Baltimore oriole (*Icterus galbula*) in the Icteridae family, and Lawrence's goldfinch (*Carduelis lawrencei*), American goldfinch (*Carduelis tristis salicamans*), and pine siskin (*Carduelis pinus pinus*) in the Fringilidae family were not observed in this effort.

Tyrannidae (Flycatchers)

The olive-sided flycatcher, western wood-pewee, western flycatcher, Hammond's flycatcher, dusky flycatcher, willow flycatcher, gray flycatcher, and ash-throated flycatcher were not observed during this effort.

Black phoebe (Sayornis nigricans semiatra)

The black phoebe is more common in developed than in natural environments. It exists in San Diego County as both a summer breeder and winter resident, not varying its habitat much between these seasons (Unitt 2004). A total of 206 black phoebes were seen during the surveys. Birds were detected during every survey month with a high count of 48 in November and a low count of nine in March. Black phoebes were seen in all regions of the bay and in the ocean grid.

Say's phoebe (Sayornis saya saya)

Say's phoebes are mainly winter visitors in the County, but they are also present as an uncommon breeding species (Unitt 2004). A total of 170 Say's phoebes were seen during the surveys during every survey month, with a high count of 58 in November and a low count of one in March. Say's phoebes were observed in all regions of the bay and in the ocean grid.

Tropical kingbird (Tyrannus melancholicus satrapa)

The tropical kingbird is a rare, annual vagrant from Mexico that usually occurs in the fall in the San Diego County area (Unitt 2004). After having not been reported in 2006-07, two were reported in this survey; one in March from the ocean shoreline of Coronado, and one in September from the south-central bay.

Cassin's kingbird (Tyrannus vociferans vociferans)

Cassin's kingbird's take advantage of suburban and rural sprawl clearing native brush and scrub habitat, and have been increasing in the County. They nest and roost in tall exotic trees, not differing in their winter and breeding season abundance or distribution (Unitt 2004). Five Cassin's kingbirds were seen during the surveys; reported in March, August, October, and December from the north, north-central, and salt pond regions.

Western kingbird (Tyrannus verticalis)
The western kingbird is rare in the winter in San Diego County but common as a migrant and during the breeding season (Unitt 2004). Recorded in 2006-07, this species was not recorded in 2009-10, however, one bird was identified as a California kingbird, which may have been this species.

Laniidae (Shrikes)

Loggerhead shrike (Lanius ludovicianus)
The loggerhead shrike is an uncommon year round resident in San Diego County. It most commonly breeds in the desert, but has been seen breeding and wintering around San Diego Bay (Unitt 2004). Six loggerhead shrikes were seen during the surveys; all between December and February. Sightings ranged from one to three birds per month and were recorded from the salt ponds and north bay.

Vireonidae (Vireos)
The Least Bell's vireo, warbling vireo, and solitary (blue-headed) vireo were not observed, although they are listed on the San Diego Bay INRMP species list.

Corvidae (Jays, crows)

Western scrub-jay (Aphelocona californica obscura)
The western scrub-jay is a year-round resident in San Diego County. It inhabits chaparral and oak woodlands and can also be seen in urban areas (Unitt 2004). One scrub-jay was observed in the salt ponds in February.

American crow (Corvus brachyrhynchos hesperius)
The American crow historically occurred in riparian and oak woodlands before expanding to take advantage of orchards and urban environments. It is a non-migratory year-round resident in the County, with similar winter and breeding distributions (Unitt 2004). A total of 390 American crows were seen during the surveys. Birds were seen during every survey month with a high count of 99 in April and a low count of 12 in December. American crows were widespread and observed in every region of the bay and in the ocean grid.

Common raven Corvus corax clarionensis
One of the most widespread breeding birds in San Diego County, the common raven is a permanent resident utilizing all San Diego County habitats (Unitt 2004). A total of 48 common ravens were seen during the surveys. Birds were seen in every month except September; with a high count of 17 in April. They were seen in low numbers in every region of the survey area.

Alaudidae (Larks)

Horned lark (Eremophila alpestris)
The horned lark is common around San Diego Bay during both the breeding and winter season; they utilize salt flat and bay fill habitats around the Bay (Unitt 2004). A total of 1,056 horned larks were seen during these surveys. Birds were observed during every survey month with a high count of 170 in April and a low count of 34 in September. Horned larks were seen in the ocean grid and in every region of the bay except for the north-central region.

Hirundinidae (Swallows)
The purple martin and bank swallow were not observed during this survey effort. The purple martin is listed as an accidental observation in the San Diego Bay INRMP as it is a declining summer visitor restricted almost completely to the mountains in this County. The bank swallow no longer nests in San Diego County and is rare as a migrant, though it was seen in the 2006-07 survey (Unitt 2004).

Tree swallow (Tachycineta bicolor)
San Diego County is at the southern end of the tree swallow's breeding range, the bird is primarily seen as a migrant in the area (Unitt 2004). A total of 193 tree swallows were seen during these surveys, in every month except April and June. Low numbers occurred in most months, except for a high of 152 in February. All the tree swallows were observed in the ocean, south, south-central, and salt ponds regions.

Violet-green swallow (Tachycineta thalassina thalassina)
In San Diego County, the violet-green swallow is far more common as a breeding and migratory bird than during the winter. Around San Diego Bay, they are primarily migrants, with the birds observed during this survey seen during the peak of their spring migration (Unitt 2004). Twelve violet-green swallows were seen, all recorded in the salt ponds in March.

Northern rough-winged swallow (Stelgidopteryx serripennis)
Common in summer and during migration but rare in the winter, the northern rough-winged swallow is widespread in the coastal lowland of San Diego County (Unitt 2004). A total of 28 northern rough-winged swallows were observed, mostly from the salt ponds, but a few were also observed in the south and south-central regions. Records were from March (21) and August (3) and September (4) during the species' migration.

Cliff swallow (Hirundo pyrrhonota tachina)
The cliff swallow is a common summer resident, largely absent from San Diego County in the winter. It has adapted well to nesting on manmade structures, but may be on the decline in the county (Unitt 2004). A total of 862 cliff swallows were seen during the surveys from March to September with a high count of 434 in August and a low count of 8 in September. Cliff swallows were observed in all regions of the bay and in the ocean grid, with the highest numbers in the salt ponds.

Barn swallow (Hirundo rustica erythrogaster)
The barn swallow, while widespread in North America, is most common in San Diego County as a migrant. It does nest in limited areas in the County though, including on Point Loma and Coronado, and shows an increasing trend during the winter (Unitt 2004). A total of 851 barn swallows were observed during the surveys. Four birds were seen in January, and the rest occurred from March to October with a high count of 268 in August. Barn swallows were observed in all regions of the bay and in the ocean grid, with the most records from the ocean, salt pond, and south regions.

Aegithalidae (Long-tailed tits)

Bushtit (Psaltriparus minimus melanurus)
The bushtit is one of San Diego County's most common songbirds; it is a year round resident and successful adapter to urban environments (Unitt 2004). A total of 49 bushtits were seen during the surveys. Birds were seen in March, November, December, and February, with a high count of 28 birds in February and a low count of 1 birds in November.

Troglodytidae (Wrens)
The Bewick's wren was not observed.

San Diego cactus wren (Campylorhynchus brunneicapillus sandiegensis)
This subspecies is restricted to the coastal plain of southern California, and is designated a Species of Special Concern by the state of California. It is a year-round resident and does not move far from its breeding range. It has disappeared from the San Diego Bay area recently and was not noted in the 2006-07 surveys (Unitt 2004). One cactus wren was reported in April from Chula Vista in the south bay.

Rock wren (Salpinctes obsoletus)
Rock wrens are present year round in San Diego County, dispersing somewhat from their breeding range during the winter. Around San Diego Bay it is present as a winter and migratory bird (Unitt 2004). Only one rock wren was observed, in the south bay in November.

House wren (Troglodytes aedon parkmanii)
Most common as a breeding bird in the County, the house wren is increasing as a year round resident and winter visitor, as demonstrated by these survey results. It is primarily confined to forested habitat but is beginning to settle more in urban environments (Unitt 2004). Nine house wrens were observed from August, September, October, December, and January. All were seen in either the salt ponds, or the south-central bay.

Marsh wren (Cistothorus palustris)
The marsh wren occurs in San Diego County as both a year round resident and winter visitor. It is confined mainly to coastal marshy habitats, more so during the breeding season. The local breeding subspecies (*C. p. clarkae*) is a species of concern in California (Unitt 2004). Only 14 marsh wrens were observed during these surveys; nine in the salt ponds and five in the south bay. Birds were detected throughout the year, with a noticeable absence of detections from April to August.

Regulidae (Kinglets)
The golden-crowned kinglet was not observed.

Ruby-crowned kinglet (Regulus calendula calendula)
The ruby-crowned kinglet is a common winter visitor and migrant in the County, most abundant in riparian and oak woodland (Unitt 2004). Two were seen in this survey, both in the north-central bay in November.

Sylviidae (Gnatcatchers)
The California gnatcatcher was not observed during this survey effort despite its inclusion on the San Diego Bay INRMP species list and being noted in the 2006-07 surveys. It is listed as threatened under the Endangered Species Act and lives only in southern California's coastal sage scrub (Unitt 2004).

Blue-gray gnatcatcher (Polioptila caerulea obscura)
The blue-gray gnatcatcher is a widespread species across San Diego, but occurs near the coast mainly in winter (Unitt 2004). Three were noted in these surveys, all in the salt pond region; one each in October, November, and January.

Turdidae (Thrushes)
The hermit thrush, Swainson's trush, mountain bluebird, and American robin were not observed.

Timaliidae (Babblers)
The wrentit is abundant in San Diego County chaparral, but also present in sage scrub and in the understory of riparian and oak woodland (Unitt 2004). It was not recorded during these surveys, though it was in the 2006-07 surveys.

Mimidae (Mimic thrushes)
The sage thrasher was not observed during this effort.

Northern mockingbird (Mimus polyglottos polyglottos)
The northern mockingbird is common year round, occurring in urban, rural, and natural landscapes (Unitt 2004). Northern mockingbirds were seen in every month ranging from a low of one in September to a high of 18 in April. Birds were widely scattered and noted from every region.

California thrasher (Toxostoma redivivum redivivum)
The California thrasher is a widespread and abundant bird across San Diego County. Its preference for mature chaparral and inability to adapt to urbanization, however, make it uncommon around San Diego Bay (Unitt 2004). It was not recorded in the 2006-07 surveys, but one was noted in the salt ponds in October during this survey period.

Sturnidae (Starlings)

European starling (Sturnus vulgaris vulgaris)
European starlings are abundant in San Diego County during both summer and winter, most abundant in agricultural and urban areas (Unitt 2004). A total of 2,141 European starlings were seen during the surveys. Birds were detected during every survey month with a high count of 440 in November and a low count of 48 in January. European starlings were seen in all regions of the bay and in the ocean grid.

Motacillidae (Wagtails, pipits)
The red-throated pipit was not observed during this effort and is listed as an accidental observation in the San Diego Bay INRMP.

American pipit (Anthus rubescens pacificus)
American pipits are present in San Diego County only as a winter visitors and migrants (Unitt 2004). A total of 453 observations of American pipits were made during this survey effort. These birds were seen in every month except June and September, primarily in the ocean, south, and south-central regions.

Bombycillidae (Waxwings)

Cedar waxwing (Bombycilla cedrorum)
The cedar waxwing is a winter visitor in San Diego County and its abundance varies from year to year. They are frugivores and feed on wild berries as well as berries from ornamental trees (Unitt 2004). Thirty birds were recorded in this survey effort; all found in November in the north-central bay.

Ptilogonatidae (Silky-flycatchers)
The phainopepla is common in the desert in the fall, winter, and spring. It is common on the coastal lowlands oak and riparian woodlands and open chaparral in the spring and summer (Unitt 2004). In the vicinity of the San Diego Bay, the San Diego County Bird Atlas (Unitt 2004) only shows occurrence on Point Loma as presumed migrants. None were seen on this survey.

Parulidae (Warblers, Redstarts, and Yellowthroats)
The black-throated gray warbler is rare in the winter and breeding season and sometimes common during migration through San Diego County. Not a breeder in San Diego County, the Townsend's warbler occurs mostly in the County as a spring migrant and rarely as a winter visitor. The palm warbler is a rare but regular visitor to the county; however, it is more common farther to the north. The yellow-breasted chat is a locally common riparian bird, recovering in numbers since the mid 1980s. It has not been typically observed in the San Diego Bay area. MacGillivray's warbler is most likely found in spring at oases on the eastern base of the county's mountains. Lucy's warbler only colonized San Diego County in 1990; its breeding distribution is localized in the Borrego Valley, though they have been observed in the winter around San Diego Bay. Virginia's warbler is a rare vagrant to coastal southern California. Currently only two or three are reported in the county per year. Occurring most commonly in San Diego County during fall migration, the American redstart has been previously recorded during this time on Point Loma. San Diego County is at the southern end of the Wilson's warbler's breeding range, with only three or four pairs. The bird is common during spring and fall migration and is rare during the winter (Unitt 2004).

Orange-crowned warbler (Oreothlypis celata)
The orange-crowned warbler is fairly common year-round in San Diego County, in different habitats during its migration, breeding, and winter seasons. It is more common around San Diego Bay during the winter, consistent with this survey's results (Unitt 2004). A total of 16 orange-crowned warblers were seen during the surveys. One bird was seen in April in the north bay, two birds were seen in the north-central in April and the remaining 13 birds were seen in the north-central in November.

Nashville warbler (Oreothlypis ruficapilla ridgwayi)
The Nashville warbler is most common as a spring migrant in San Diego County (Unitt 2004). One Nashville warbler was seen in the north-central bay along the Coronado shore in April, consistent with its peak spring migration abundance.

Yellow warbler (Dendroica petechia)
The yellow warbler is a fairly common migrant and breeding season bird in San Diego County, but is somewhat rare in the winter (Unitt 2004). It is listed as a California Second Priority Species of Special Concern during the breeding season (CDFG 2008). Thirteen yellow warblers were recorded during this survey, all from the north and north-central bay. Birds were seen from December through February, with most records from January.

Yellow-rumped warbler (Audubon's) (Dendroica coronata auduboni)
One of San Diego County's most abundant winter visitors is the yellow-rumped warbler. It is also a recent breeding colonizer, confined to the County's highest mountains. The dominant subspecies in the County, and the one recorded during this survey is *D. c. auduboni* (Unitt 2004). A total of 229 Audubon's warblers were seen during the surveys, with the majority occurring in the north and north-central bay, though it was found in every region. Birds were seen in March and April, and again in October through February with a high count of 125 in November and a low count of one in April.

Yellow-rumped warbler (myrtle) (Dendroica coronata hooveri)
The myrtle warbler, a subspecies of the yellow-rumped warbler, is an uncommon winter visitor in San Diego County, with most records being from the coastal lowland in October through May (Unitt 2004). One individual of this subspecies was noted from the southeast part of the bay in December.

Hermit warbler (Dendroica occidentalis)
The hermit warbler is primarily a migrant in San Diego County, particularly in the spring (Unitt 2004). The hermit warbler is not commonly seen on the coast and has been in decline, with current numbers less than those 30 years ago. Four birds were seen on Coronado Island during April in these surveys.

Common yellowthroat (Geothlypis trichas)
The common yellowthroat is present in the County in both the summer and winter, and is the second most common bird in the area's riparian woodland (Unitt 2004). A total of 31 common yellowthroats were observed during the surveys. Birds were observed in March and April, and again in August through February with a high count of 8 in November, and a low count of one bird in December. Common yellowthroats were mainly seen in the salt ponds.

Thraupidae (Tanangers)

The only bird of this family on the San Diego Bay INRMP species list is the western tanager, which was not observed during this effort. It has been observed during the winter around the bay, and it is most numerous in Balboa Park during this season (Unitt 2004).

Emberizidae (Sparrows, Towhees and Buntings)

The following birds were not observed during this effort: Spotted towhees are common in chaparral as a year-round resident in San Diego County. They are not well adapted to urbanization and are vulnerable to habitat fragmentation. The California towhee is common in coastal sage scrub as well as in chaparral, riparian and high-desert scrub, and in the undergrowth of riparian and oak woodlands. It also adapts well to urbanized environments and is common in the County during the winter and breeding seasons, not widely varying its distribution. Both the spotted and California towhees were seen in the 2006-07 surveys, but not in 2009-10. The green-tailed towhee is rare in the winter, but has been observed during this time around San Diego Bay. The rufous-crowned sparrow is a year-round resident in San Diego County. It inhabits coastal sage scrub and can also be found in burned chaparral and in openings in mature chaparral, they are rarely seen very far from their breeding habitat. It was seen in the 2006-07 surveys. The Nelson's sharp-tailed sparrow is a rare winter visitor in San Diego County, it is usually found in coastal salt marshes. Around San Diego Bay, Nelson's sharp-tailed sparrows were seen in the Sweetwater River estuary in 1987

and 1994 (Unitt 2004). The fox sparrow is much more common in the County as a winter visitor, as the area is marginal to the sparrow's breeding range. The swamp sparrow is a regular rare fall migrant and winter visitor in California. It inhabits freshwater marshes and riparian woodland understory; the San Diego County Bird Atlas (Unitt 2004) mentions sightings on Point Loma for fall migrants. The vesper sparrow is an uncommon winter visitor in San Diego County. It inhabits open grasslands and sparse scrub. The lark bunting is rare in California, and is primarily seen as a rare spring migrant in the desert. It is listed as an accidental observation in the San Diego Bay INRMP. The dark-eyed junco is common in the conifers and oaks of San Diego County's mountains; while they are seen only as migrants and wintering birds around the bay (Unitt 2004).

Chipping sparrow (Spizella passerine arizonae)
The chipping sparrow is a breeder and migrant in San Diego County. It usually breeds in open pine and oak woodlands, although a breeding colony has established itself on Point Loma around native scrubs and ornamental plantings (Unitt 2004). Two chipping sparrows were seen in the salt ponds in March.

Brewer's sparrow (Spizella breweri breweri)
Brewer's sparrow is very limited breeder in San Diego County; however, it is a widespread migrant and winter visitor. Most records are from the desert areas, though it has been noted along the coast, as at Point Loma (Unitt 2004). One individual was noted in January in the salt ponds.

Savannah sparrow (Passerculus sandwichensis)
The Savannah sparrow is split into many subspecies, several of which occur in San Diego County. Three of these visiting as winter migrants from the north are not safely distinguishable from each other in the field, including *P. s. anthinus*, *P. s. nevadensis*, and *P. s. brooksi*. Another, the Belding's (*P. s. beldingi*), is a non-migratory year round resident (Unitt 2004). A total of 229 undifferentiated Savannah sparrows were recorded during the surveys. Birds were observed from September to March, mostly in the salt ponds.

Belding's Savannah sparrow (Passerculus sandwichensis beldingi)
Endemic to the coast of northern Baja and southern California, the Belding's Savannah sparrow is a non-migratory subspecies of the Savannah sparrow. It is primarily restricted to pickleweed dominated coastal marshes and is designated as endangered by the CDFG (Unitt 2004). A total of 1,892 Belding's Savannah sparrows were seen during these surveys. Birds were seen during every survey month with a high count of 329 in August and a low count of 96 in October. This subspecies was noted from every grid, except the north-central, with a high of 869 records from the salt ponds and a low of 6 from the north bay.

Large-billed Savannah sparrow (Passerculus sandwichensis rostratus)
The large-billed Savannah sparrow is a subspecies of Savannah sparrow whose post breeding individuals reach San Diego County from northeastern Baja California and northwestern Sonora (Wheelwright and Rising 2008). This subspecies differs from the others in its large size, body streaking, and thick bill (Unitt 2004). Sixty large-billed Savannah sparrows were seen during the surveys, 52 of which were recorded from the south bay. Birds were noted from August through February with a high count of 25 in November and a low count of one bird in October.

Song sparrow (Melospiza melodia)
The most abundant bird in San Diego County riparian woodlands, the song sparrow makes limited use of heavily urbanized areas (Unitt 2004). A total of 104 song sparrows were observed during the surveys. This year round resident was seen during every survey month, except June, with a high count of 18 in October and a low count of four birds in April. The vast majority were noted in the salt ponds (93 records).

Lincoln's sparrow (Melospiza lincolnii)
With only one summer record for San Diego County, Lincoln's sparrow is a migrant and winter visitor only (Unitt 2004). Only two Lincoln's sparrows were noted during these surveys: one in November along the Coronado coast in the north-central bay, and one in December in the south bay.

White-crowned sparrow (Zonotrichia leucophrys)
The white-crowned sparrow is common in San Diego County during the winter. It normally arrives in September and departs April to May (Unitt 2004). A total of 511 white-crowned sparrows were seen during the surveys. Birds were seen in March, and again from October through February with a high count of 125 in November and a low count of 33 in October. White-crowned sparrows were widespread throughout the survey area, with the highest concentrations in the salt ponds.

Golden-crowned sparrow (Zonotrichia atricapilla)
The golden-crowned sparrow is a winter visitor in San Diego County where it is widespread over the coastal slopes (Unitt 2004). One bird was observed in December in the salt ponds.

Cardinalidae (Cardinals and allies)
No individuals of the three species in this family from the Bay INRMP were seen in these surveys, despite the presence of all three in the 2006-07 surveys. The black-headed grosbeak is common in the summer but rare in the winter in San Diego County. Breeding has been confirmed around San Diego Bay, on Coronado Island (Unitt 2004). Rare in the winter but locally common in the summer, the blue grosbeak prefers riparian woodland and scrub. They are not as common around San Diego Bay as around other parts of the County (Unitt 2004). The lazuli bunting is absent from San Diego County in the winter, but is common during breeding and migration. Unitt (2004) shows only migrants around San Diego Bay.

Icteridae (Balckbirds, Orioles, and Meadowlarks)
The red-winged blackbird is a locally common permanent resident in San Diego County. It mainly inhabits freshwater marshes, but can also use creeks, ponds, and mustard stands (Unitt 2004). The tricolored blackbird is a year-round resident in San Diego County. Twenty to thirty breeding colonies are known around the county, none around San Diego Bay (Unitt 2004). The San Diego County Bird Atlas (Unitt 2004) shows records of birds in the north-central bay and south of the bay in the winter. The yellow-headed blackbird is a rare migrant and winter visitor in San Diego County. Only one nesting colony was confirmed during the Atlas survey years, in the southeast county. In the San Diego Bay area, only one bird was sighted in the winter in the Tijuana River valley (Unitt 2004). The great-tailed grackle is a locally common resident in San Diego County, after invading and increasing in number since the mid-1970s. They nest in wetland or marsh habitat, but have been spotted only as migrants or in the winter around San Diego Bay (Unitt 2004). The brown-headed cowbird is migratory, but found in San Diego County year round. They are brood parasites, laying their eggs in small songbird nests (Unitt 2004). Both of these species were noted in 2006-07, but not in 2009-10.

The Baltimore oriole is a rare migrant and winter visitor in San Diego County. It is mostly associated with ornamental trees (Unitt 2004). The San Diego County Bird Atlas (Unitt 2004) mentions wintering birds on Point Loma and Coronado.

Western meadowlark (Sturnella neglecta)
Grasslands are the most common western meadowlark habitat, but they have been observed in coastal marshes, open sage scrub and other habitats, including those around San Diego Bay. The meadowlark is common as a breeding resident, but even more so in the winter (Unitt 2004). A total of 285 western meadowlarks were seen during the surveys. Birds were seen in March and April, and again from October to February with a high count of 73 birds in March and a low count of five birds in April. This species was widespread throughout the grids, but was concentrated in the salt ponds.

Brewer's blackbird (Euphagus cyanocephalus)
A common, but perhaps declining resident in San Diego County, the Brewer's blackbird exists in developed as well as undeveloped areas year-round (Unitt 2004). A total of 604 Brewer's blackbirds were seen during the surveys. Birds were observed during every survey month with a high count of 135 birds in November and a low count of 18 in October. Brewer's blackbirds were observed in the ocean grid and in every region of the bay except for the salt ponds.

Hooded oriole (Icterus cucullatus nelsoni)
The hooded oriole is very common during the breeding season but rare in the winter in San Diego County. It is well adapted to the urban landscape, nesting in palm and eucalyptus trees (Unitt 2004). A total of 14 hooded orioles were seen during the surveys, all during their reported breeding season of April to August. Birds were scattered through the north, north-central, south-central, and south regions.

Bullock's oriole (Icterus bullocki)
This species is a widespread breeding bird throughout the woods of San Diego, though it is absent as a breeder on Coronado and Point Loma. It is also a winter visitor to the San Diego Bay area (Unitt 2004). However, one bird was noted in June along the south bay.

Fringillidae (Finches)
Lawrence's goldfinch, American goldfinch, and the pine siskin were not observed during this survey effort.

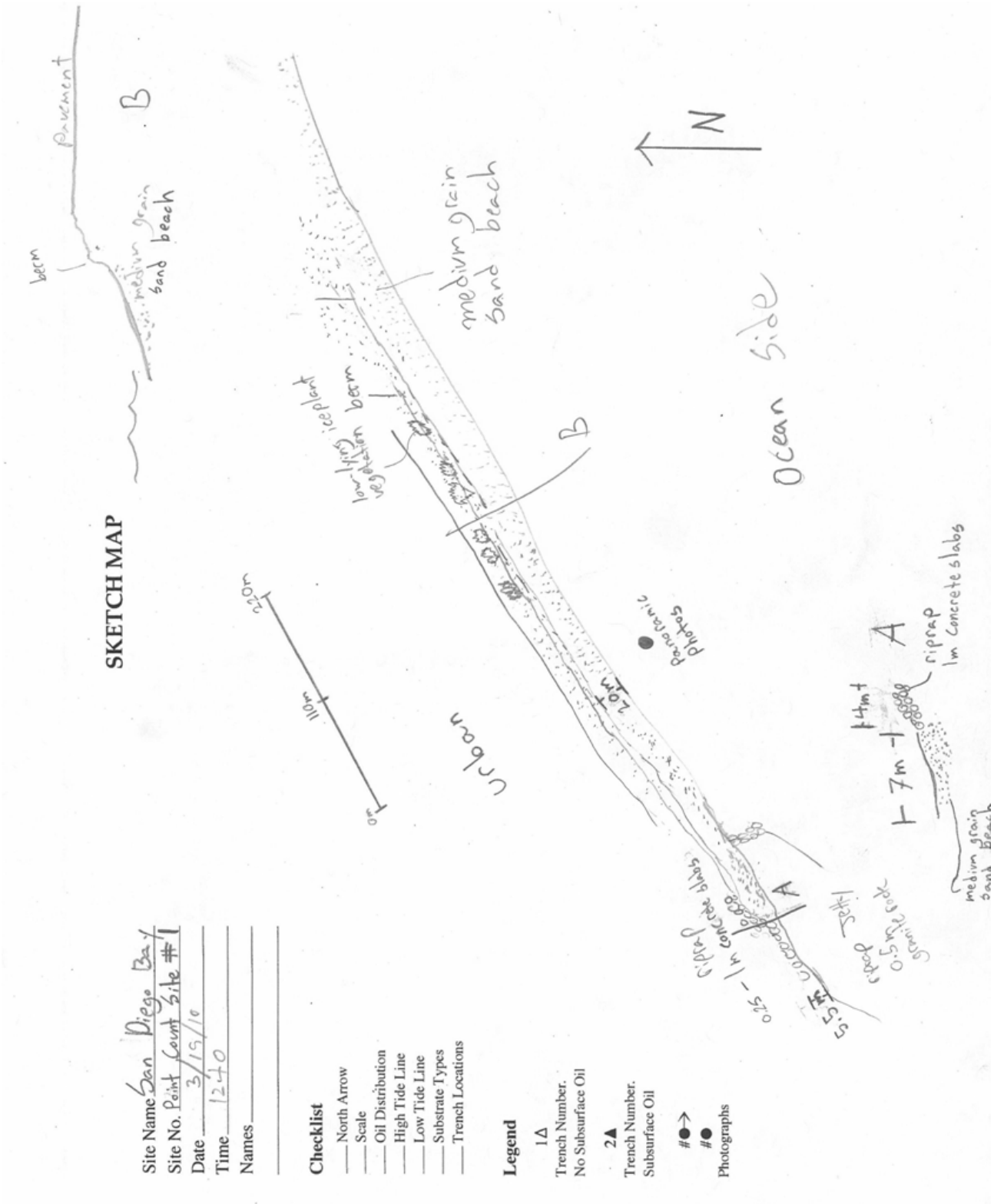
House finch (Carpodacus mexicanus frontalis)
Unitt (2004) describes the house finch as the most abundant bird in San Diego County. It occupies all terrestrial habitats, adapting well to urbanized areas. A total of 1,917 house finches were seen during the surveys. Birds were seen during every survey month with a high count of 423 birds in Aoruk and a low of 17 in September. House finches were evenly distributed throughout every region of the bay.

Lesser goldfinch (Spinus psaltria hesperophilus)
The lesser goldfinch is very common in San Diego County; it is a year-round resident utilizing a wide variety of habitats. Their winter habitat does not differ much from their breeding one; they are not as common around the bay as they are in other parts of the County (Unitt 2004). Two of these birds were spotted during these surveys, both in the salt ponds, one in October and one in November.

Passeridae (Old world sparrow)

House sparrow (Passer domesticus domesticus)
Introduced to the United States from Eurasia in the 19th century, the house sparrow is common to developed habitats (Unitt 2004). A total of 904 house sparrows were seen during the surveys. Birds were detected in every survey month with a high count of 186 in August and a low count of 39 in December; although their winter distribution does not normally differ from that of their breeding season. House sparrows were observed in all regions of the bay and in the ocean grid, but were most numerous in the north and north-central regions.

Appendix C: Point Count Habitat Sketches



SKETCH MAP

Site Name San Diego Bay
Site No. Point Count site # 2
Date 3/19/10
Time 1330
Names

Checklist

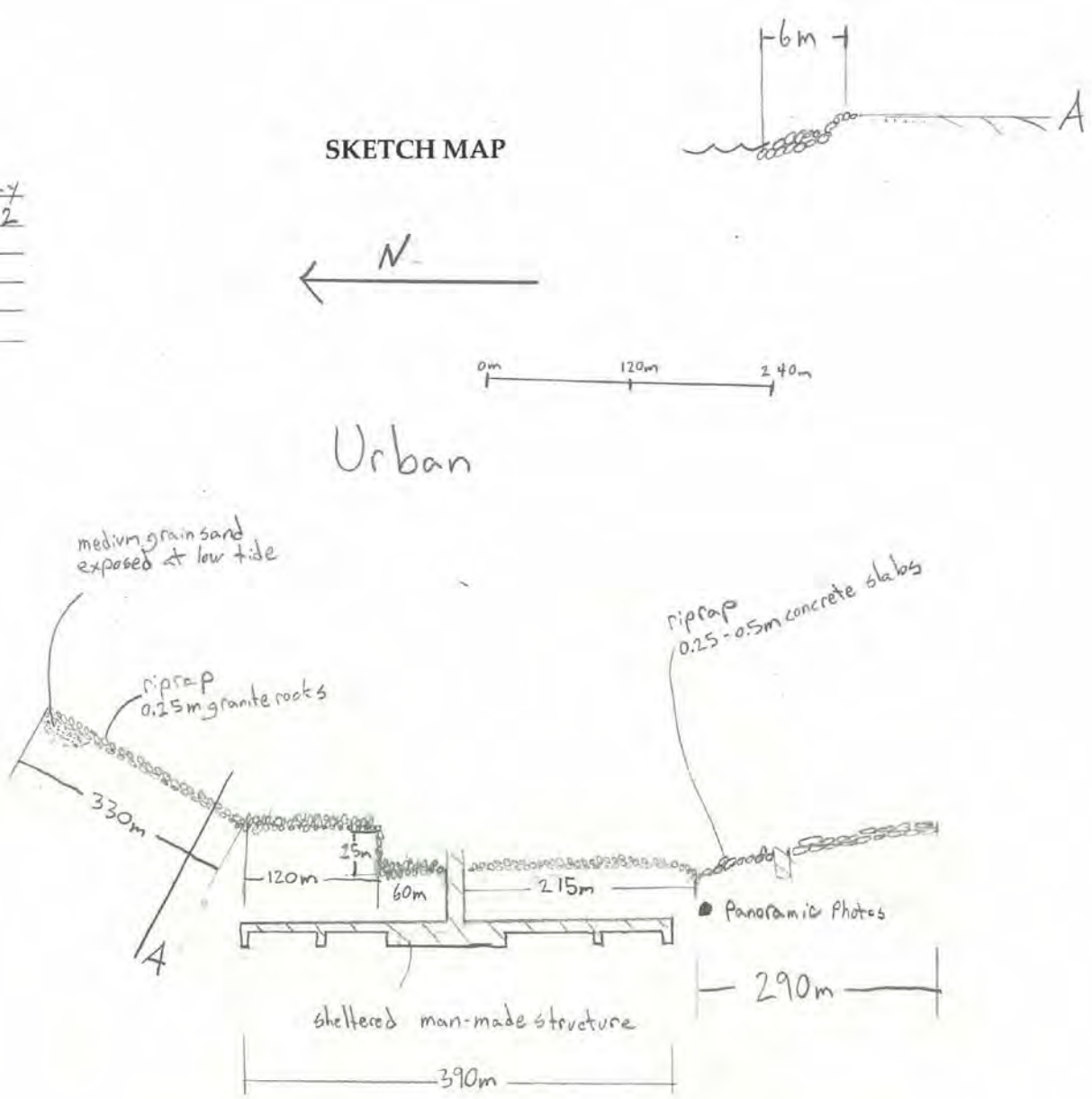
- ✓ North Arrow
- ✓ Scale
- N/A Oil Distribution
- ___ High Tide Line
- N/A Low Tide Line
- ✓ Substrate Types
- N/A Trench Locations

Legend

1Δ
Trench Number,
No Subsurface Oil

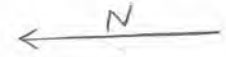
2▲
Trench Number,
Subsurface Oil

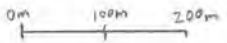
#●→
#●
Photographs

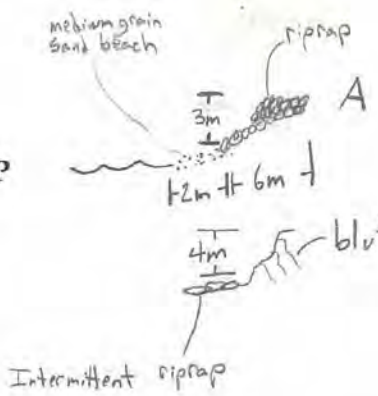


SKETCH MAP

Site Name San Diego Bay
Site No. Point Count Site #4
Date 3/19/10
Time 1430
Names







Urban

Checklist

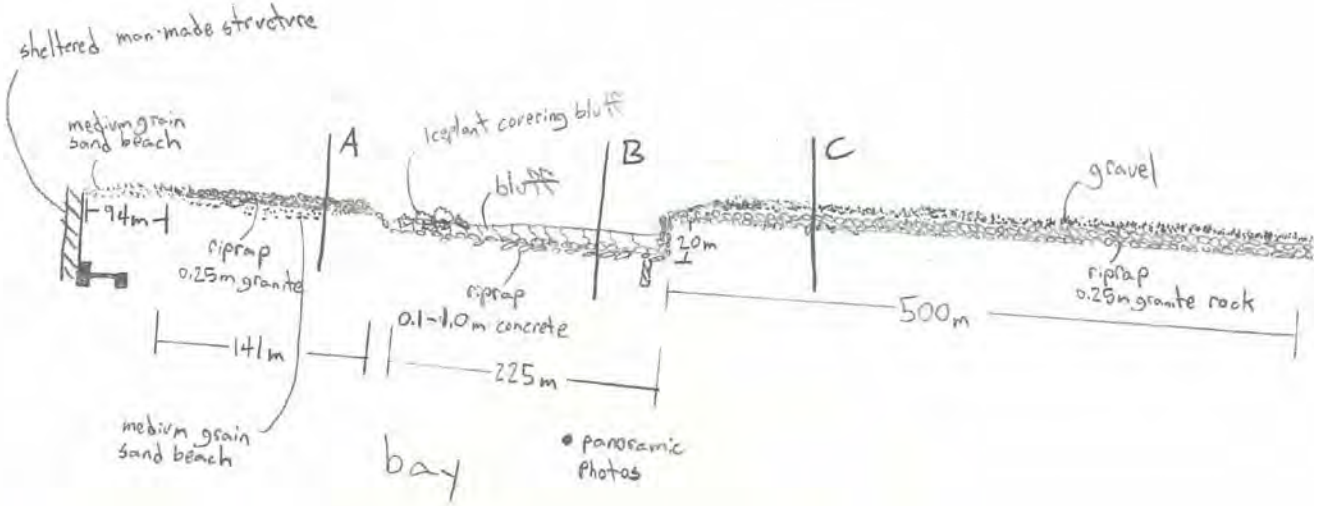
- ___ North Arrow
- ___ Scale
- ___ Oil Distribution
- ___ High Tide Line
- ___ Low Tide Line
- ___ Substrate Types
- ___ Trench Locations

Legend

1Δ
Trench Number.
No Subsurface Oil

2▲
Trench Number.
Subsurface Oil

#●→
#●
Photographs



SKETCH MAP
Site Name San Diego Bay Avian Surveys
Site No. Point Loma Site #5
Date 3/29/10
Time 1600
Names
N
Urban
Checklist
North Arrow
Scale
Oil Distribution
High Tide Line
Low Tide Line
Substrate Types
Trench Locations
Legend
1Δ
Trench Number.
No Subsurface Oil
2▲
Trench Number.
Subsurface Oil
#●→
#●
Photographs
riprap
1m concrete slabs
fine grain
sand beach
Parking Lot
Panoramic Photos
Park
medium grain
sandy beach
inside slope
riprap
0.5m granite
boats & Docks
(sheltered, man-made structure)
buildings
Parking
Park
Parking
buildings
sheltered
man-made structure
riprap
0.5m granite
6m
12m
2m
120m
240m

SKETCH MAP

Site Name San Diego Bay
Site No. Point Count Site # 6
Date 4/7/10
Time 1000
Names

Checklist

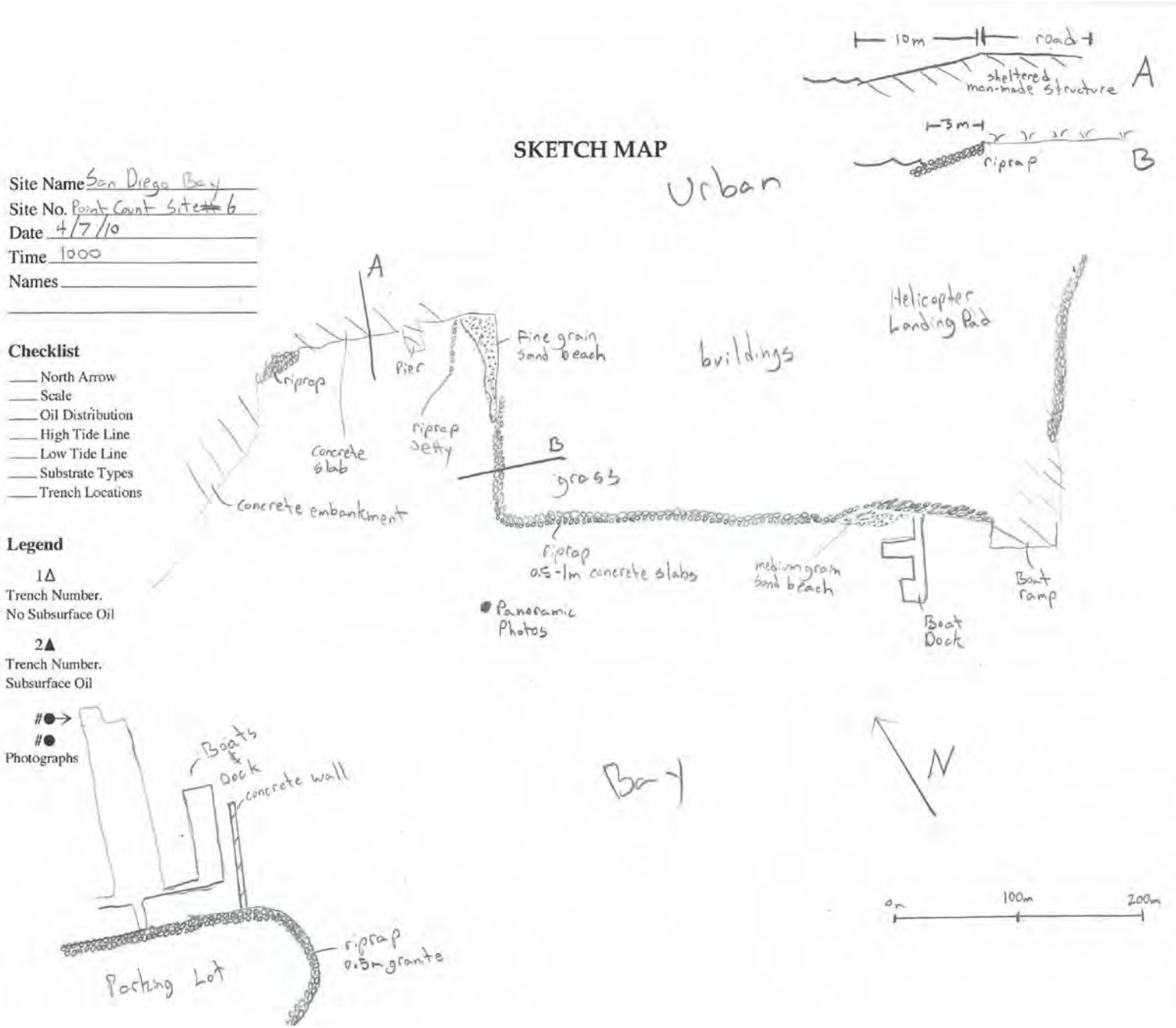
___ North Arrow
___ Scale
___ Oil Distribution
___ High Tide Line
___ Low Tide Line
___ Substrate Types
___ Trench Locations

Legend

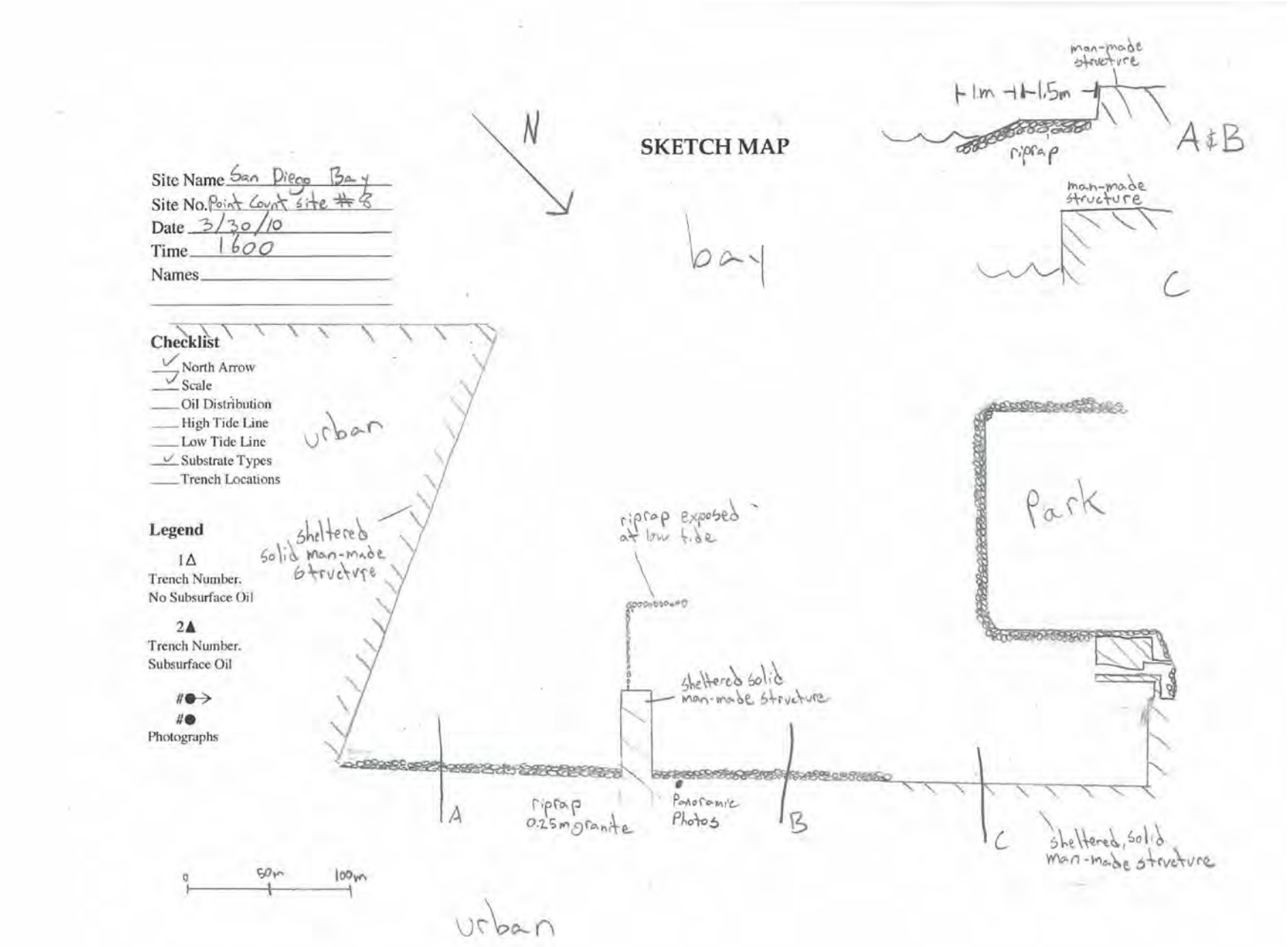
1Δ
Trench Number.
No Subsurface Oil

2▲
Trench Number.
Subsurface Oil

#●→
#●
Photographs



SKETCH MAP
Site Name San Diego Bay Avian Survey
Site No. Point Count Sheet #7
Date 3/29/10
Time 1700
Names
Checklist
North Arrow
Scale
Oil Distribution
High Tide Line
Low Tide Line
Substrate Types
Trench Locations
Legend
1Δ
Trench Number.
No Subsurface Oil.
2Δ
Trench Number.
Subsurface Oil
#●→
#●
Photographs
Sheltered man-made structure
Panoramic Photos
road & Parking
Bay
N
0m
50m
100m
A & B
A
B


SKETCH MAP
Site Name San Diego Bay
Site No. Point Count site #8
Date 3/30/10
Time 1600
Names
Checklist
North Arrow
Scale
Oil Distribution
High Tide Line
Low Tide Line
Substrate Types
Trench Locations
Legend
1Δ
Trench Number.
No Subsurface Oil
2▲
Trench Number.
Subsurface Oil
#●→
#●
Photographs
N
bay
urban
sheltered solid man-made structure
riprap exposed at low tide
sheltered solid man-made structure
Panoramic Photos
riprap 0.25m granite
A
B
C
Park
sheltered, solid man-made structure
man-made structure
+1m +1-1.5m
riprap
A & B
man-made structure
C
0
50m
100m
urban

SKETCH MAP
Site Name San Diego Bay Avian Survey
Site No. Point Count Site #9
Date 4/7/10
Time 1300
Names
Checklist
North Arrow
Scale
Oil Distribution
High Tide Line
Low Tide Line
Substrate Types
Trench Locations
Legend
1Δ
Trench Number.
No Subsurface Oil
2▲
Trench Number.
Subsurface Oil
#●→
#●
Photographs
N
0m
100m
200m
Urban
sheltered man-made structure
1A
Bay

SKETCH MAP

Site Name San Diego Bay
Site No. Point Count Site #10
Date 4/7/10
Time 1030
Names

Checklist

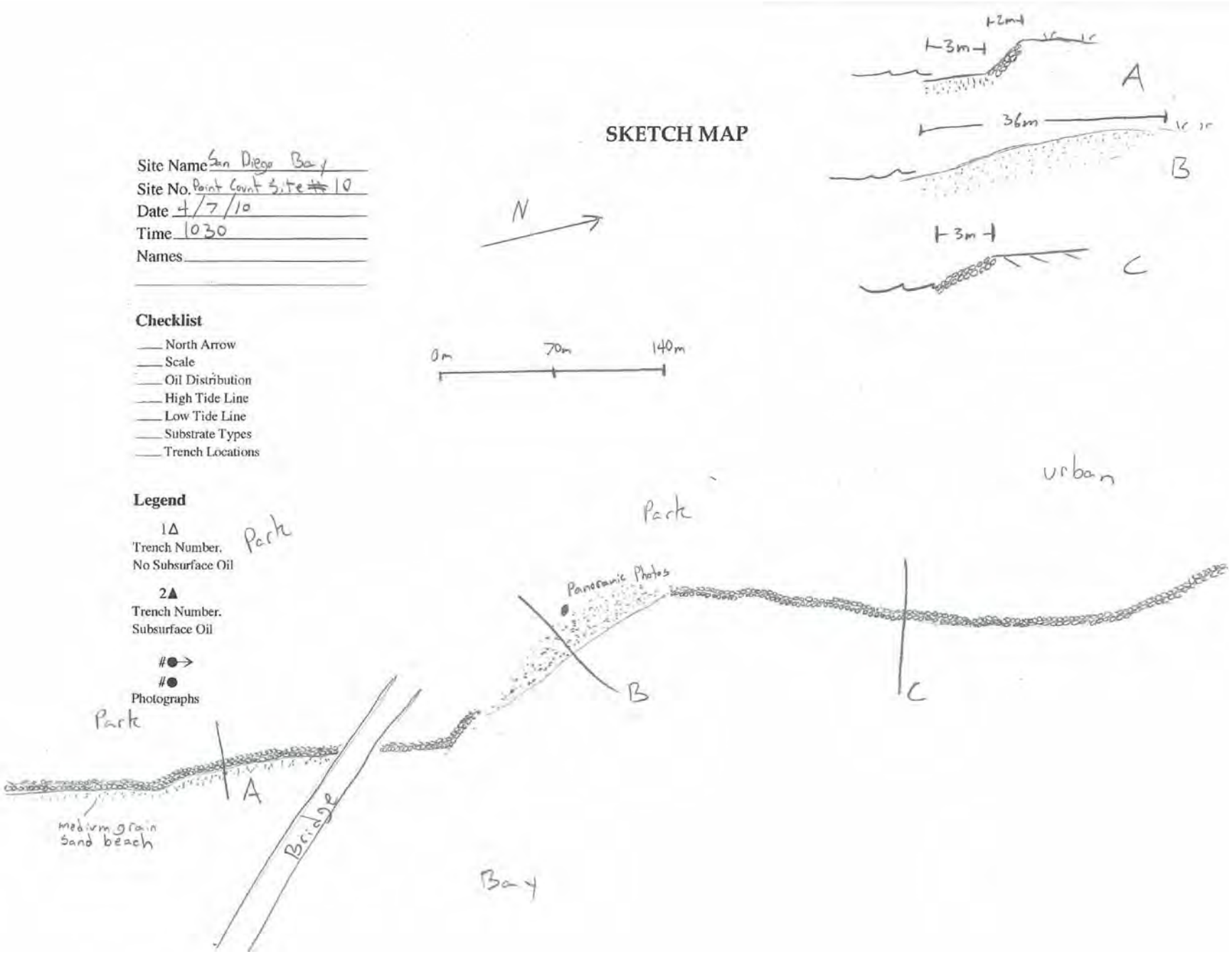
___ North Arrow
___ Scale
___ Oil Distribution
___ High Tide Line
___ Low Tide Line
___ Substrate Types
___ Trench Locations

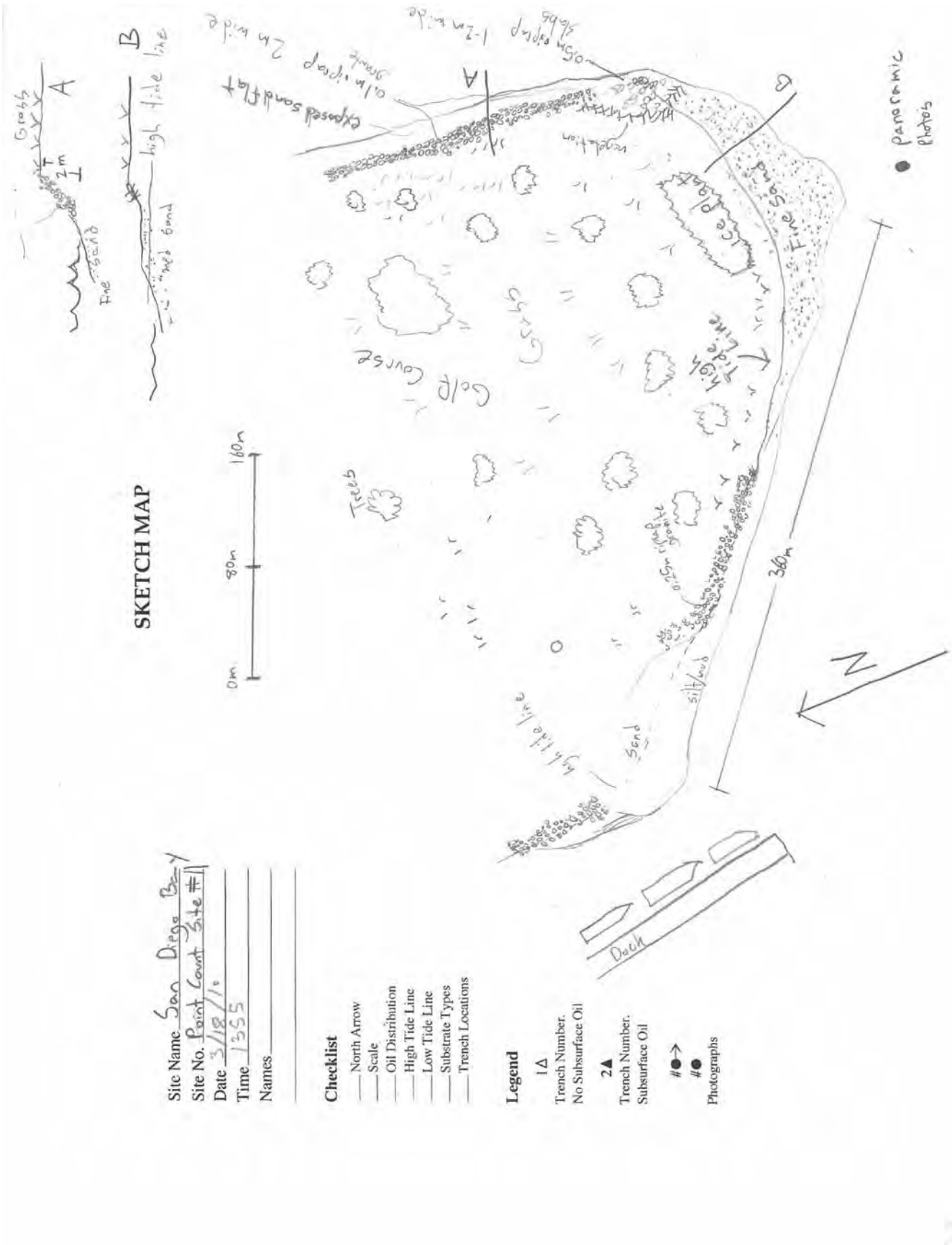
Legend

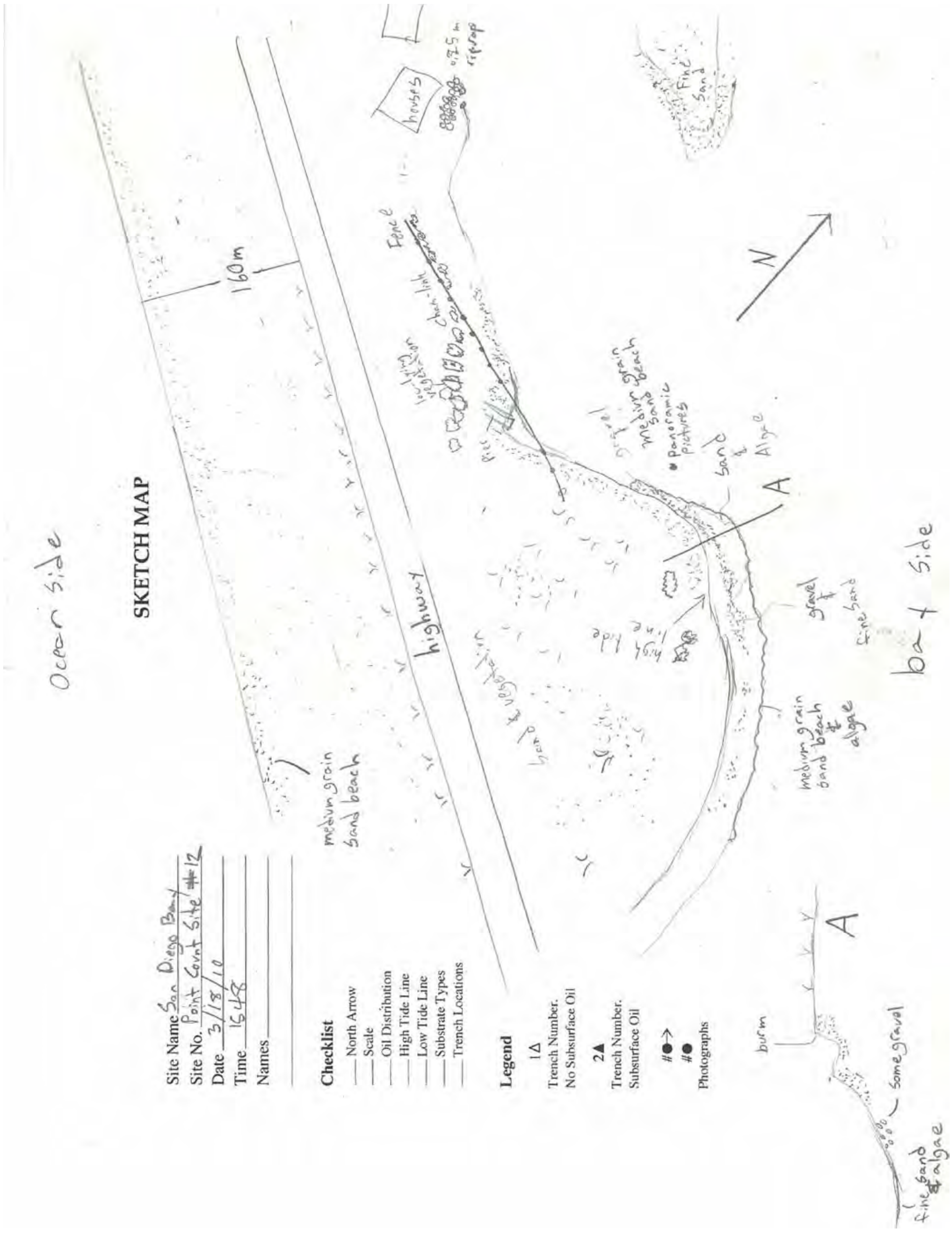
1Δ
Trench Number,
No Subsurface Oil

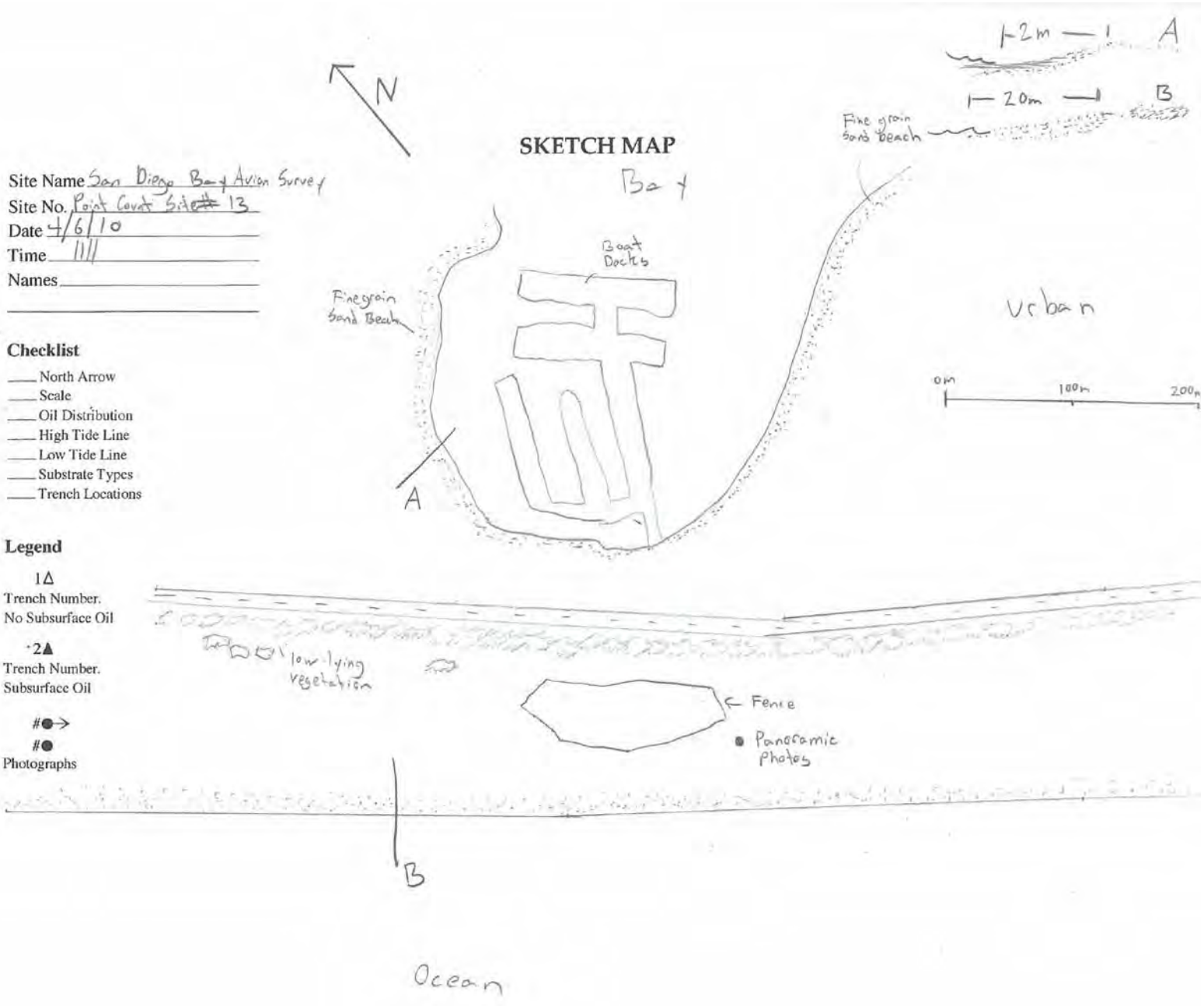
2▲
Trench Number,
Subsurface Oil

#●→
#●
Photographs




SKETCH MAP
Site Name San Diego Bay
Site No. Point Count Site #11
Date 3/18/10
Time 1355
Names
Checklist
North Arrow
Scale
Oil Distribution
High Tide Line
Low Tide Line
Substrate Types
Trench Locations
Legend
1Δ
Trench Number.
No Subsurface Oil
2▲
Trench Number.
Subsurface Oil
#●→
#●
Photographs
Panoramic Photos
Exposed sand flat
Golf Course
Trees
Ice plant
Fine sand
High tide line
Low tide line
Sand
Silt/sand
Dock
0m
80m
160m
360m
N
A
B
C
D
Grass
Fine sand
Low tide line


SKETCH MAP
Site Name San Diego Bay
Site No. Point Count Site #12
Date 3/18/10
Time 1648
Names
Checklist
North Arrow
Scale
Oil Distribution
High Tide Line
Low Tide Line
Substrate Types
Trench Locations
Legend
1△ Trench Number. No Subsurface Oil
2▲ Trench Number. Subsurface Oil
Photographs
Ocean side
bay side
highway
160m
medium grain sand beach
houses
0.75 m riprap
Fine Sand
Fence
chain-link
medium grain sand beach
panoramic pictures
sand & Algae
gravel
A
N
high tide
gravel & fine sand
medium grain sand beach & algae
burm
some gravel
fine sand & algae


SKETCH MAP
Site Name San Diego Bay Avian Survey
Site No. Point Count Site # 13
Date 4/6/10
Time 1111
Names
Checklist
North Arrow
Scale
Oil Distribution
High Tide Line
Low Tide Line
Substrate Types
Trench Locations
Legend
1Δ
Trench Number.
No Subsurface Oil
2▲
Trench Number.
Subsurface Oil
#●→
#●
Photographs
N
Bay
Boat Docks
Fine grain sand beach
Urban
A
B
12m
20m
0m
100m
200m
Pool
low-lying vegetation
Fence
Panoramic Photos
Ocean

SKETCH MAP
Site Name San Diego Bay
Site No. H
Date 3/18/10
Time 1510
Names
Checklist
North Arrow
Scale
Oil Distribution
High Tide Line
Low Tide Line
Substrate Types
Trench Locations
Legend
1Δ
Trench Number.
No Subsurface Oil
2▲
Trench Number.
Subsurface Oil
#●→
#●
Photographs
Ocean Side
Bike Path & Highway
Pit road
Vegetation
chain link Fence
low lying Vegetation
100m
50m
fine sand
medium grain sand beach
sand bluff
mud flat
Low lying vegetation
Panoramic Pictures
A
B
Bay

SKETCH MAP

Site Name San Diego Bay
Site No. Point Count site #15
Date 3/18/10
Time 1229
Names

Checklist

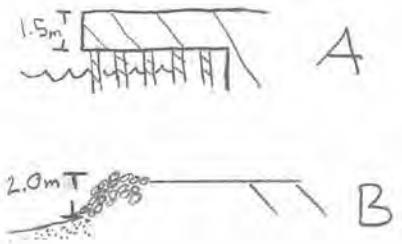
- ✓ North Arrow
- ✓ Scale
- N/A Oil Distribution
- ___ High Tide Line
- ___ Low Tide Line
- ✓ Substrate Types
- N/A Trench Locations

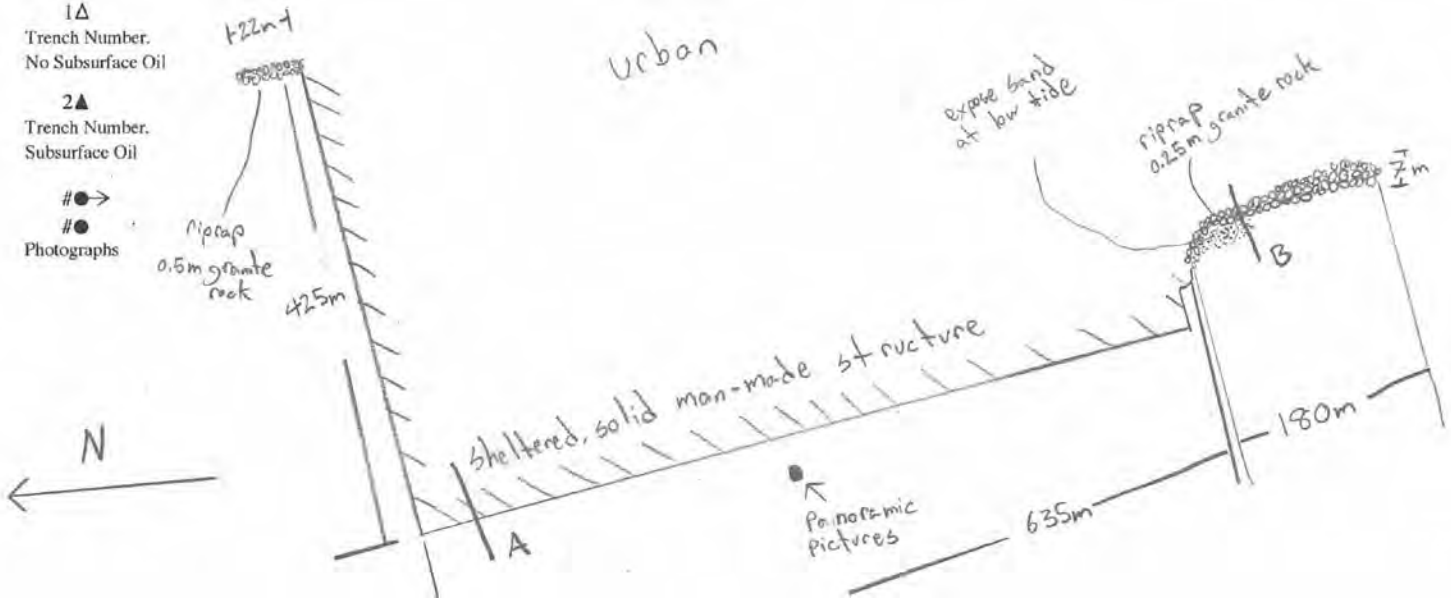
Legend

1Δ
Trench Number.
No Subsurface Oil

2▲
Trench Number.
Subsurface Oil

#●→
#●
Photographs





SKETCH MAP

Site Name San Diego Bay Avian Survey
Site No. Point Count Site # 14
Date 4/6/10
Time 12 45
Names

Checklist

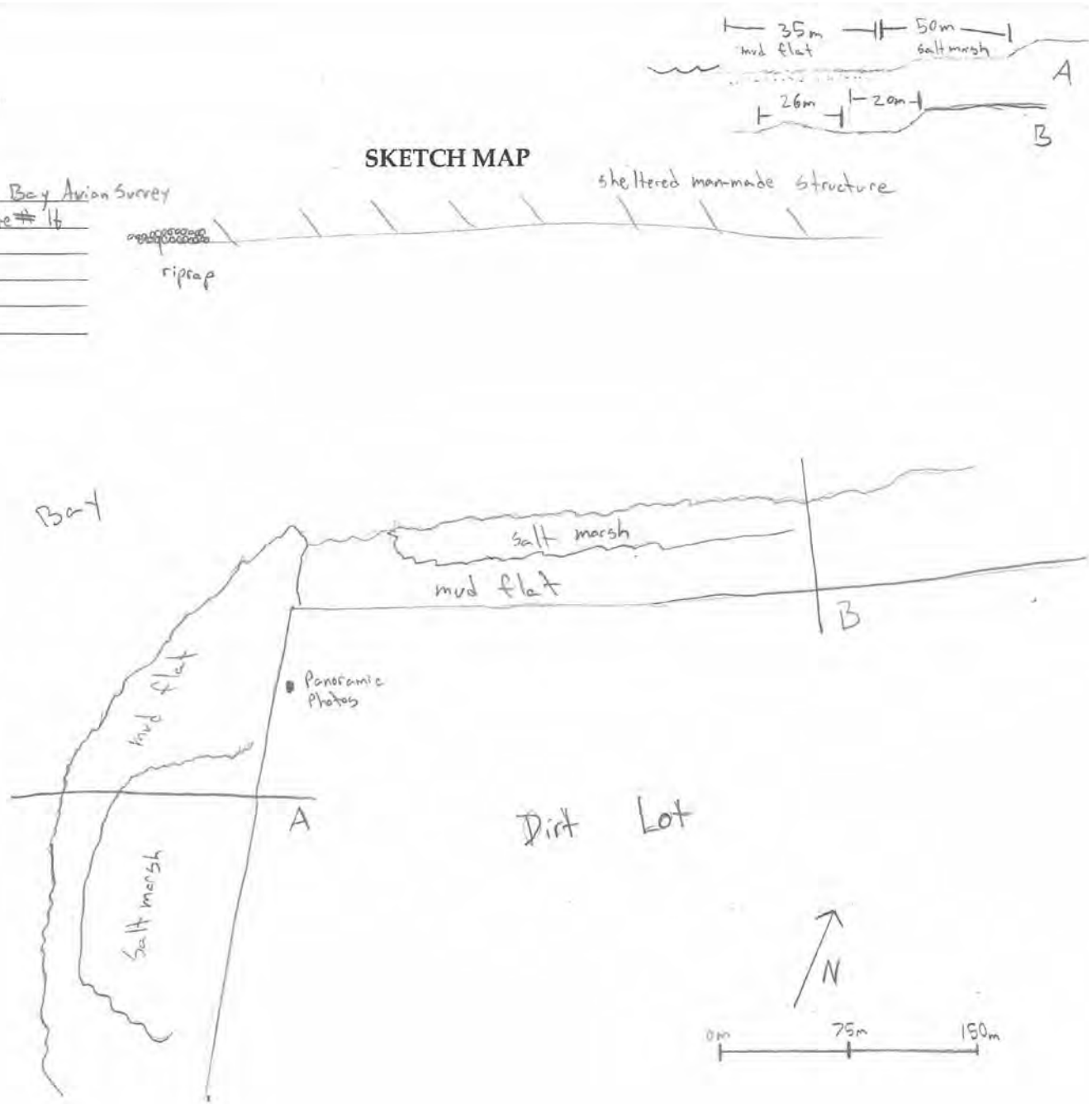
___ North Arrow
___ Scale
___ Oil Distribution
___ High Tide Line
___ Low Tide Line
___ Substrate Types
___ Trench Locations

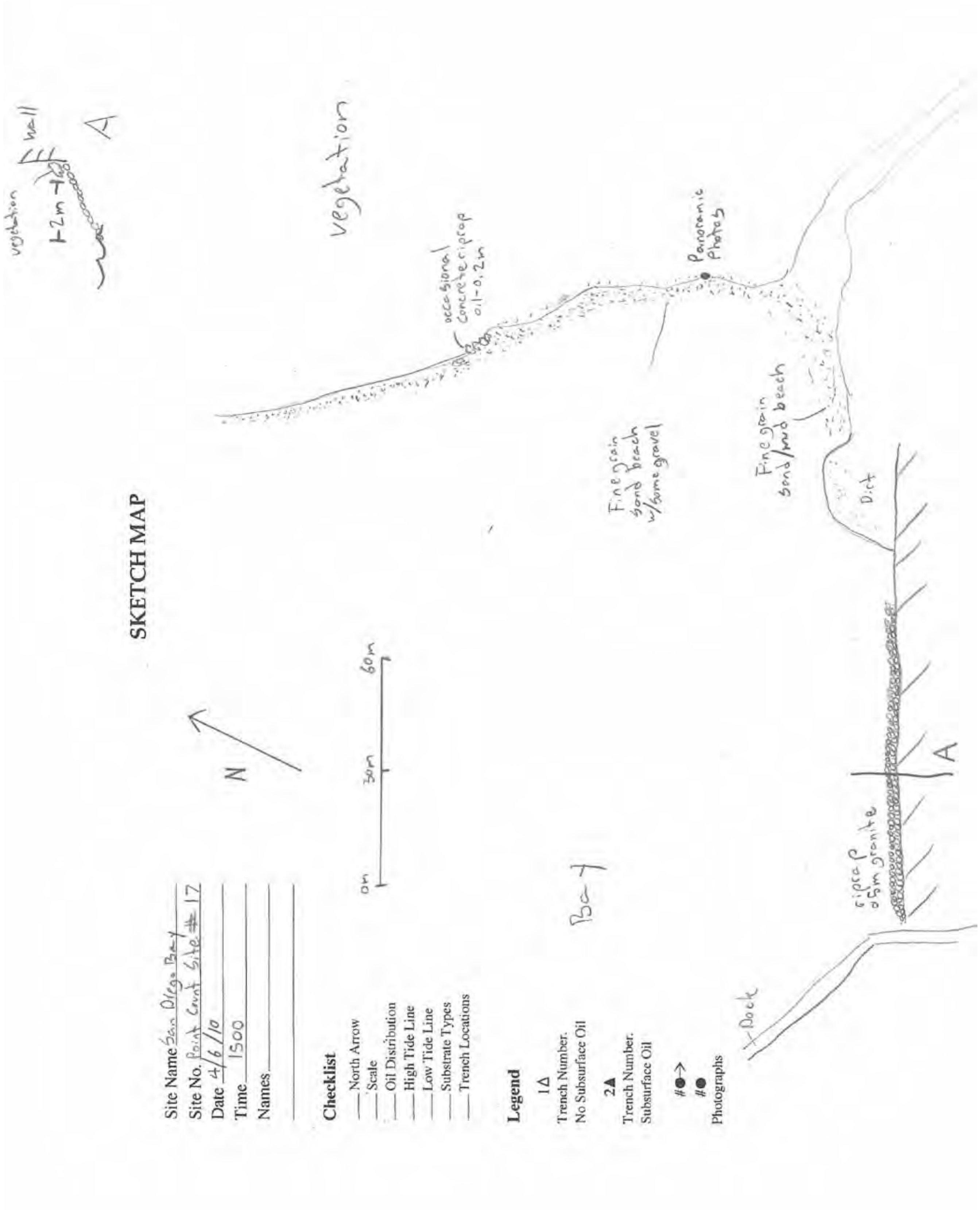
Legend

1Δ
Trench Number.
No Subsurface Oil

2▲
Trench Number.
Subsurface Oil

#●→
#●
Photographs

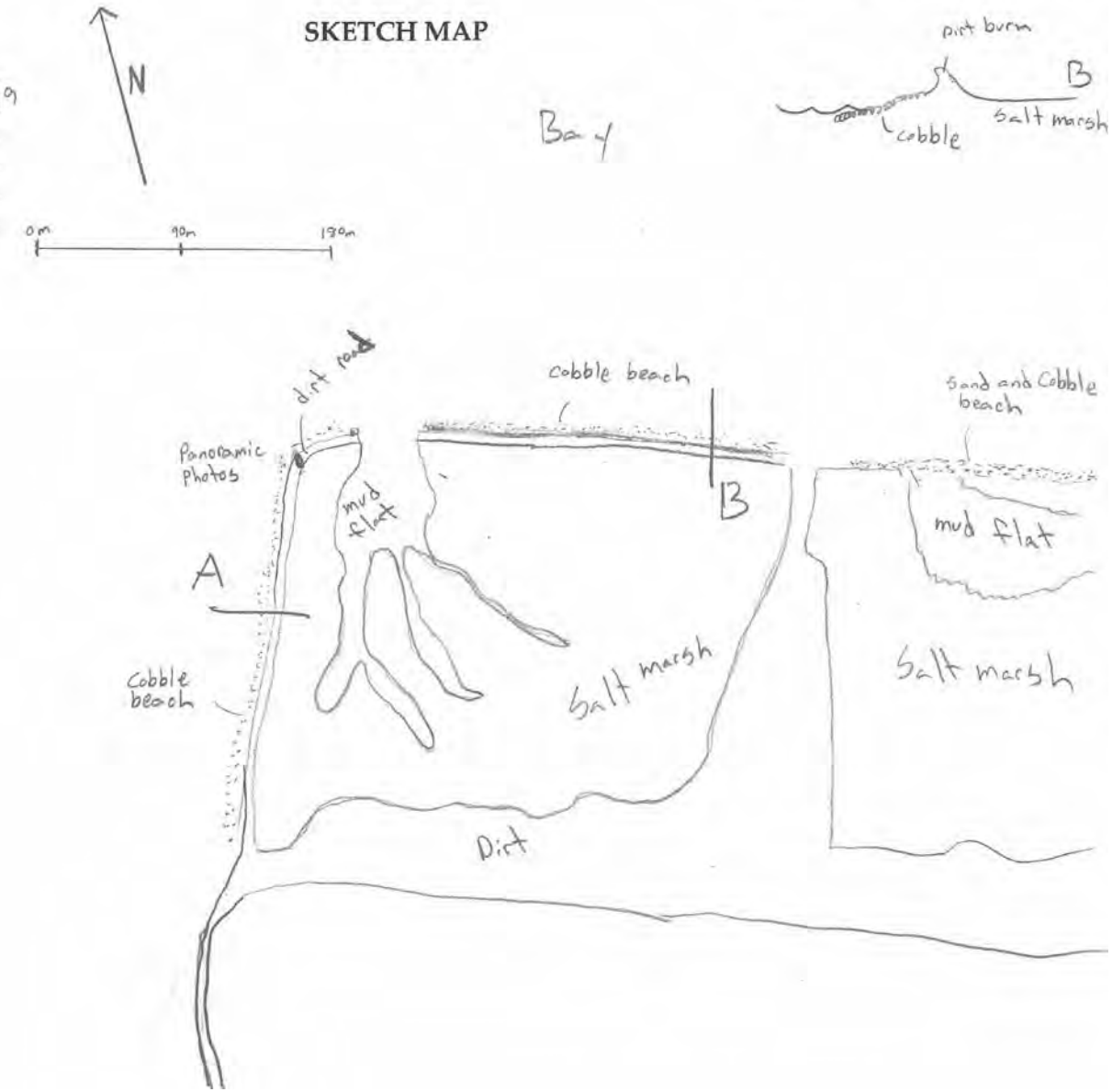



SKETCH MAP
Site Name San Diego Bay
Site No. Point Count Site #17
Date 4/6/10
Time 1500
Names
Checklist
North Arrow
Scale
Oil Distribution
High Tide Line
Low Tide Line
Substrate Types
Trench Locations
Legend
Trench Number. No Subsurface Oil
Trench Number. Subsurface Oil
Photographs
N
0m
30m
60m
Bay
Dock
Dirt
Fine grain sand/mud beach
Fine grain sand beach w/some gravel
Panoramic Photos
vegetation
wall
A

SKETCH MAP
Site Name San Diego Bay
Site No. Point Count sites 18
Date 3/30/10
Time 1630
Names
Checklist
North Arrow
Scale
Oil Distribution
High Tide Line
Low Tide Line
Substrate Types
Trench Locations
Legend
1Δ
Trench Number.
No Subsurface Oil
2▲
Trench Number.
Subsurface Oil
#●→
#●
Photographs
Protected mud flat
riprap
Parking Lot
~200m
A
Bay
sheltered tidal marsh
salt marsh
Panoramic Photos
Park & Parking Lot
riprap 0.25m granite
N
0m 50m 100m 150m

SKETCH MAP

Site Name San Diego Bay
Site No. Point Count Site #19
Date 4/6/10
Time 1215
Names



Checklist

___ North Arrow
___ Scale
___ Oil Distribution
___ High Tide Line
___ Low Tide Line
___ Substrate Types
___ Trench Locations

Legend

1Δ
Trench Number.
No Subsurface Oil

2▲
Trench Number.
Subsurface Oil

#●→
#●
Photographs

Bay

SKETCH MAP

Site Name San Diego Bay
Site No. Point Count site # 20
Date 3/30/10
Time 1500
Names

Checklist

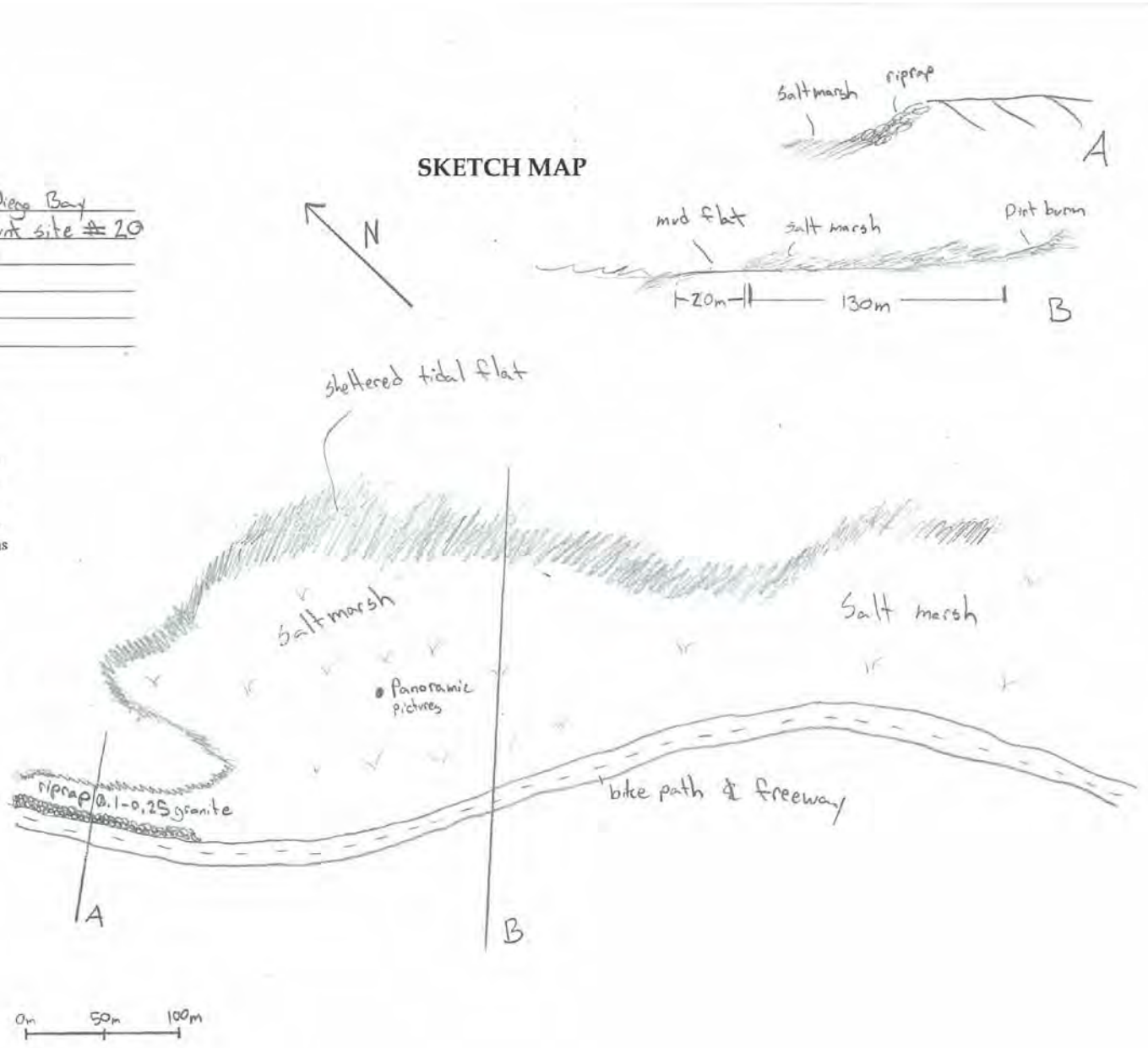
- ✓ North Arrow
- ✓ Scale
- ___ Oil Distribution
- ___ High Tide Line
- ___ Low Tide Line
- ✓ Substrate Types
- ___ Trench Locations

Legend

1Δ
Trench Number.
No Subsurface Oil

2▲
Trench Number.
Subsurface Oil

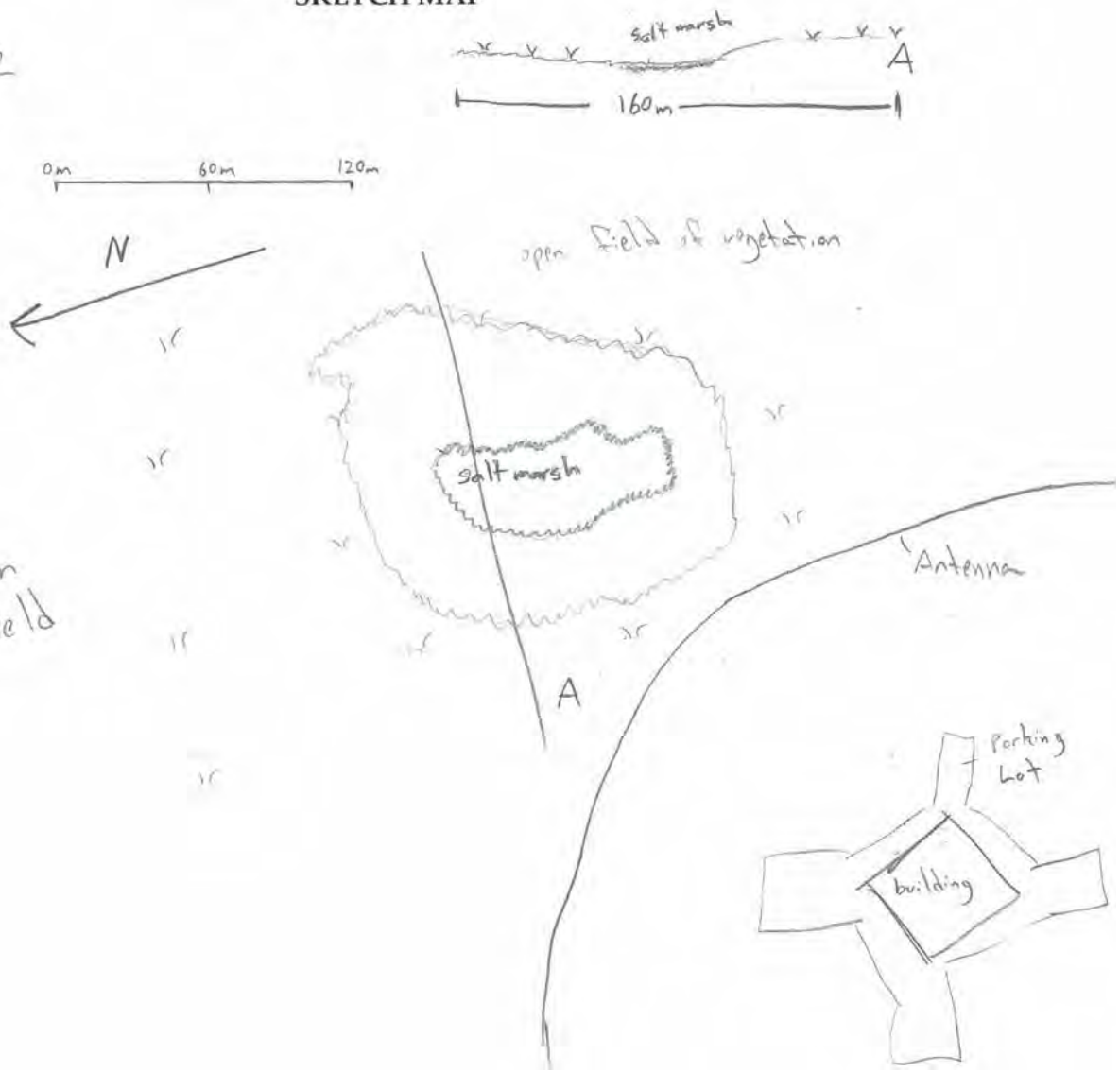
#●→
#●
Photographs



SKETCH MAP
Site Name San Diego Bay
Site No. Point Loma Site #21
Date 4/7/10
Time 1300
Names
0m
150m
300m
N
Checklist
North Arrow
Scale
Oil Distribution
High Tide Line
Low Tide Line
Substrate Types
Trench Locations
Legend
1Δ
Trench Number.
No Subsurface Oil
2▲
Trench Number.
Subsurface Oil
#●→
#●
Photographs
Bay
mud flat ~ 100m wide
dirt road
evaporation pond
Evaporation Pond
Evaporation Pond
evaporation pond

SKETCH MAP

Site Name San Diego Bay
Site No. Point Count Site #27
Date 4/6/10
Time 1400
Names



Checklist

___ North Arrow
___ Scale
___ Oil Distribution
___ High Tide Line
___ Low Tide Line
___ Substrate Types
___ Trench Locations

Legend

1Δ
Trench Number.
No Subsurface Oil

2▲
Trench Number.
Subsurface Oil

#●→
#●
Photographs

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