

## Area-Search Protocol for Surveying Shorebirds along Transects

**PLEASE READ:** This protocol was developed for The Pacific Flyway Shorebird Survey ([www.prbo.org/pfss](http://www.prbo.org/pfss)) and Migratory Shorebird Project ([www.migratoryshorebirdproject.org](http://www.migratoryshorebirdproject.org)). 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 description(s), map(s), and data form(s)) thoroughly before conducting a survey. If you have any questions, please contact your local site coordinator or Matt Reiter, [mreiter@pointblue.org](mailto:mreiter@pointblue.org). Thank you in advance for your hard work and enthusiasm for birds. **Note:** This protocol and other documents recommended below, shared by The Pacific Flyway Shorebird Survey and Migratory Shorebird Project, can be found here: <http://www.migratoryshorebirdproject.org/sharedresources>.

### PURPOSE

These surveys are designed to obtain data on annual variation, long-term trends, and habitat associations of wintering shorebird use of the agricultural and wetland landscapes. Currently, these data are combined annually with comparable data from other sites across the Pacific Coast of the Americas to assess spatial and temporal patterns of shorebird abundance at multiple scales from your survey area to the flyway.

### SURVEY DESIGN

Each transect consists of a series of pre-defined survey areas within specific wetland management units. Observers drive a pre-defined road-transect (please see your survey route map) and collect data from each wetland unit along the transect. Observers count all shorebirds and raptors within a 0.1 mile (160 m) buffer from the road and record survey area characteristics using any available and possibly multiple observation points. Surveys are conducted once annually on any day during the survey window. Be aware of hunting and other recreational activities along your survey route.

### IMPORTANT THINGS TO REMEMBER

- **Inclement Weather:** Surveys should not be conducted in weather with strong winds (>24 mph), heavy fog (<200m visibility), or steady rain.
- **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 can split the count effort (e.g. divide by species or sub-divided areas) to enable efficient counting. The observers (people counting) and data recorders should be listed on the data sheet and entered into the California Avian Data Center (CADC).
- **Survey Etiquette:** In most cases it is appropriate to get out your vehicle to count birds. If you risk flushing birds, please count from your car if you have appropriate visibility.
- **Pre-survey Scouting:** We encourage you to drive your transect prior to the day of the survey to familiarize yourself with the transect, surrounding environment and to assess potential obstructions and/or transect diversions.
- **Survey Distance Calibration:** Observers should calibrate their 0.1 mile distance estimation prior to conducting surveys. The survey area buffer distance (0.1 mile) can easily be estimated by stopping

at a utility pole or other obvious landmark driving 0.1 mile, then getting out of your vehicle to look back at the starting landmark. Do this several times to get a sense of what 0.1 miles looks like in the field. You can then test yourself by predicting where 0.1 miles should be in front of you, then drive to that point and see if it was 0.1 mile. With practice, you will get used to estimating the 0.1 mile buffer distance.

- **Survey in One Direction:** To minimize bias due to bird movement, count survey areas along both sides of the road during the same pass of the transect. In other words, do not survey one side of the road traveling in one direction and then turn around and count the other side of the road going the other direction. Use your survey map, if needed, to keep track of where you are and which survey areas you have counted.
- **Keys and Permits:** Some areas require access keys and/or permits. Make sure to know if this applies to you.
- **Datasheet:** Please refer to accompanying datasheet along with this protocol.

### **SURVEY PROTOCOL AND DATA COLLECTION**

*Data should be recorded on a separate datasheet for each unique **Survey Area** as named on the survey transect map. Begin each area-search transect at the starting location and indicate the **Date** (mm/dd/yyyy), **Observer(s)** who counted birds and **Data Recorder** on the datasheet. Record the observer's full name[s] – multiple observers should only be recorded if the primary observer changes during the survey transect or if a survey area was split between two observers. When splitting a survey area do so in one of the following two ways. Two observers can count the same survey areas but count *different species* or two observers can count the same species in *different parts of the survey area*.*

Proceed in your vehicle along the area-search transect to the first survey area as defined by the map or the "Area-search Transect Narrative" document. Begin each count of each survey area along the transect by indicating the **Survey Area** and **Start Time** on the datasheet (24-hr clock; e.g., 3PM = 1500). Then, count and identify to species all shorebirds using each survey area (defined by a boundary at 0.1 miles [~160m] from the road) within each wetland unit as indicated on the area-search transect map. This includes birds that enter or leave the survey area during the count. For a shorebird to be considered "using" the survey area, it needs 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, but do not land in, the survey area should **NOT** be counted. Keep track of bird movements and do not to double-count shorebirds if they leave and then re-enter the survey area or if they fly from one side of the road to the other. Also, record the number and species of raptors that are in, perched adjacent to, or foraging over the survey area. Record **Species** observed in the appropriate column of the datasheet. The total number of each species observed during the count of each survey area should be entered into the **Count** column, regardless of whether the observer tracks sub-tallies in the **tally** column for each species (see the Shared Survey Resources at [www.migratoryshorebirdproject.org/sharedresources](http://www.migratoryshorebirdproject.org/sharedresources) for recording tips).

Conduct surveys of each survey area from opportunistic observation points along the area-search transect (see your Area-search Transect Map) with adequate visibility. *It is critical to the validity of the analyses that the survey covers all wetland units along the transect. Please do your very best to ensure that this occurs by following the Area-search Transect Narrative associated with each transect that details the transect route and wetland boundaries.*

There is no maximum time limit for counting birds. However, survey areas that appear to have 0 birds should be scanned for 2 minutes before continuing to the next survey location on the transect. Once all birds in the survey area have been recorded, the count is considered complete. At this point, note the **End Time** on the datasheet and thereafter NO additional birds should be recorded for that survey area.

### Counting Methods

It usually will be possible to make exact counts of small groups of birds (<50 individuals), but estimation may be needed for larger flocks. In addition, it may not be possible to identify a few or, sometimes, even large numbers of shorebirds 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 on the Shared Survey Resources page at [www.migratoryshorebirdproject.org/sharedresources](http://www.migratoryshorebirdproject.org/sharedresources)):

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:** only do this calculation if you are confident the proportions are accurate. Please use a mixed-species code if necessary (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 at the end of the protocol for commonly observed mixed-species flocks.

Following bird observations fill out the remainder of the datasheet completely, including **Survey Area Conditions** before proceeding to the next survey area. Please fill out a datasheet completely **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 are important data for determining the conditions that influence bird use.

### COLLECTING AND RECORDING SURVEY AREA CHARACTERISTICS

To understand what habitats shorebird use and why, this protocol includes the collection of weather and habitat characteristics for each survey area. Please record weather conditions and site characteristics for each survey area using the following codes.

#### WEATHER

Wind speed (Wind): Do not conduct surveys when wind speed is > 24mph (category 5 below).

0 – *calm*: smoke rises vertically (<1 mph)

1 – *light air*: smoke drifts (1 – 3 mph)

2 – *light breeze*: felt on face, leaves rustle (4 – 7 mph)

3 – *gentle breeze*: leaves and small twigs in constant motion (8 – 12 mph)

4 – *moderate breeze*: dust, leaves, and loose paper rise up; small branches move (13 – 18 mph)

5 – *fresh breeze*: small trees sway (19 – 24 mph)

6 – *strong breeze*: large branches in motion (25 – 30 mph)

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 rain please record 3

- 0 – none
- 1 – light intermittent; mist, sprinkle, drizzle
- 2 – fog
- 3 – steady rain

## CHARACTERISTICS

**Cover Type (Type):** Document the cover type(s) that best describes the **dominant characteristic(s)** of the survey area. Record only the one or two cover types **that each comprise at least 40% of the survey area**; if no cover type meets this criterion, describe the composition of the cover types in the notes section of the datasheet and leave field blank.

- 1 – **Wetland:** open freshwater with tules, cattails, and some grasses and sedges.
- 2 – **Rice:** flooded or dry field with clearly defined internal levees; if dry, the field may be tilled or have standing stubble.
- 3 – **Pasture:** predominantly grasses; if irrigated it will be green year round.
- 4 – **Hay:** various types of grass/herbs mowed and cured for fodder.
- 5 – **Irrigated Row Crop:** likely dirt field with raised beds or with standing stubble (e.g. corn, tomatoes, cotton)
- 6 – **Winter Crop:** emergent green vegetation from tilled soil (e.g. winter wheat)
- 7 – **Freshwater Lake/Pond:** large body of freshwater including reservoirs
- 8 – **Evaporation Pond:** settling pond constructed to collect agricultural wastewater
- 9 – **Wastewater Pond:** pond associated with wastewater from sewage or other industrial operations
- 10 – **Orchard:** trees (e.g. almonds, apples etc.)
- 11 – **Forest:** extensive woody vegetation, non-agricultural (e.g. willows in riparian)
- 12 – **Developed:** houses, cemetery, parking lot, other human-made structures etc.
- 13 – **Salt Pond:** shallow, artificial ponds of water (without vegetation) associated with salt production. This includes the levee around the salt pond.
- 14 – **Tidal Salt Marsh:** coastal marsh with vegetation inundated by high tides
- 15 – **Tidal Mud Flat:** areas of mud, sand or gravel (generally lacking vegetation) alternately exposed and inundated by tides. If flats are covered at the time of the survey, the area should be considered Open Bay (see protocol).
- 16 – **Beach:** sandy shoreline; sand can be coarse or fine grain and composed of multiple substrates
- 17 – **Rocky Shoreline:** includes riprap, i.e., embankments lined with rocks or chunks of concrete to limit erosion.
- 18 – **Agricultural Field** (non-orchard) includes categories 3, 4, 5 and 6 from above. Use this category only when unable to determine a more specific field type.
- 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 (not completely open) or non-tidal (entirely closed) salt marsh that usually includes some salt marsh vegetation. Muted tidal areas have a narrow break in the dike (or tidal culvert or gate) allowing tidal flow to slowly enter and leave the diked area delaying the high and low tides relative to the adjacent portions of the bay. This type includes salt ponds recently restored to tidal action and coastal estuaries that are separated from the ocean by natural barriers.
- 21 – **Levee**
- 22 – **Islands**
- 23 – **Lagoon:** saline, alkaline, or fresh water pools separated from a main body of water by a shoal; pooled water may be from waves washing over the shoal, waters stranded by declining lake

levels, or water from drains or streams that pools up behind beaches or other shoreline features.

Lagoon shorelines may be barren or may support marsh plants or trees.

24 – **Saline Lake**: landlocked lake with high concentrations of mineral salts (saline or alkaline); e.g. Salton Sea.

99 – **Other**: describe in notes

**Area Surveyed (Visible Area)**: *Because visual obstructions (e.g. levee, tall vegetation, distance) may limit your ability to survey some portions of the survey area from the survey location, it is important to record the percent of the survey area you could see and subsequently count. If you cannot see over (e.g. vegetation >5ft tall) or through vegetation it is blocking part of the survey area and should be accounted for by reducing the Visible Area. However do not reduce the visible area if there is short vegetation that does not block your overall view of the survey area.*  
Enter numeric percentage: (0 – 100) -OR- U: Cannot Determine

**Percent Flooded, Percent Bare Ground, Percent Vegetated**

*\*The following 3 variables should NOT sum to greater than 100% but will often 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*

Enter numeric percentage: (0 – 100) -OR- U: Cannot Determine

**Percent Vegetated (Perc Veg)**: *Percent of visible area with vegetation*

Enter numeric percentage: (0 – 100) -OR- U: Cannot Determine

**Vegetation Height (Veg Ht)**: *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        | 3: >12 – 18 in. |
| 1: 1 – 6 in.   | 4: >18 – 24 in. |
| 2: >6 – 12 in. | 5: >24 in.      |

**Notes**: Record any additional details about factors that may have influenced the accuracy of your count in the notes section of the datasheet. Such factors might include intense disturbance by raptors or large mammals (coyotes, dogs), machinery, crop dusters flying overhead, etc.

**WHAT TO TAKE IN THE FIELD:**

Site Map(s)	Watch
Protocol	Sunscreen
Datasheets	Water
Pencils or Permanent Ink Pen	Field guide
Binoculars	Clipboard
Scope and tripod	

**DATA ENTRY**

Data should be entered directly into the appropriate project in California Avian Data Center (CADC; [www.prbo.org/cadc](http://www.prbo.org/cadc)) within a few days of the survey. If you have not registered for a CADC account please see the CADC protocol in the Shared Survey Resources Page at [www.migratoryshorebirdproject.org/sharedresources](http://www.migratoryshorebirdproject.org/sharedresources)) for instructions on how to register with CADC and enter data.

**SHOREBIRD SPECIES IDENTIFICATION**

View and download instructional shorebird identification materials from Shared Survey Resources here: [www.migratoryshorebirdproject.org/sharedresources](http://www.migratoryshorebirdproject.org/sharedresources).

## SPECIES LIST

The following list contains the primary species of shorebirds, including mixed flocks, and diurnal raptors that may be seen in or around shallow-water habitats along the Pacific Coast of North America 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. 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 (please see the CADC data entry protocol for more information).

### 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)