Data Collection Protocol
Monitoring River Otter *(Lutra [=Lontra] canadensis)*

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Introduction

River otters (*Lutra [= Lontra] canadensis*) are medium-sized (5-13 kg), highly aquatic mustelids that live in fresh, brackish, and marine environments. Currently in the San Francisco Bay region, river otter populations are stable and unevenly distributed with relatively high numbers in the Delta and Suisun, and lower numbers in the Napa marshes (Carl Wilcox, pers. comm., CA. Department of Fish and Game) and along the Contra Costa shoreline of the Carquinez Strait (Johnson 2000). While river otters can live in a wide range of habitats, this protocol will concentrate on tidal marshes and related habitats, which are the focus of the Wetland Regional Monitoring Program.

This protocol is based on a review of approximately 30 journal articles or reports describing techniques for monitoring the status of river otter populations throughout the world. Techniques include observation of river otters from fixed sampling points and searches for their sign, e.g., spraints (scat) or tracks within fixed distances from the sampling point. Spraints are frequently deposited in conspicuous places as a form of signaling to other animals, and are therefore useful in surveying for presence of otters. Spraint density of the European otter (*Lutra lutra*) can provide a broad indication of the status of otter populations if sample sizes are large enough (Mason and Macdonald 1987). Other methods of estimating river otter populations include examining fur-harvest data from commercial trappers, interviewing local residents, observing tracks left at scent stations, using mark-recapture techniques, and tracking river otter locations after surgically inserting radio transmitters.

Since little is known about the populations of river otters in the northern San Francisco Bay region, this protocol provides instructions to generate baseline information on their presence or absence in the region which can be used as an index of spatial distribution and abundance (Thompson et al. 1998). This protocol determines the presence of river otters in perennial streams with both tidal wetlands and non-tidal riparian areas. If cost prohibits implementing the complete sampling effort, then non-

tidal riparian areas can be omitted from the surveys. However, if both habitat types can be surveyed, an indication of the relative importance of each may be determined.

Survey Procedure

(From Clark et al. 1987; Shackelford and Whitaker 1997):

1. On a U.S.G.S. map or suitable GIS, delineate sections with tidal marshes that are likely to contain river otters in portions of Napa, Sonoma, and Solano counties and along the Contra Costa shoreline. One of two approaches can be used:

   (a) Measure the length of creek/river in each of the four counties to sample a particular percentage of the total creek length in each county (first choice); or

   (b) Select four regions of approximately the same size within each of the selected counties (second choice).

   Within the entire area recommended for the four regions (whether by creek length or selected area), number all bridge crossings that cross perennial streams and, if possible, distinguish between tidal and non-tidal habitats based on tidal elevations or salinity. Exclude bridge crossings over divided highways and within city limits where high human activity is likely to discourage the presence of otters. Randomly select a subset of 30 sample units in each region from the numbered crossings. If any selected sample units are within 1.0 kilometer of each other, omit one to decrease the possibility of double counting the same otter at different sample units, and continue the random selection until 30 sample units at least 1.0 kilometer apart are selected.

   Note that bridges are selected for ease of sampling but are not required. Sample units located at least 1.0 kilometer apart along tidal creeks can be randomly selected at the first sampling and carefully described on maps and in notes for future sampling at the same site. A GPS unit is ideal for marking and finding stations at future dates.

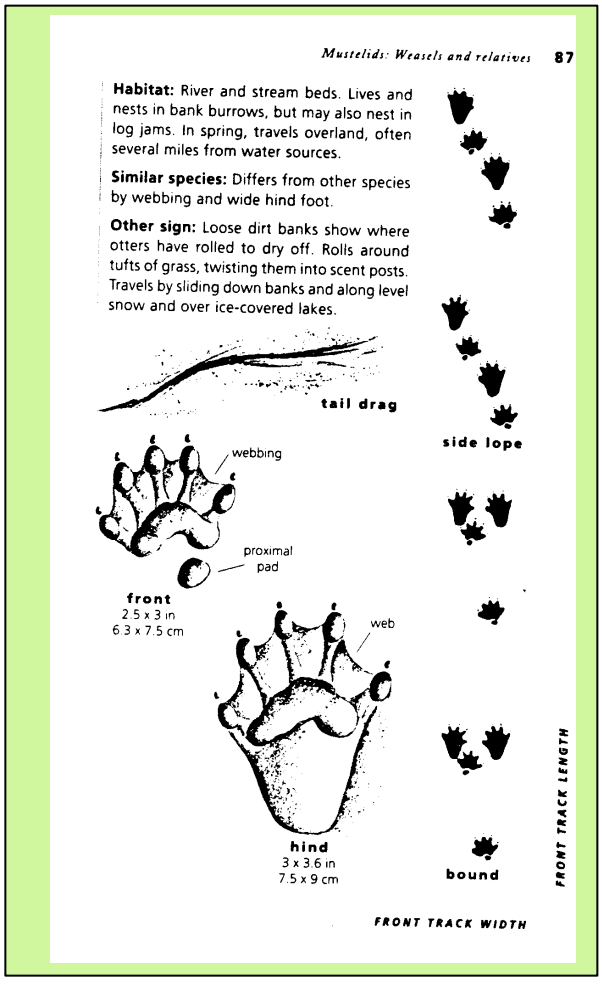
2. Observe the banks of the tidal creek for signs of river otters – either tracks or scat --100 meters upstream and 100 meters downstream of the bridge sample unit. [1] Only presence or absence will be recorded,

[1] Clark et al. 1987 used 100 meter segments upstream and downstream of the bridge station (total 200 meters) for their Georgia study. Mason and Macdonald (1987), however, note that the standard survey distance used in Europe for determining signs of *Lutra lutra* is 600 meters (total), and that between 69% and 79% of positive sites for otter signs were found within the first 200 meters. We recommend using the 200 meters total described by Clark et al. (100 upstream and 100 downstream) in this protocol with the understanding that if positive sites are not identified, the distance should be doubled in both directions. Also note that regression analysis could be performed to predict the occurrence of otter signs in the event that the survey was extended to 1000 meters (Mason and Macdonald 1987).

so do not attempt to count the number of tracks or scat. While preliminary data will be compared on the basis of presence/absence, the data sheet is structured for data at 10-meter intervals in order to provide more detailed data if necessary for future analysis. Record confirmed otter tracks or scat on the data sheet and note the predominant vegetation type and approximate cover in the area. Record other animals or animal signs in addition to tracks and scat that may or may not be from otters, e.g., bedding sites, haul-outs, rolling sites, slides, diggings, scent-posts, dens (holes in river banks, under trees, or under other large objects). (See sample data sheet)

3. Report the predominant vegetation types on the bank being surveyed, and its approximate percent cover. Also note whether other wildlife or signs of wildlife are present. (See sample data sheet).

4. In the unlikely event that river otters are observed, record their behavior as described on the sample data sheet.



Permits

This protocol calls for simply observing otters or signs of otters, and does not, therefore, require a permit. (Since river otters are a protected species according to the CA. Department of Fish and Game, any handling of otters for research purposes requires an MOU with the Department.)

Personnel

A one-day training session is suggested for volunteers or CA. Department of Fish and Game personnel to become acquainted with river otter sign and to be able to distinguish this sign from that of other animals. The success of the monitoring program will depend on the observer's ability to correctly distinguish otter tracks and scat from those of other animals. It is important that volunteers understand that river otters can be dangerous and should not be approached or touched.

Sample Universe?

River otters can be found in coastal marsh areas and along stream channels. Surveys are conducted at points of access to marshes and stream channels, which are most commonly bridges. The protocol instructs the surveyor to randomly select bridges from all available and to search for tracks within 100 meters above and below the bridge. Thus, the sample universe is all areas within 100 meters of a bridge within the Napa, Sonoma, Solano, and Contra Costa County shorelines.

Sample Strata?

The four regions that will be sampled were selected to assure that the sample is representative, but we do not propose a sampling scheme that will achieve separate estimates of population status for each region. We recommend against stratification initially. Stratification is usually recommended when there is a strong expectation that the detections will be different in different types of habitats or different regions. The data do not yet exist to make this determination. Instead, the initial inventory should be conducted without stratification and then, if it is determined that otter detections seem to be biased toward one type (e.g. non-tidal marsh creeks), then the design should be altered (to be more efficient) in subsequent years.

Timing

Few studies of river otter density and abundance are reported in California. In states or countries with snow, locating tracks are the recommended survey technique and the timing of the sample therefore depends on snowfall, but this is not appropriate for the San Francisco Bay region. Labor-intensive and relatively short-lived studies using sifted sand or agricultural lime (Clark 1982; Clark et al. 1987) often use a scent-attractant so that samples are timed to coincide with the breeding season when visitation rates to scent stations are high, e.g., January - February in the southern United States (Clark et al. 1985 and Shackelford and Whitaker 1997) and May-April in Idaho (Melquist and Hornocker 1983). Because this protocol does not recommend scent-stations due to the high labor costs, and because river otters in warmer climates may be active at all times of the day and year, confining the sampling period to a particular season or part of the day is unnecessary.

Instead, surveys for river otters in the San Francisco Bay region should coincide with hydrological events. Clark et al. (1987) recommend that surveys be conducted no earlier than 3 days after a rainfall and only when water levels are medium or low. In tidally influenced areas, it is extremely important to survey creek banks on ebb tides to avoid being trapped by incoming tides. Surveys along creek banks should cover enough area above the high tide level to observe wetland areas that have not been recently covered by tides.

Surveys can be conducted as often as field personnel are available, ranging from monthly to yearly if that is all that is possible. Surveys conducted simultaneously in each

of the four regions (Napa, Sonoma, Solano, and the Contra Costa shoreline) would be ideal but not required.

Frequency or Interval of the Sample

The "Presence/Absence" section above describes the random process of selecting sampling units along the creeks in the 4 counties and of surveying them up and downstream for 100 meters. Recommended survey areas are 5 meters wide, at 10 meter intervals for a total length of 100 meters along one creek bank (see attached data sheet). However, actual boundaries on sampled areas may differ from the recommended area and will be determined in advance, after reconnaissance. Upstream and downstream photos should be taken at each station.

Data would preferably be collected 2-4 times/year, but once per year will provide adequate data for analysis of population trends in the sub-regions.

The sample units are segments of stream bank that occur 100 meters in each direction from a bridge. The entire sample unit is searched for tracks so that there are no repeated measurements within a sample unit. Bridges are not usually located so close together that the same otter(s) would be sampled at more than one bridge, but to be certain if any bridges are within 1.0 kilometers of each other, one will be omitted from the sample and another bridge selected in its place.

Equipment

The basic gear includes binoculars, area maps and/or aerial photos, compass, data sheets, field guides with river otter scat and river otter tracks as distinguished from other animals that might use the area. A GPS unit is useful but optional.

What Are the Units of the Data?

The units of data will be confirmed presence/absence of river otters (i.e., otter positive stations) as an index of population status based on signs of tracks or scat at each of 30 sample units in each of the four general regions to be surveyed (total = 120 sample units).

Recommended Sample Size

In a study of river otter distribution and density in Georgia using scent-stations and field-sign indices, Clark et al. (1987) determined that a sample size of 20 stations per county, totaling about 1,040 bridge crossings throughout the state, was effective for determining changes in otter distribution but ineffective for determining changes in otter population densities. Shackelford and Whitaker (1997) also found large variances in their Oklahoma study in which they randomly selected survey stations until one station per 16.1 kilometers of waterways was contained in each basin (totaling 60 stations for the state).

Unfortunately, data from elsewhere in North America may not apply to the densities and distributions of otters in the San Francisco Bay area. Local data on the frequency of occurrence of otter sign do not exist, but are a key component for generating credible estimates of sample size necessary to detect change. However, we will be capable of estimating these important parameters after the first year of sampling. The first year will result in new information describing: (1) the spatial distribution of otter sign, (2) an estimate of the proportion of sample units with occupancy, and (3) a determination of the number of visits necessary to estimate the probability of detecting otter sign at a sample unit.

Estimates of these parameters are essential for developing a statistically valid approach to detecting change in the index of otter occurrence over time. An approach to estimating the necessary sample size to achieve a threshold of statistical power will be used that is similar to that proposed to monitor the populations of rare forest carnivores (i.e., Zielinski and Stauffer 1996, Zielinski and Mori 2001).

In the absence of information necessary to make a quantitative decision on sample size, funding will permit a maximum of 120 sample units, 30 in each region (Napa, Sonoma, Solano, and the Contra Costa shoreline). Adjustments in sampling effort will be made prior to the second year of sampling. These corrections will be based on simulations that use parameters estimated during the first year of sampling to predict the necessary sample size to meet standards for statistical power and precision. Depending on the results of these calculations, the necessary annual sample could increase or decrease.

Recommended format of the field record

The field record should describe the recommended elements on one bank for a total of 100 meters up and downstream of the survey unit at ten-meter intervals. Those elements include: otter sign (tracks or scat); otter behavior; sign or presence of other animals; and the predominant vegetation under- and over-story. In addition, basic field data should be provided (e.g., date, time, weather, temperature, names of field surveyors) in addition to whether or not the station is above or below tidal influence (based on tidal elevations or salinity). (See attached data sheets).

Expected Unit Cost

Costs are not available but the presence/absence method described here is the least expensive method available for estimating river otter populations. Surveys should require at least two people sampling one day per subregion (30 stations in each of the four subregion), totaling 8 people sampling for 4 days per sampling session. Sampling sessions should occur between 1 to 4 times per year. If volunteers are available to carry out the research, then costs will involve only the one-day training fee required by the instructor (unless CA. Department of Fish & Game can conduct the training without charge). If its personnel can assist with the monitoring, then the cost would be the Department's salary charge plus any additional overhead charges.

Data Be Analysis and Presentation

The analysis of the otter monitoring data is very straightforward. The proportion of sample units with at least once detection of otter sign will be determined after the first complete sampling occasion. This will provide not only the initial index of population status but will also help determine whether the number of sample units should be greater or fewer on the subsequent sampling occasion(s). The latter objective will be achieved by using the proportion estimate as one important variable in a simulation exercise that will help determine the number of sample units that will be necessary to detect a specified decrease or increase in the proportion of sample units with detections. This simulation will include 2 different statistical models, one that evaluates whether the proportions from 2 sampling occasions differ and one that evaluates the sampling effort necessary to detect a significant change in trend over >2 sampling occasions. In this way the analysis of each episode of sampling produces data to: (1) address the status of otters, and (2) to help improve the efficiency of the future sampling occasions.

Results should be represented in graphs comparing river otter signs (scat and tracks) in different regions and during different years (y-axis = number of signs; x-axis = region and/or year). Standard error bars can be displayed on bar or line graphs, and as the data sets accumulate over the years time-series can be readily understood as graphs. Reports should accompany the graphs, and raw data should also be included until it becomes too bulky, at which point the reader can be referred to a website or the data can be can be made available only in an electronic format.

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Sample Data Sheet : Use one data sheet for each of the 30 stations in each of the four sub-regions in the northern San Francisco Bay.

Station Number: _____

Location: (If station is located at a bridge, provide name of creek and road name or number. If station located at a tidal marsh, provide the name

_____

__

:_____

___

Date:
Time:
Weather:
Temperature:
Name of field surveyors:
Is the station above tidal influence (based on tidal elevations or salinity) ? Y or N.

100 meters UPSTREAM of Station—River Otter Signs.
Search should include 5 meters x 100 meters on one side of the creek.
Mark "Y" for Confirmed Observation.

	10 M	20 M	30 M	40 M	50 M	60 M	70 M	80 M	90 M	100 M
Otter tracks?										
Otter scat?										
Otters observed?*										
Other animal tracks?										
Other animal scat?										
Other wildlife signs?**										
Other wildlife observed?										
Describe predominant vegetation understory.										
Describe predominant vegetation overstory										

***** If otters are observed, describe their behavior as F (foraging and feeding); T (traveling); R (rubbing or rolling); SG (self-grooming); MG (mutual grooming); M (marking feces urine, glandular); Re (resting); P (playing); O (other) [after Melquist & Hornocker 1983]

** Report animal signs in general that may or may not be from otters, e.g., (B) bedding sites, (H) haul-outs, (R) rolling sites, (S) slides, (SP) scent posts, (Dig) digging, (D) dens (holes in river banks, under trees, or under other large objects).

100 m <u>DOWNSTREAM</u> of Station—River Otter Signs.

Search should include 5 meters x 100 meters on one side of the creek. Mark "Y" for Confirmed Observation.

	10 M	20 M	30 M	40 M	50 M	60 M	70 M	80 M	90 M	100 M
Otter tracks?										
Otter scat?										
Otters observed?*										
Other animal tracks?										
Other animal scat?										
Other wildlife signs?**										
Other wildlife observed?										
Describe predominant vegetation understory.										
Describe predominant vegetation overstory										

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