High Tide Area Search Protocol for Shorebirds and Raptors in San Francisco Bay

PLEASE READ: *The usefulness of data collected as part of these surveys requires that all observers closely follow the protocol outlined here. Please read the protocol and associated documents (area descriptions, maps, and data forms) thoroughly before conducting a survey. If you have any questions, please contact Dave Shuford (dshuford@prbo.org). Thank you in advance for your hard work and enthusiasm for birds.* ***Note****: This protocol as well as other documents recommended below can be found under "Resources" on The Pacific Flyway Shorebird Survey webpage (www.prbo.org/pfss).*

PURPOSE

These surveys are designed to obtain data on annual variation, long-term trends, and habitat associations of wintering shorebirds in the San Francisco Bay Estuary (SF Bay). These data will be combined annually with comparable data from other sites across California and the Pacific Flyway to assess spatial and temporal patterns of shorebird abundance at a broader scale.

SURVEY DESIGN

These surveys are conducted by multiple teams coordinated to search a randomly selected set of 120 pre-defined survey areas in SF Bay on the same day under comparable high tide conditions. Individual teams are assigned one or more survey areas to cover. Although at high tide most shorebirds will be roosting, observers should count and identify all shorebirds within their survey area(s) regardless of whether they are roosting or not.

Generally, surveys are conducted when local tidal conditions throughout SF Bay are high enough to force shorebirds off of tidal mudflat foraging areas (a tide at least 6 feet higher than MLLW at the Golden Gate Bridge). Surveys should be conducted within the specified survey window (see below) centered around peak high tide to minimize variation from bird movement as tidal conditions change. Surveys will be conducted once annually during the period November 15 – December 15, and they will be coordinated across SF Bay to occur on the same day and time. All data will be entered directly into the California Avian Data Center (CADC) via an online data entry portal (see below).

IMPORTANT THINGS TO REMEMBER

- **Think Ahead:** Because factors on the day of the survey (e.g., wind, atmospheric pressure) may influence tidal height and timing, please try to be at your area slightly before the predicted start time to ensure adequate time to complete the survey.

- **Inclement Weather:** Surveys should not be conducted in weather with strong winds (>24 mph), heavy fog (<200 m visibility), or steady rain. You will be notified if the survey is canceled due to weather.

- **Observers**: Under most conditions, surveys should be conducted by one observer. Having multiple observers counting simultaneously may bias results. We recommend working in pairs where one person counts birds (observer) and a second person records data (data recorder). In large areas or

areas with large numbers of birds, additional observers should split the count effort to enable completion of the count in the allotted tidal window (~1.5 hours before and after peak high tide).

- **Pre-survey scouting:** If possible, we urge you to visit your survey area prior to the day of the survey so you are certain how to easily access the area.

- **Keys and Permits:** Some areas require access keys and permits. If this applies to you, these materials will be included in your packet.

- **Datasheet:** Refer to accompanying datasheet along with this protocol.

SURVEY PROTOCOL AND DATA COLLECTION

Begin each survey of each area by indicating the **start time** on the datasheet (24-hr clock; e.g., 3 PM = 1500). Then move around, as needed, to count and identify to species all shorebirds using the survey area as defined on your map. This includes birds that enter or leave the survey area during the survey. For shorebirds to be considered "using" the survey area, they need to be on the ground within the defined survey area for at least part of the time it takes to do the survey. Thus, shorebirds that fly over the survey area but do not land in it should NOT be counted. Also, count all raptors (e.g., hawks, falcons) by species that are within, perched adjacent to, or foraging over the survey area. Do not double count birds if they leave and then re-enter the survey area. For each **Species** seen during the survey, record numbers as you go in the **Tally** column (see www.prbo.org/pfss for recording tips).

Complete surveys within the optimal 3-hour survey window around peak high tide. Once the area has been thoroughly searched and all birds seen have been recorded, the count is considered complete. At that point, the **end time** should be noted on the datasheet and thereafter NO additional birds should be recorded for that survey area. The total number of each species observed during the survey of each area should be entered into the **Total** column.

It usually will be possible to make exact counts of small groups of birds (<50 individuals), but estimation may be needed for larger flocks. Furthermore, it may not be possible to identify a few or, sometimes, even large numbers of shorebirds to species because of poor lighting, quick or distant views, similarity of species, or other factors. Try to count or estimate numbers by whatever technique works best as listed here in order of preference (also see tips on how to estimate flock size at www.prbo.org/pfss):

1) Identify species and their abundance (i.e., 148 Western Sandpipers, 153 Dunlin, 308 Least Sandpipers).
2) Estimate the proportion of species in flock and use the proportions and total flock size to calculate the total of each species (i.e., 600 birds: 25% Western, 25% Dunlin, 50% Least = 150 Western, 150 Dunlin, and 300 Least). **Note**: do this calculation only if you are confident the proportions are reasonably accurate. Please use a mixed-species code only if unsure of proportions (see next bullet).
3) Estimate size of flock and species present (i.e., 600 birds, composed of Western Sandpipers, Least Sandpipers and Dunlin in unknown proportions). Please see the species list provided for commonly recorded mixed-species flocks.

Following bird observations in each survey area, please fill out the remainder of the datasheet completely, including **Date** (mm/dd/yyyy), **Observer(s)** who counted birds (full name), **Data Recorder(s)** who helped record data only (full name), and **Survey Area Conditions** (see below). *Data should be*

recorded on a separate datasheet for each unique **Survey Area,** which is assigned a specific ID code and name (found on survey area map and description).

Please fill out a datasheet **even if no birds were detected**. This will help us determine the total effort expended during each survey, and knowing that zero birds were observed is important for determining the conditions that influence bird use.

SURVEY AREA CONDITIONS

Record weather and habitat conditions for each survey area using the following codes. Because the survey may take several hours and cover a large area, we recommend keeping notes on weather and survey area characteristics while moving through the survey area. The accompanying map can be useful for tracking survey area characteristics. You can then summarize survey area conditions during your survey on the data sheet using the criteria below. If weather conditions shift during the course of the survey, record the average condition observed.

WEATHER

Wind speed (**Wind**):
*Do not conduct surveys when wind speed is >24 mph (category 6 below).

0 – *calm* (<1 mph)	smoke rises vertically	water surface smooth and mirror-like
1 – *light air* (1–3 mph)	smoke drifts	scaly ripples, no foam crests
2 – *light breeze* (4–7 mph)	felt on face, leaves rustle	small wavelets, crests glassy, no breaking
3 – *gentle breeze* (8–12 mph)	leaves and small twigs in constant motion	large wavelets, crests begin to break, scattered whitecaps
4 – *moderate breeze* (13–18 mph)	dust, leaves, and loose paper rise up; small branches move	small waves 1-4 ft. becoming longer, numerous whitecaps
5 – *fresh breeze* (19–24 mph)	small trees sway	moderate waves 4-8 ft taking longer form, many whitecaps, some spray
6 – *strong breeze* (25–30 mph)	large branches in motion	larger waves 8-13 ft, whitecaps common, more spray

Cloud cover (**Cloud**):
*Indicate the percent of sky covered by clouds.
Enter numeric percentage (0–100).

Precipitation (**Precip**):
*Ideally, surveys should not be conducted in steady rain. But if the survey is conducted despite steady rain at your survey area or rain starts when in the field, please record 3 as the code.
0 – none
1 – light intermittent; mist, sprinkle, drizzle
2 – fog
3 – steady rain

CHARACTERISTICS

When recording data on survey area characteristics, be sure to distinguish between the dominant Cover Types (Type) present at the time of the survey (not all of which will be potential shorebird habitat) versus those Cover Types that are being used by shorebirds (Bird Use).

Cover Type (**Type**):

*Document the cover type(s) that best describes the **dominant characteristic(s)** of the survey area. Record the one or two cover types **that each comprise at least 40% of the survey area**; if no cover type meets this criterion, leave blank and describe the composition of the cover types in the notes section of the survey datasheet. In the following list, numbers in sequence that are excluded (e.g., 1-6) pertain to cover types found elsewhere in California but not in SF Bay.

7 – *Freshwater lake/pond*: large body of freshwater, including reservoirs.
9 – *Wastewater/Sewage pond*: pond associated with wastewater from sewage or other industrial operations.
12 – *Developed*: houses, parking lots, pilings, docks, other human-made structures, etc.
13 – *Salt pond:* impounded water (without vegetation) associated with salt production; includes levee around the salt pond.
14 – *Tidal salt marsh:* coastal marsh with vegetation inundated by high tides.
15 – *Tidal mudflat:* areas of mud, sand, or gravel (generally lacking vegetation) alternately exposed and inundated by tides. If mudflats are covered with water at the time of the survey, the cover type should be considered "Bay/Ocean" (see 19 below).
16 – *Beach*: sandy shoreline.
17 – *Rocky shoreline* (includes riprap, i.e., embankments lined with rocks or chunks of concrete to limit erosion).
19 – *Bay/Ocean*: open water within a tidal system. Includes waters over subtidal areas, water covering tidal flats at time of survey, and the ocean.
20 – *Diked salt marsh:* muted or non-tidal salt marsh. Area may be entirely diked, and, if so, usually includes some salt marsh vegetation. Muted tidal areas have a narrow break in the dike (or a tidal culvert or gate) allowing tidal flow to slowly enter or leave the diked area. In such cases, high and low tides are delayed relative to the adjacent portions of the bay. The proportion of tidal flat or marsh vegetation may depend on various factors, including time since restoration of tidal action, slope or profile of area, degree of subsidence, etc. This type includes salt ponds recently restored to tidal action.
21 – *Levee*
22 – *Island*
99 – *Other*: describe in notes.

Bird Use

*Record the cover type(s) in the survey area used by roosts or other concentrations of shorebirds. Please attempt to describe bird use areas using only one or two of the types described under **Cover Type** above. Indicate in the notes if two cover types are not adequate.

Area Surveyed (**Visible Area**):

* Because visual obstructions (e.g., levee, tall vegetation, distance) may limit your ability to observe some portions of the survey area, it is important to record the percent of the survey area you could see and subsequently count. If you cannot see over or through vegetation, it is blocking part of the survey

area and should be accounted for by reducing the Visible Area. But do not reduce the visible area if there is short vegetation that does not block your overall view of the survey area.

Enter data as numeric percentage: (0–100) -or- U: Unknown/Cannot Determine

Percent Flooded, Percent Bare Ground, Percent Vegetated

The following 3 variables (PercFlood, PercBare, PercVeg) should NOT sum to greater than 100% but often will sum to 100%.

When estimating proportions of these variables, it may be useful to mentally divide the survey or visible area into a grid to better visualize the extent of each. Another option is to sketch the extent of the flooded, vegetated, and bare areas on your map. If tracking on your map, do this based on what you see on the ground during the survey, as things may have changed since the aerial photo was taken, or it may have been taken at a different tide than that on the survey date.

Percent Flooded (**PercFlood**): Percent of visible area with open standing water; encompasses the sum of flooded fresh or brackish areas, salt ponds, and open bay waters, including tidally inundated areas at the time of the survey.
Enter numeric percentage: (0 – 100) -OR- U: Cannot Determine

Percent Bare Ground (**PercBare**): Percent of visible area with open dirt or mud at the time of the survey.
Enter numeric percentage: (0 – 100) -OR- U: Cannot Determine

Percent Vegetated (**Perc Veg**): Percent of visible area with vegetation at the time of the survey.
Enter numeric percentage: (0 – 100) -OR- U: Cannot Determine

Vegetation Height (**VegHt**)
*Visual estimate of the average vegetation height in the visible survey area. If the survey area is flooded, estimate the height of the vegetation emerging from the water.
0: Bare
1: 1–6 in.
2: >6–12 in.
3: >12–18 in.
4: >18–24 in.
5: >24 in.

WHAT TO TAKE IN THE FIELD

Survey Area map(s)
Protocol
Datasheets
Permit (if applicable)
Species list
Pencils or permanent ink pens (≥2; NO ballpoint pens)
Binoculars
Scope and tripod
Watch
Sunscreen
Water
Field guide

Clipboard
Bicycle (if permitted and advisable in your area's directions)

DATA ENTRY

Data should be entered directly into the San Francisco Bay Shorebird Survey (SFSS) project in CADC (www.prbo.org/cadc) within a few days of the survey. If you have not registered for a CADC account, please see www.prbo.org/pfss for instructions on how to register and enter data. If you already have a CADC account DO NOT register again. Please login using your email and password. If you have trouble with log-in (e.g., forgot password or changed email address), please send an email to cadc_webmaster@prbo.org.

SHOREBIRD SPECIES IDENTIFICATION

View or download instructional shorebird identification materials at PRBO's Pacific Flyway Shorebird Survey website: www.prbo.org/pfss. Also, see species list below.

PACIFIC FLYWAY SHOREBIRD SURVEY SPECIES LIST

The following list contains the primary species of shorebirds, including mixed flocks, and diurnal raptors that may be seen in shallow-water habitats in California in winter. Note that some of these species may be rare or absent as you move north to south or from the coast to the interior of the state. Also, this list is NOT comprehensive and, hence, we ask that you record all shorebirds and diurnal raptors that you identify. The California Avian Data Center (CADC) will allow you to look up the "Species Code" for species that are not listed here (see "PFSS_CADCprotocol_v4.pdf"). Most protocols, as part of the PFSS, ask that observers record only shorebirds and diurnal raptors, the "primary species" listed here. A longer list of species will be provided to volunteers participating in surveys in areas where the protocol is more inclusive in the species of wetlands birds to be counted.

SHOREBIRDS

Black-bellied Plover (BBPL)
American Golden-Plover (AMGP)
Pacific Golden-Plover (PAGP)
Snowy Plover (SNPL)
Semipalmated Plover (SEPL)
Killdeer (KILL)
Mountain Plover (MOPL)
Black Oystercatcher (BLOY)
Black-necked Stilt (BNST)
American Avocet (AMAV)
Spotted Sandpiper (SPSA)
Solitary Sandpiper (SOSA)
Wandering Tattler (WATA)
Greater Yellowlegs (GRYE)
Lesser Yellowlegs (LEYE)
Greater/Lesser Yellowlegs (XYEL)
Willet (WILL)
Whimbrel (WHIM)
Long-billed Curlew (LBCU)
Whimbrel/Curlew (XNUM)
Marbled Godwit (MAGO)
Curlew/Godwit (XCGO)
Whimbrel/Curlew/Godwit (XWCG)
Godwit/ Whimbrel/Willet/Curlew (XWNG)
Ruddy Turnstone (RUTU)
Black Turnstone (BLTU)
Surfbird (SURF)
Red Knot (REKN)
Sanderling (SAND)
Semipalmated Sandpiper (SESA)
Western Sandpiper (WESA)
Least Sandpiper (LESA)
Baird's Sandpiper (BASA)
Pectoral Sandpiper (PESA)
Rock Sandpiper (ROSA)
Dunlin (DUNL)
Western/Least Sandpiper (XWLS)
Western/Least/Dunlin (XWLD)
Stilt Sandpiper (STSA)
Ruff (RUFF)
Short-billed Dowitcher (SBDO)
Long-billed Dowitcher (LBDO)
Short-billed/Long-billed Dowitcher (XDOW)
Wilson's Snipe (WISN)
Wilson's Phalarope (WIPH)
Red-necked Phalarope (RNPH)
Red Phalarope (REPH)
Wilson's/Red-necked Phalarope (XWRP)
Wilson's/Red-necked/Red Phalarope (XPHL)

DIURNAL RAPTORS

Turkey Vulture (TUVU)
Osprey (OSPR)
White-tailed Kite (WTKI)
Bald Eagle (BAEA)
Northern Harrier (NOHA)
Sharp-shinned Hawk (SSHA)
Cooper's Hawk (COHA)
Sharp-shinned/Cooper's (XSCH)
Red-shouldered Hawk (RSHA)
Swainson's Hawk (SWHA)
Red-tailed Hawk (RTHA)
Ferruginous Hawk (FEHA)
Rough-legged Hawk (RLHA)
Golden Eagle (GOEA)
American Kestrel (AMKE)
Merlin (MERL)
Peregrine Falcon (PEFA)
Prairie Falcon (PRFA)