MVSD River Otter Study

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Introduction

The North American River Otter (*Lontra canadensis*) is a semi-aquatic mustelid endemic to North America, a keystone carnivore and a sentinel for environmental contamination. Although the species is highly dependent on freshwater, otters traverse through and forage within a variety of habitats that include terrestrial, marine, estuarine, and freshwater ecosystems. They predate an array of species such as native and non-native freshwater, anadromous, and marine fishes, waterbirds, crustaceans and amphibians.

Very little is known about the current status, distribution, and ecology of river otters in California. Historically documented, but shortly thereafter extirpated from much of their range in the early 20th century, populations were offered protection through fur trapping restrictions in 1961. Since then, and only just within the past few years, a selection of research has been published on populations in California, with these studies limited to Northern California, the San Francisco Bay Delta, inland mountainous regions of the state and the San Francisco Bay Area.

The River Otter Ecology Project (ROEP), monitors ~225 linear km of coastal, wetland, riverine and reservoir in Marin County, California, using noninvasive methods, for population, health, prey and dispersal information. Moorhen and McNabney Marshes comprise ROEP's initial site outside Marin County, and make an interesting contrast to Marin sites, in part because river otters were never extirpated from the Martinez area, and because Moorhen Marsh is a constructed treatment wetland built in the 1970s with only one directional flow into Peyton Slough and McNabney Marsh is heavily managed by tide gates operated offsite by a third party. Both McNabney Marsh and Peyton Slough are affected by Shell Martinez Refinery stormwater discharges that typically occur before, during, or immediately after wet weather events.

Habitat description

Moorhen Marsh is a 21-acre, constructed wetland dependent solely on treated effluent as its primary water source. The Shell Martinez Refinery surrounds it on two sides, and Interstate 680 borders the north side. Native wildlife species dependent on the wetland for habitat include the western pond turtle, North American river otter, mink, North American beaver, and many species of birds including marsh wren, San Francisco common yellow-throat, Suisun song sparrow, green heron, snowy egret, and black-crowned night heron.

McNabney Marsh is a restored, muted tidal wetland located east of I-680 in Martinez. MVSD and the East Bay Regional Park District, with an agreement that gives MVSD responsibility for its management, jointly own the 138-acre wetland.

North American river otters have been regularly sighted in the MVSD wetlands since at least 2005, including a group of 9 river otters observed by MVSD Biologist, Kelly Davidson, in Moorhen Marsh in 2011. One river otter was reported to the California Roadkill Observation System as a mortality on Waterbird Way, adjacent to McNabney

Marsh, in 2011; however, until 2016 there were no formal surveys or monitoring for river otters on these properties.

Project Goals

MVSD and ROEP partnered in September 2016 to:

- Noninvasively gather information on river otter presence, abundance and habitat use within Moorhen and McNabney Marshes,
- Document sex ratios as possible,
- Document pup emergence and survival; and to
- Advise on mitigations for disturbance in otter habitat due to pre-construction and construction activities for a 2017-2018 habitat enhancement and maintenance project in Moorhen Marsh including vegetation removal, dewatering, pond excavation and other activities, if necessary.

Methodology

ROEP surveyed Moorhen and McNabney Marshes on foot, marking likely otter corridors/paths (as determined by their proximity to water and otter sign such as scat and wallowing places), dens, latrine sites and wallows, using Collector for ArcGIS (ESRI). ROEP placed six motion detector, infrared Bushnell trail cameras at latrine sites, in wildlife corridors and at crossovers between the two marshes (Peyton Slough and culverts under Highway 680), and one camera dedicated to moving from place to place as needed. Cameras were programmed to record video both day and night.

Surveys and camera checks are conducted weekly and are ongoing, beginning in September 2016. ROEP collected, viewed and documented videos including otter activity. We noted other wildlife, saving videos of other animals that were of particular interest, such as North American beaver. Documentation of otter videos includes date, time, number of otters seen in each video and unusual behavior, such as mating and pregnancy. Identifying traits, if any, are noted, such as a particular otter with an ocular defect that eliminates eye shine at night in that individual. Cameras were adjusted as necessary for better video. Video is catalogued and stored in multiple locations for backup.

Due to heavy rains in December and January, the McNabney Marsh cameras were removed to avoid submersion and camera failure and utilized in Moorhen Marsh during levee mowing, and emergent vegetation removal, dewatering and other activities in preparation for pond excavation.

When emergent vegetation removal began at Moorhen Marsh on January 25, 2017, one camera was used solely for “roaming”, and was deployed in various spots to record otter reaction to vegetation pulling and pond turtle fencing. Those placements are indicated in Figure 1 by triangular icons.

Figure 1: Camera Sites, Moorhen and McNabney Marshes, 2017

Data represented in this report are confined to Moorhen Marsh and the two McNabney Marsh cameras covering the Peyton Slough and Interstate 680 culverts. Due to winter flooding, camera trapping in McNabney Marsh was halted and camera trapping and observation were increased in Moorhen Marsh during preparations for pond excavation.

Data from MH04A, MH04B and MH04C (diamond-shaped) are from the moving camera deployed during vegetation removal, de-watering and preparation for pond excavation at Ponds C, D and E. The data includes videos from January 25 through June 30, 2017.

Results

According to results through January 2017 (please see Interim Report, February 2017), otters used Moorhen Marsh Ponds C, D and E as areas for fishing, grooming, and latrines, and as pass-through corridors on their way to and from McNabney Marsh and the Shell Martinez Refinery property. They most often passed through the culvert beneath Interstate 680, rather than the Peyton Slough underpass. They were particularly active at Sites MH01 and MH02, visiting the most frequently and spending the most time at those sites.

1) As expected, vegetation removal and dewatering of Ponds C, D and E disrupted otter activity patterns, and the otters entered a period of flux, changing their movements and pathways between and through the ponds. The changes continue through the date of this report. ROEP employed a combination of moving cameras and tracking latrine sites and scats using ArcGIS Collector to gather information about changes in otter activities and pathways.

These changes in movement and pathways are reflected in Figures 2-5, Heat Maps, as the otters reacted to vegetation removal, dewatering of Ponds C, D and E, and the installation of a wildlife exclusion fence to keep western pond turtles and other species from entering the construction zone.

2) A second challenge to the otters' habits occurred in April when the CDFW Game Warden ordered EcoServices to refrain from operating the tide gate until the end of the nesting bird season in McNabney Marsh. Water levels in McNabney Marsh are consequently lower and the pond area on the McNabney side of the culvert dried completely, making the area less attractive as an otter pass-through. Otters were last seen using the culvert on June 13, 2017. Otters began using Peyton Slough to traverse beneath Interstate 680, and have been photographed in the Slough.

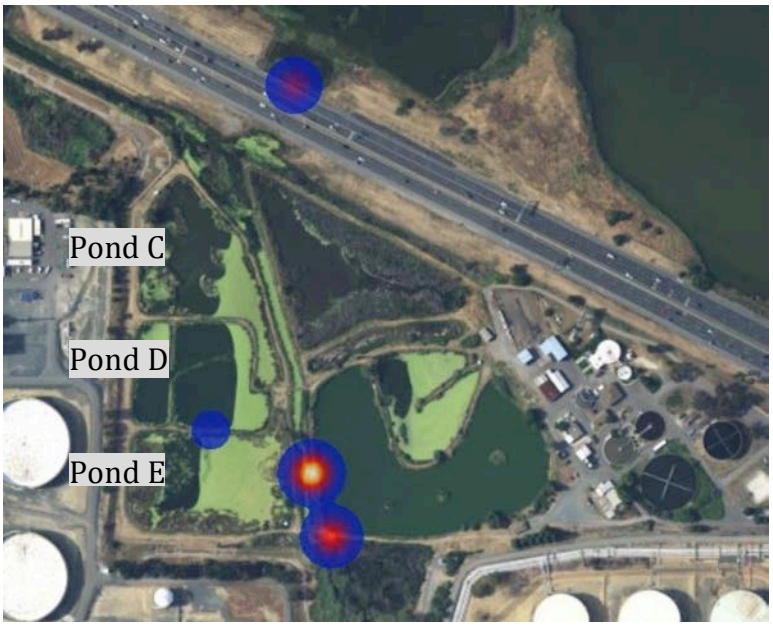
3) Birth and young: While a pregnant otter was observed in February 2017, and mating behavior (please see video links), was also observed in early April on Cameras MH04 and MH05, no otter pups have been observed as of the time of this report.

4) Mortalities: No otter mortalities were encountered during the period of this report.

5) Other animals: Beaver kits and mating mink are both inhabiting Moorhen Marsh and adjacent areas, as are gray fox, red fox, muskrat, Canada goose, and the omnipresent raccoons. Please see video links.

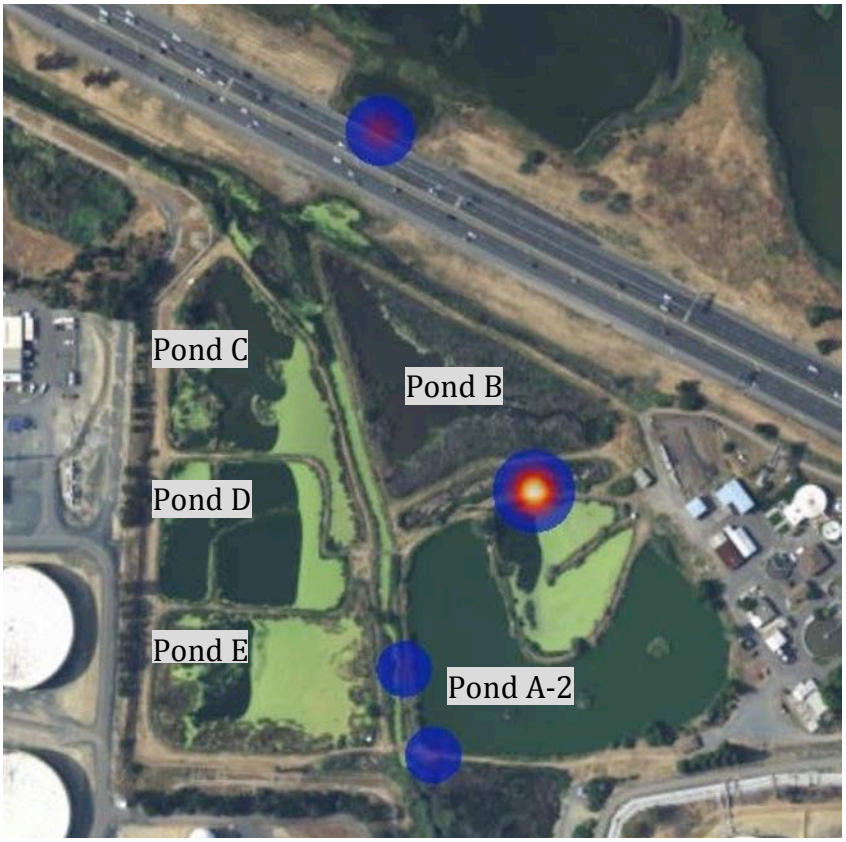
Discussion, Finding #1

Figure 2: Feb-March Heat Map



In the last week of January, emergent vegetation removal began in Ponds C, D & E. The otters stopped using the devegetated ponds, but continued to move through the wetlands and culvert, often using the levees.

Figure 3: April Heat Map

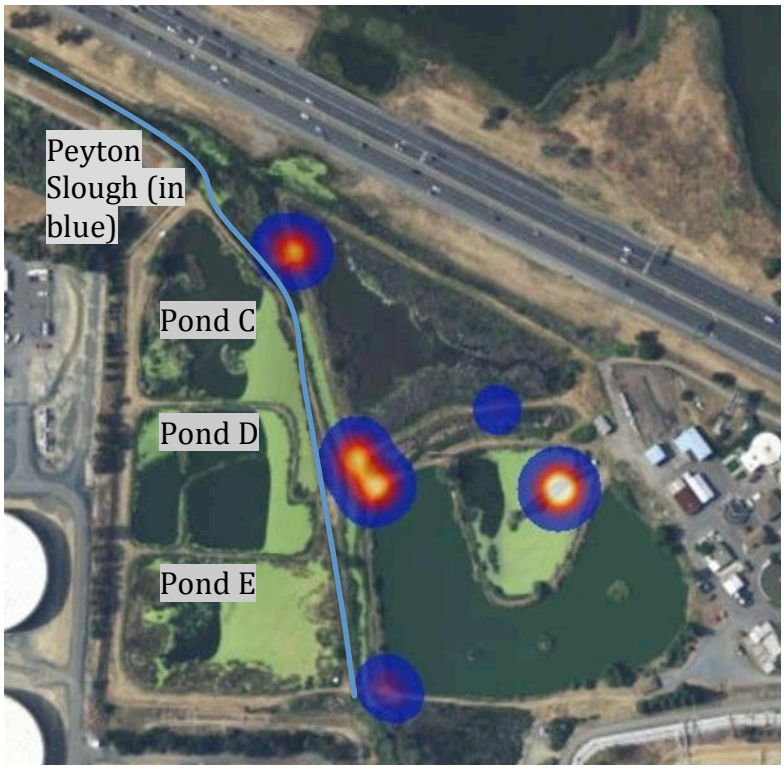


Exclusion fencing installed between Peyton Slough and Ponds C, D & E for western pond turtles. (Please see Figure 4). Otters begin using the area near Pond A-1, at MH05 significantly more often and reducing their use of Sites MH01 and MH04B near Pond A-2. Otters continue to use the culvert to traverse I-680.

Figure 4: Exclusion Fencing, April 2017

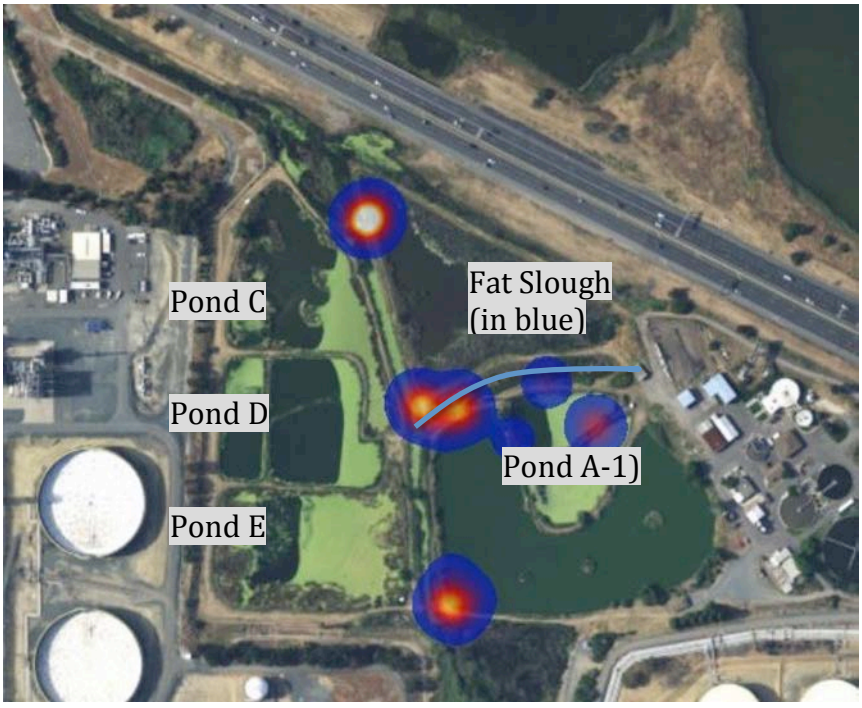
Exclusion Fencing for Western Pond Turtles

Figure 4: May Heat Map



Otters stop using the ponds for egress, and begin using Peyton Slough. Otters avoid dewatered ponds C, D & E.

Figure 5: June Heat Map

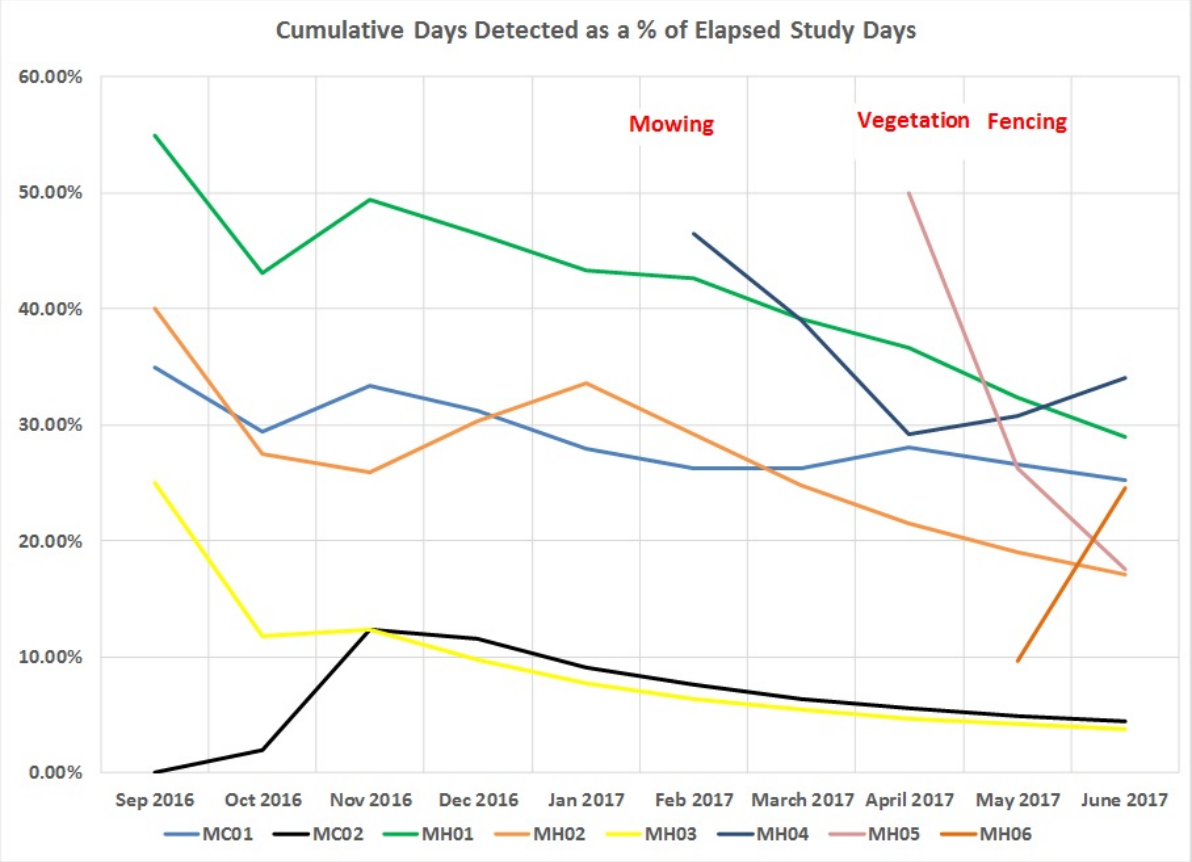


Otters coming from Peyton Slough, into Fat Slough to Pond A-1 in groups of up to 5.

Otters not using the I-680 culvert at all from June 13 onward.

Excavation begins in Ponds C, D & E on June 21.

Figure 6: Cumulative Detections by Site



Otter movements through and around the Moorhen Marsh area changed significantly during the first six months of 2017. In order to track the changes, ROEP moved cameras often. To account for otter presence at each site, as well as the varying lengths of camera deployment at each site, we express otter use of each site as cumulative days of detection relative to the length of the camera deployment.

At every site, with the exception of MH06, which has only been up for ~ 60 days, otter use declined after levee mowing, emergent vegetation removal and fence installation. This indicates not so much that the otters no longer used the area, but that their habits and movements changed in response to these activities.

Discussion, Finding #2

After ground nests in McNabney Marsh were lost due to tide gate operations in April 2017, the CDFW Game Warden ordered the tide gates to be closed through the completion of the nesting bird season in McNabney Marsh.

Parts of McNabney Marsh had dried as of mid-May, including the area just in front of the culverts, which had been an underpass for wildlife beneath I-680. Otters no longer use the culverts as of mid-June, though red fox, skunk, opossum, muskrat and mink continue to use them. Otters are likely using Peyton Slough instead, for access to the wetter portions of McNabney Marsh. Otter preference is to travel between or along waterways; therefore it's not surprising that they've changed their pathway of egress to McNabney Marsh.

Observation of scat in Moorhen Marsh indicates the otters are eating mainly crayfish, which is consistent with otter habits when crayfish are abundant and easy to capture. After emergent vegetation removal and dewatering of the ponds, and as McNabney Marsh water levels declined, river otters were likely able to take advantage of easier fishing and crayfish capture.

Discussion: Finding #3

We suspect a litter of young was born somewhere on the Shell Martinez Refinery (SMR) property, due to a video observation of a pregnant otter moving into and out of that property, and an otter coming out of SMR, defecating in Moorhen, then returning immediately to SMR. These observations are consistent with otter behavior when young are in a natal den. Female otters tend not to defecate anywhere near their natal dens but instead go some distance, defecate and return to the den. The SMR property is protected from the public by high fences, and includes several ponds and some riparian habitat, making it a suitable nesting site.

Previous otter behavior has been to come from the SMR, spend time at the MH01 camera site scent marking, defecating and socializing, then carry on into the Moorhen Marsh ponds and thence to McNabney for hunting. ROEP emailed Cathy Ivers, of SMR through a contact with Heidi Perryman (martinezbeavers.org) on March 14, 2017 to request access to SMR for permission to survey on foot for otter signs and possible den in late summer or fall. It was our understanding that Cathy Ivers would pass the request on to the appropriate parties. As of the date of the report, we have not received a response.

By the time of this report we would have expected to see otter young traversing Moorhen Marsh with their mother, but despite camera placement in Peyton Slough at the boundary line to the Shell Martinez property, as well as at several other sites, we have not detected young. ROEP has observed otters with young at sites in Marin County, and there is no reason to expect Martinez otter young to be behind in development, although it's possible the pups were born later than we suspect.

Other possible reasons for the lack of observations of young are:

1. The pup/s died;
2. The female is taking the pup/s to the ponds on SMR, and not entering Moorhen Marsh when the pups are with her;
3. The female has moved the pups somewhere else;

4. The female has egress into Moorhen Marsh that has not been discovered and is using that with her young;
5. The pups are not yet emerging with their mother.

To further confound the issue, larger groups of 5-9 otters were not seen in Moorhen Marsh from the first week in February 2017 until May 5, when they began frequenting Moorhen Marsh on a regular basis. Large groups of otters are usually male groups, though juvenile females may spend time with groups of males before they are sexually mature, usually at age 2 or later. When young are in residence, male river otters are generally not allowed in the vicinity as they may pose a threat to the young. Does this mean the female's young are no longer in the vicinity and the large groups of otters are males? The question of whether there are pups, and where they are, remains central to our study.

Finding #4: No otter mortalities have been discovered since our last report.

Finding #5: Beavers, including at least one kit, as well as gray fox, red fox, mink, geese, raccoons, muskrat, opossum and various birds continue to use both sites. Nesting continues at McNabney Marsh. Of note are some amusing interactions among the otters, fox and geese. Please see video links.

Recommendations:

1) Collaborate with District Biologist Kelly Davidson in advance of the 2018 work on Phase B (Ponds A-1, A-2, B, Fat Slough and Peyton Slough) to formulate a mitigation plan with particular regard to birth and denning season, mid-February to June.

2) Continue monitoring for birth and pup emergence and survival.

3) Begin prey species analysis in partnership with ROEP's existing Hands on High School program. There is currently a lack of baseline information on river otter diet in the San Francisco Bay Area.

4) Consider genetic analysis on this population of river otters if there's a desire to discover matrilines, sex ratios and relatedness among animals. The information could serve as a baseline and comparison to similar studies currently in progress through ROEP at San Francisco State University.

Video Links

Pregnant Otter, Moorhen Marsh
Mating Behavior, Moorhen Marsh
Otter and Fox, Moorhen Marsh
Otter and Geese, Moorhen Marsh