



November 12, 2020

COMMISSIONERS  
MARINE ADVISORY COMMISSION  
City of Long Beach  
California

**RECOMMENDATION:**

Recommendation to support the Marine Bureau's request for City Council to authorize the City Manager or designee to execute a Right-of-Entry Permit with California State University, Long Beach, to enter the Colorado Lagoon and Marine Stadium to conduct academic research on biological resources and perform monitoring activities, for an initial three-year term, with the option to renew for one additional two-year period at the discretion of the City Manager or his designee. (District 3)

**DISCUSSION**

On June 16, 2015, City Council authorized a Right-of-Entry Permit with California State University, Long Beach (CSULB), to enter the Colorado Lagoon and Marine Stadium to engage in research activities to ascertain fish foraging behavior, migration patterns, and utilization of culverts to access estuarine habitat. CSULB researchers assessed to what extent fish were able to transit the 880-foot-long culvert connecting Alamitos Bay to Colorado Lagoon to access new habitat. Their findings (Attachment A) that the culvert and grate did pose a movement barrier for some fish species at all times of day, and for other fish species at certain tide times of day, were shared with the City and helped guide decisions about ongoing restoration plans for Colorado Lagoon and supported continuing water quality monitoring activities.

CSULB researchers have requested to engage in further study at these locations, to build on previous results and understand the impacts of the planned culvert removal as the Colorado Lagoon Open Channel Restoration Project continues. The objective of the study is to determine how the habitat is affected by the culvert removal and how several economically important fish species (including round stingray, California halibut, yellowfin croaker, and grey smoothhound) can utilize this newly restored urban lagoon habitat. Researchers are seeking grants from various agencies to fund the study.

To support the research, a new Right-of-Entry Permit will be required to evaluate the habitat; conduct fish sampling; and temporarily install water quality loggers, Radiofrequency Identification (RFID) readers below sea level at both ends of the Colorado Lagoon and Marine Stadium, and RFID receptor and power boxes at both ends

of the culvert. The academic research activities will be used by the City and other groups to guide management decisions and will provide feedback on how conversion from a culvert to an open channel improves conditions for fish. These activities also will support the City in its efforts to meet water quality targets as mandated by the Environmental Protection Agency, State Water Resources Control Board, and Regional Water Quality Board. The Colorado Lagoon has an active Total Maximum Daily Load (TMDL) for water, sediment, and fish tissue quality. The conditions of the Right-of-Entry Permit would include a requirement for making all research findings available to the City to inform restoration activities, coastal resource management actions, and support ongoing TMDL monitoring activities.

The proposed Right-of-Entry Permit contains the following major provisions:

- Permittee: California State University, Long Beach.
- Permit Area: Colorado Lagoon and north end of Marine Stadium as shown in Attachment B.
- Term: Three years, from January 1, 2021, to December 31, 2023.
- Renewal Options: One two-year option to renew, at the discretion of the City Manager or designee.
- Authorized Use: The Premises shall be used, at no cost to the Permittee, for engaging in academic research, specifically fish tagging, water quality monitoring, and other data collection.
- Conditions of Use: Permittee shall be responsible for obtaining all necessary certificates, permits, and approvals, as required by federal, state, and local authorities, prior to commencing the project, and will supply copies to the Department of Parks, Recreation and Marine. All data collected, findings, and reports produced from the research shall be made available to the City to help inform coastal resource management policies, support existing operations, and provide feedback on the improving conditions for fish as the tidal channel restoration project continues.
- Termination: Either party may terminate the Permit with 30 days' written notice. At the revocation of the Permit, the Permittee shall abandon the site and remove all equipment and devices installed.
- Insurance: Permittee shall maintain all applicable insurance and endorsements, as required and approved by the City Risk Manager, and submit renewals as necessary.



SUGGESTED ACTION:

Approve recommendation and submit to City Council on December 8, 2020.

Sincerely,



ELVIRA HALLINAN  
MANAGER, MARINAS AND BEACHES

ATTACHMENTS: A – CSULB Colorado Lagoon Case Study  
B – Permit Area Map





# Do Culverts Prevent Estuarine Fish from Accessing Important Habitats? A Case Study at the Colorado Lagoon, Long Beach, CA



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## Background:

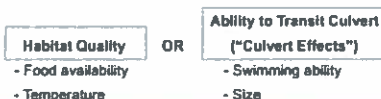
- Culverts widely used to facilitate water flow in freshwater and saltwater systems. Studies show that culverts impede fish movements<sup>1,2</sup> and reduce connectivity between habitats.
- Connectivity between habitats important for sustainability of fish populations<sup>3</sup> as juveniles use coastal wetlands and embayments as nursery habitat.<sup>4</sup>
- Impacts on estuarine fish have not been well-studied; movement barriers could have consequences for local anglers and commercial fisheries.



## Objectives:

- Understand use of the CO Lagoon by marine teleosts and elasmobranchs by way of a 268-meter culvert and identify culvert effects on these populations.
- Identify biotic and abiotic characteristics of the CO Lagoon and adjacent Alamitos Bay to understand possible drivers of fish movements.

### WHAT'S DRIVING FISH MOVEMENTS?



## Study Site:

Colorado Lagoon & Alamitos Bay  
Long Beach, CA



Figure 1. Study site locations including CO Lagoon, Alamitos Bay, and line culvert.

## Methods:

- Fish tagged with PIT tags and tracked using Radio Frequency Identification (RFID): Tag readers placed at both ends of culvert



Figure 2. From left to right: culvert opening and receivers at CO Lagoon, receivers at Alamitos Bay; PIT tags, round stingray (top), striped mullet (bottom).

- Habitat data collected at each site across multiple seasons, including water chemistry, infaunal invertebrate cores, sediment cores, zooplankton tows, and prey fish community surveys.



Figure 3. From left to right: sediment cores, infaunal polychaetes, oozed zooplankton, CTD logger

## Results:

- Movement patterns show that many fish were able to move freely between both sites (Fig. 4), demonstrating the ability to successfully navigate the culvert. Of the 9 striped mullet detected, 5 were detected in both sites. Of the 22 round stingrays detected, 15 were detected in both sites.
- Even when individuals were translocated to the site opposite of capture, most (5 out of 7) found their way back to the original capture site within 11 days.



Figure 4. Detection plot for all individuals detected in the Colorado Lagoon (blue) and Alamitos Bay (red) during the study period

- There are significant distinctions between the two habitats in terms of abiotic parameters, food availability, and fish communities.
- The Lagoon is warmer during the summer and fall months.
- Sources of food are different demonstrated by community analyses of infauna, zooplankton, and prey fish.

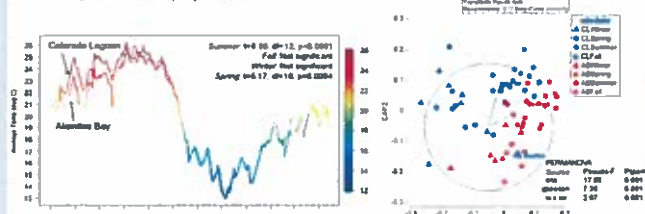


Figure 5. Average water temperature of both sites from May 2015 to May 2016. The Lagoon is significantly warmer on average during the summer and fall months.

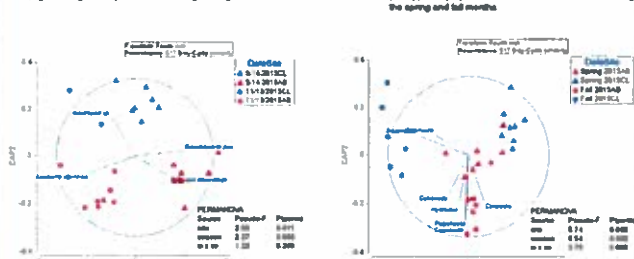


Figure 6. CAP plot demonstrating relationships between infaunal invertebrate communities during the spring and fall months in both sites.

## Results:

- Movement data suggests a trend where smaller individuals are more successful in moving between the study sites than larger individuals.
- Based on the data, the largest individuals (bat rays, CA halibut) did not successfully transit the culvert during the course of the study.

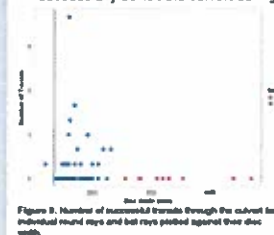


Figure 8. Number of successful transits through the culvert for individual round rays and bat rays plotted against their disc width.



Figure 10. View of safety gates covering the opening of the culvert in the CO Lagoon.

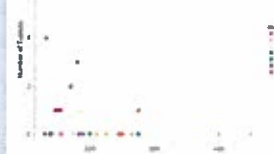


Figure 11. Number of successful transits through the culvert for individual teleosts plotted against their standard length.

## Conclusions:

- The ability of these fish to move between the lagoon and the bay by way of the culvert demonstrates that habitat quality factors such as food availability and water temperature are not driving movements.
- A fish's ability to transit the culvert, which may include their size and swimming ability, is driving movements.
- Larger fish were noticeably absent in terms of detection. We posit that the safety gates located at the openings of the culvert (Fig. 10) and not the culvert itself are limiting movements.

## References:

- Warren J.M., Pastore M.J. 1990. Road crossings as barriers to small-stream fish movement. *Trans Am Fish Soc* 119: 637-644.
- Schroeder J.F., Marsh-Matthews E., Spencer D.E., Ode K.B., Matthews W.J. 2003. Effects of barriers and thermal refuge on local movement of the threatened leopard darter, *Parachanna obscura*. *Can J Fish Aquat Sci* 60: 281-293.
- Chapman B., Allen R., Brown J., Eggleston J., Shuman P. 2003. Evidence of connectivity between juvenile and adult habitats for mobile estuarine fauna: an important component of nurseries. *Mar Ecol Prog Ser* 247: 281-300.
- Allen L.G. 1986. Recruitment, distribution, and feeding habits of young-of-the-year California halibut (*Paralichthys californicus*) in the vicinity of Alamitos Bay-Long Beach Harbor, California, 1983-1986. *Bull South Calif Acad Sci* 87: 19-30.

## Acknowledgements:

Bergt Allen & many graduate and undergraduate volunteers





## Attachment B

# Colorado Lagoon and Marine Stadium Permit Area

