Tijuana River National Estuarine Research Reserve (TRNERR)

Program Manager Reports
Report Period: July 1, 2024 through December 31, 2024

TASK: REFUGE MANAGER REPORT

Sally Brown, Wildlife Refuge Manager, San Diego Bay NWR and Tijuana Slough NWR

1. Personnel

Funding for the San Diego National Wildlife Refuge Complex has declined by 28 percent between FY 2017 and FY 2024 such that Refuges is no longer able to staff the Tijuana Slough National Wildlife Refuge with a Park Ranger, Biologist, and Assistant Refuge Manager. As a result of these funding declines, staffing is reduced to a single employee for both the San Diego Bay and Tijuana Slough National Wildlife Refuges.

2. Wildlife

In 2024, between 27 and 50 pairs of California least terns established 58 nests and fledged 13 to 15 chicks on the Tijuana Slough National Wildlife Refuge beach north of the river mouth. [While between 125 and 140 pairs of California least terns established 150 nests and fledged 28 to 32 chicks on the beach at Border Field State Park south of the river mouth.]

In addition, 11 female and 15 male Western snowy plovers established 28 nests and fledged 20 to 24 chicks on the Tijuana Slough National Wildlife Refuge beach north of the river mouth. [While 9 female and 13 male Western snowy plovers established 28 nests and fledged 8 to 11 chicks on the beach at Border Field State Park south of the river mouth.]

The annual census for light-footed Ridgway's rails documented a total of 413 breeding pairs in 20 coastal wetlands in 2024. The Tijuana Slough National Wildlife Refuge supports the largest population, with 108 breeding pairs, or 26.2 percent of the state total.

Many of our threatened and endangered birds are year-round residents on the Refuge. Please help us provide a safe refuge for them by keeping dogs leashed and observing from a distance.

Refuge staff continue to work as part of a consortium of scientists, NGOs and resource agencies investigating possible reintroduction sites for the critically endangered Pacific pocket mouse. Refuge staff will be attending the upcoming pacific pocket mouse working group meeting, and weed removal is planned within potential reintroduction habitats. You can read about ongoing conservation efforts for this species here https://institute.sandiegozoo.org/species/pacific-pocket-mouse. Note that the 'type location' for the species when it was initially described in the scientific literature was for

a specimen taken from the Tijuana River Valley. A recent taxonomic reassessment for the species suggests that these historic records represented a unique subspecies (Patton J. L. and R. N. Fisher. 2023. Taxonomic reassessment of the Little pocket mouse, Perognathus longimembris (Rodentia, Heteromyidae) of southern California and northern Baja California. Therya vol.14 no.1.).

Refuges is continuing its work with Team Ridgway's Rail in a captive rearing effort between State and Federal wildlife agencies, San Diego Zoo Wildlife Alliance, SeaWorld San Diego and the Living Coast Discovery Center. Results of a genetic study conducted by the U.S. Geological Survey has helped direct releases of young captive reared rails to marshes in Orange County in 2024. The team revised its propagation plan to address the genetics of the captive population, and the propagation permit has been renewed which will allow for implementation of the revised propagation plan in 2025.

Surveys for endangered salt marsh bird's-beak were conducted in the marsh this year as part of the Rare Plant Inspect and Manage Monitoring effort by the San Diego Management and Monitoring Program. You can read about this management and monitoring effort here: https://sdmmp.com/view_project.php?sdid=SDID_sarah.mccutcheon%40aecom.com_57cf0196dff76#data-files-tab

3. Multi-Agency Planning Efforts

FWS is working with the City of Imperial Beach on planning and environmental assessment efforts for the City's Bayshore Community Resiliency: Living Levee Project. A Notice of Intent was published to prepare an Environmental Impact Statement in the Federal Register on January 10th and the project team will be seeking public scoping comments on the project through February 24th.

The San Diego NWR Complex continues to participate in the team that is planning the Tijuana Estuary Tidal Restoration Program II Phase I.

FWS ia also in the final year of construction for the Otay River Estuary Restoration Project (ORERP) which will restore approximately 125 acres of intertidal habitat in south bay. Grading was completed on the 34.56-acre Otay River Floodplain site, and it was opened to tidal flow on December 12, 2024. The 90.90-acre Pond 15 site is nearly complete as well and will be opened to tidal flow on January 12, 2025. While grading of these sites will be complete prior to the bird nesting season, planting is planned for fall of 2025.

In addition, the ORERP project team is coordinating with the Port of San Diego on their proposal to restore the adjacent Pond 20 site located north of Palm Avenue and east of 13th Street. Together, the ORERP and Pond 20 restoration projects will restore an abandoned salt pond, former agricultural areas, and one active salt evaporation pond into native intertidal salt marsh habitats.

4. Tijuana River Mouth and Water Quality Data

Refuge staff are working on documentation required to renew its Tijuana River Inlet Dredging permit, including a 401 Water Quality Application, Essential Fish Habitat Assessment, and Endangered Species Act Section 7 analysis. The permit will allow land managers to respond in the event that the river inlet requires maintenance dredging.

5. Wildland Urban Interface

The San Diego NWR Complex has been working to manage an infestation of *Caulerpa prolifera*, an invasive algae that threatens the marine ecosystem within south San Diego Bay. Refuge staff have been successful in their pursuit of grant funding for eradication level surveys and the installation of benthic barriers to kill the algae within the infested area. Left unchecked, this algae would form a dense mat within subtidal habitats, outcompeting native eelgrass and affecting fisheries and foraging areas for green sea turtles. It is likely that the *Caulerpa* was introduced by a person emptying a saltwater aquarium into the bay. Please clean out aquariums in facilities (e.g., sinks and toilets) that connect to water treatment plants to avoid introducing invasive species into the environment.

TASK: OVERSIGHT AND IMPLEMENTATION OF RESERVE OPERATIONS
Chris Peregrin, TRNERR Reserve Manager, California State Parks

1. Development and Coordinated Implementation of Reserve Programs

The Reserve Management Team worked with the TRNERR Program Managers to respond to the Necessary Action and the Recommendations identified in the Reserve's 312 findings.

The Assistant Reserve Manager coordinated the TRNERR Program Manager reports and submitted Performance Progress Report(s) for NOAA Award NA23NOS4200172-T1-012nd period.

The TRNERR Management Team worked with the TRNERR Program Managers to further the Draft TRNERR Comprehensive Management Plan. During this award period, the TRNERR Management team met with NOAA OCM representatives to clarify NOAA OCM comments.

The Reserve Manager travelled to the Wells Reserve in Maine to contribute to the NERRA Board meeting and the NERRS system-wide meeting October 21-25, 2024.

The Reserve Manager contributed to virtual NERRA meetings on August 26, September 30, December 9, 2024

The Reserve Manager contributed to virtual NERRS Managers meetings on July 31, October 2, November 15, 2024.

The Reserve Manager attended NOAA West Coast regional meetings during this period.

The TRNERR Management Team and Program Managers hosted the quarterly TRNERR Advisory Council meetings on August 13, and November 5, 2024. New business topics for each meeting included:

1. August 13, 2024.
    a. Doug Liden (U.S. Environmental Protection Agency) presented on a study for the reuse of wastewater in Mexico. Presentation link: https://trnerr.org/wp-content/uploads/2024/08/Advisorycouncil-presentation-Liden-8_13_24.pdf
2. November 5, 2024.
    a. Audrey Kennar (County of San Diego, Health and Human Services Agency) presented on the Assessment for Chemical Exposures (ACE) Survey to assess the impact of the Tijuana River Valley sewage contamination.
    b. Morgan Rogers (International Boundary and Water Commission) gave a synopsis of updates from the IBWC Citizens Forum meeting on the Launch of the South Bay International Wastewater Treatment Plant rehabilitation and expansion.

The Assistant Reserve Manager continued role of Cooperating Association Liaison for the Southwest Wetlands Interpretive Association (SWIA) and is attending the regular SWIA Board Meetings.

The Reserve Manager continued coordination with CA State Parks Peace Officers and seasonal lifeguards to support Reserve operations through public safety.

The Management Team met with the TRNERR Program Managers in virtual format approximately weekly for this term of the grant to ensure programmatic coordination.

The Reserve Manager attended monthly CA State Parks San Diego Coast District Manager Team Meetings. One of the goals of this engagement is to ensure effective integration of Reserve programs with CA State Parks operations.

The TRNERR Management Team worked with the Education Program and CA State Parks Interpretation and Administration to recruit, interview, and hire a new State Park Interpretive Specialist, Jackie Weeden.

The TRNERR Management Team worked with CA State Parks San Diego Coast District interpretation and education program to support on-going interpretation and education programming at the Reserve during extended leave of the TRNERR Education Coordinator.

The TRNERR Management Team and the TRNERR Program Managers welcomed and began collaboration with the new Margaret A. Davidson Fellow- Shanasia Sylman. The

Coastal Training Program Director is serving as primary TRNERR support (*see also Coastal Training Program*).

The Reserve Management Team attended a training on cultural resource conservation hosted by CA State Parks Cultural Resources staff, October 15, 2025.

2. Management of Reserve Budget

California State Parks established the San Diego Coast District NOAA Grant Review Team primarily for oversight of the reserve operations award submittal process as well as staffing of positions split between SWIA and California State Parks. The Grant Review Team is composed of the Assistant Reserve Manager, San Diego Coast District Natural Resources Program lead, the San Diego Coast District Superintendent, the San Diego Coast District Environmental Coordinator, and TRNERR Research Coordinator and the SWIA Administrative Director, who are both employees of the Southwest Wetlands Interpretive Association. The Grant Review Team has the decision-making authority over all state park agreements, grants, and contracts associated with reserve operations including the NOAA operations award and the Coastal Training Program contract.

The Reserve Manager continued work with the Assistant Reserve Manager and CA State Parks Administration staff to manage the NOAA and CA State Parks operating budgets and to verify grant expenditures. The Assistant Reserve Manager coordinated the expenditures and tracking of the NOAA NERRS Operations Award NA23NOS4200172 and NA24NOSX473C0042. The Assistant Reserve Manager worked with CA State Parks Accounting Division staff in headquarters on a no-cost extension justification to extend the NA23NOS4200172 grant through December 31, 2025.

NOAA has rolled out a new internet-based grant management program known as eRA Commons. The Assistant Reserve Manager continued work with CA State Parks Administrative team and NOAA OCM Liaison and support staff to integrate all TRNERR grant submittals.

The Reserve Management Team worked with NOAA OCM Liaison and NOAA support staff to further environmental review for the NERRS Inflation Reduction Act non-competitive funding opportunity (NA24NOSX473C0057). The grant totals $400,000 to support staff and contracts across five years with focus on the following outcomes:

1. Advance priority projects that enhance climate resilience of the Reserve and surrounding communities.
2. Implement on-the-ground activities that enhance climate resilience of the Reserve and surrounding communities.

The Reserve Manager worked with local NGO Wildcoast on the development of a grant application to the USEPA which includes allocation of approximately $8million to CA State Parks to support maintenance of the Goat Canyon Sediment Basins.

3. Development of TRNERR Partnerships

The Reserve Manager hosted CA State Parks Acting Division Chief Matt Bellah for a tour of the Reserve on July 12, 2024.

The Reserve Manager and the Reserve Research Director hosted the San Diego Diplomacy Council for a tour of the Reserve with visitors from the Mekong Delta July 18, 2024.

The Reserve Manager worked with the Coastal Training Program to host National Geographic photographer for a tour of the Reserve, August 6-7, 2024. The effort is part of the National Geographic Preserving Legacies initiative. (*see also Coastal Training Program*)

The San Diego Coast District NOAA Grant Review Team worked with CA State Parks Partnerships office to further the development of an updated operating agreement between CA State Parks and SWIA for management of the TRNERR.

The Reserve Manager worked with CA State Parks Executive Staff and CA Resources Agency Executive Staff to prepare resources for a briefing on Tijuana River pollution for CA Natural Resources Secretary Wade Crowfoot.

The Reserve Management Team joined other Reserve employees and stakeholders in the kick-off to the Cultural Heritage Climate Vulnerability Assessment workshop series hosted by the TRNERR Coastal training Program, CA State Office of Historic Preservation, and University of CA San Diego. (*see also Coastal Training Program*)

The Reserve Manager collaborated with Surfrider to further efforts for future drone flights and capture of imagery of the Tijuana River Valley and Reserve.

The Reserve Management Team coordinated with the San Diego Congressional Delegation to support a press conference at the Reserve Visitor Center, September 5, 2024.

The Reserve Management Team, Research Director, Coastal Training and Education staff supported an event at the Reserve visitor center for Parks California and the local public radio group KPBS, and stakeholders, September 7, 2024.

The Reserve Management Team and Research Director hosted CalEPA Secretary Yana Garcia and San Diego Regional Water Quality Control Board Executive Director David Gibson to discuss Tijuana River Pollution, September 9, 2024.

The Reserve Manager hosted the CA State Parks and Recreation Commission, and CA State Parks Director Armando Quintero, along with the public for a tour of the Reserve on September 11, 2024.

The Reserve Manager contributed to the Tijuana River Valley Recovery Team Meetings on September 18, and December 18, 2024.

The Reserve Manager worked with CA State Parks San Diego Coast District and the U.S. Navy on initial concepts for future partnership and applications to the U.S. Navy Readiness and Environmental Protection Integration (REPI) grant program.

The Reserve Manager and Research Director met with NOAA OCM and CA Coastal Commission staff to discuss a shared response to the Tijuana River pollution issues. A priority effort includes the development of a summary paper highlighting pollution impacts to ecosystem of the Tijuana River.

The Reserve Manager and Research Director hosted Congressman Levin staff Amanda Shafer November 1, 2024.

The Reserve Manager attended the California Mexico Border Relations Council meeting November 7, 2024.

The Reserve Manager and Binational Liaison attended the USIBWC Minute 320 Binational Core group meeting December 17, 2024.

The Reserve Management Team collaborated with San Diego Urban Corps on a grant application to CA Ocean Protection Council for the support of a 5-person Urban Corps crew to work at the Reserve September 2024 through August 2025. The grant application was successful. Work was initiated in this reporting period, with initial efforts focused on removal of the invasive plant *Arundo donax* within the Reserve.

The Reserve Manager and SD Coast District Natural Resources lead supported a visit by Ron Melcer, CA State Parks Coastal Programs Staff, October 17, 2024.

The Reserve Management Team and Program Managers furthered community connection by facilitating various uses of the Tijuana Estuary facilities, including:

- Un Mar de Colores, July 24, August 21, October 26, November 2, 2024.
- World Design Capital and Tijuana Verde, July 25, 2024.
- Scripps Masters Students visit, July 25, 2024
- Imperial Beach Nature Book Club, July 27, August 24, September 28, October 26, November 23, 2024.
- Tijuana River Action Network, August 8, August 29, September 12, 2024.
- WELL Group, August 10, 2024.
- Outdoor Outreach, August 22, 2024.
- Parks California, September 7, 2024.
- San Diego Zoo, September 8, 2024.
- University of San Diego Architecture, September 18, 2024.
- 4Walls International, September 21, 2024.
- National geographic, September 24,25, 2024.
- Friends of Friendship Park, September 27, 2024.

- Coastal Defenders, September 28, 2024.
- Friends of San Diego Bay National Wildlife Refuge, October 19, 2024.
- Senator Padilla December 4, 2024.
- City of Imperial Beach, December 5, 2024.

4. Oversight of Reserve Facilities and Public Access Opportunities

The Reserve Manager worked with CA State Parks San Diego Coast District Management Team to respond to CA Assembly Bill1150 – the development of CA State Parks Community Access Agreements. The San Diego Coast District was one of two State Park Districts selected to pilot the development of this access opportunity.

The TRNERR Management Team and Education Coordinator worked with the CA State Parks Southern Service Center and the San Diego Coast District on early stages of planning for rehabilitation of day use facilities and interpretive and educational elements at Monument Mesa in the southwest corner of the Reserve.

The Reserve Manager worked with CA State Parks San Diego Coast District Interpretation and Education staff, and the CA State Parks Southern Service Center, in partnership with The Friends of Friendship Park on a grant application to the CA Coastal Conservancy's 'Coastal Stories' grant program. The grant was submitted by the Friends of Friendship Park and was approved by the State Coastal Conservancy and includes support for the development of 1 piece of art and 1-2 interpretive elements focused on Friendship Park. During this award period, initial discussions started with focus on scheduling future collaboration toward design, stakeholder engagement, and implementation.

The Reserve Manager worked with CA State Parks Headquarters and San Diego Coast District contracting staff to initiate emergency clean-up work to clear debris from Monument Road, within the Reserve, in response to flood damage from the previous winter. The State of CA contributed $500,000 to clean-up efforts in the Reserve.

The TRNERR Management Team coordinated the TRNERR Trails Committee quarterly meeting, August 27, and November 19, 2024, which involved a site visit to the trail system in the vicinity of Goat Canyon within the Reserve, and a review of proposed alignments for the CA Coastal Trail through the Reserve.

The Reserve Manager worked with CA State Parks San Diego Coast District and staff on the development of a work plan and project agreement to expend $250,000 grant allocation to the Reserve from State of CA grant program for upgrades to the reserve's public restrooms at the visitor center.

The Reserve Manager and Coastal Training Program Director visited the California Capital for a series of meeting with NOAA OCM and representatives from Elkhorn Slough NERR and San Francisco Bay NERR and decision makers in Sacramento to highlight NERRS work on Resilient Roads and Reserves, a project funded by the

NERRS Science Collaborative. December 16,17, 2024. (*see also Coastal Training Program*)

The TRNERR Management Team continued work with CA State Parks Southern Service Center and District Office to advance plans and environmental review for realignment of Monument Road. During this reporting period the team advanced project design to approximately 60% and drafted biological resources impact analysis.

TASK: EDUCATION PROGRAM

Jessie Looney, TRNERR Education Specialist, California State Parks

1. Implementation of Education Programs

A. *Formal and Non-formal Teacher Training*

The Education Coordinator (EC) conducted one *M.A.R.S.H.* (Marsh Awareness with Resources for Slough Habitats) orientation training session in August for five high school teachers.

The EC also conducted a *Tijuana Estuary Explorers* training for one elementary school teacher in September. It was a hybrid training with two one-hour virtual sessions and one one-hour in-person session.

B. *Student-centered Formal and Informal programs*

During this reporting period from July through September, the Education Coordinator (CA State Parks Interpreter II) led three in-person school programs and trained the new Education Specialist (CA State Parks Interpreter I) on all education programs. During this reporting period, the TRNERR Education Coordinator was on an extended leave and thus the Education Specialist led the remaining 11 in-person school programs with support from other Reserve staff, an Interpreter I and a Parks Interpretive Specialist from the San Diego Coast District, and volunteers. The 14 in-person school programs (3 college level, 3 high school, and 8 elementary) served a total of 432 students.

The Education Specialist facilitated virtual field trips through California State Parks, Parks Online Resources for Teachers and Students (PORTS). The 3rd through 5th grade program titled *Salt Marsh Secrets* was provided to 21 schools serving a total of 676 students.

The Reserve's virtual programs developed for PORTS are available on their own landing page on the PORTS website: https://ports.parks.ca.gov/

C. *Interpretation*

TRNERR continued to offer 1 to 2 public walks every weekend that included general nature walks, bird walks, an art therapy experience and walk, and a specialized walk utilizing all senses led by a docent who is blind. In addition to these regularly offered walks, the Education Specialist supported 3 specialized

walks. One, hosted guests from *Parks California and KPBS Producer's Club,* another celebrated *California Biodiversity Day* with a bioblitz, and the third was the annual *King Tide Hike* which hosted its largest audience yet.

The Education Specialist restarted the TRNERR *Junior Rangers* program in August, following a 5-year halt to the program initially triggered by COVID-19 restrictions. The statewide program is geared toward children aged 7-12 and is designed to help them discover the rich natural and cultural heritage preserved in parks. It is implemented in a variety of formats best suited to the park's visitors. At TRNERR, it was previously provided as a weekly after school program for the Imperial Beach community and was recently restarted as such. For this reporting period, *Junior Rangers* was offered 11 times and attended by 8 children. To serve the busy schedules of today's local families and to incorporate weekend visitors from near and far, *Junior Rangers* will be changed to Saturdays in 2025.

In this reporting period, TRNERR Education staff supported 2 partner events by setting up a table to engage participants with relevant activities and information about the Reserve. The events were *Latino Conservation Week: Wander the Wetlands* and *The San Diego Natural History Museum's Big Birthday Block Party.* Staff also conducted outreach to the local Imperial Beach community by tabling at San Diego Job Corps and the Suncoast Farmer's Market; the intent was to highlight the Reserve's public programs such as nature walks and the new Junior Rangers program, as well as to attract potential volunteers. These outreach efforts resulted in 764 visits to the TRNERR table.

D. Visitor Services

The Tijuana Estuary Visitor Center had 3,146 visitors from July to December.

2. Production of Outreach Materials

The Education Specialist produced a monthly e-newsletter each month of this reporting period including highlighting volunteers, other special events, and accomplishments. Social media posts were created and shared every two weeks on average.

3. Volunteer Capacity Building

The annual Info Ambassadors volunteer training was cancelled due to EC's leave of absence. However, the Reserve Volunteer Coordinator and Education Specialist continued engaging long-term volunteers in work around the reserve and trained volunteers for Education on a case-by-case basis. (*see also Stewardship*)

The annual Tijuana River Action Month was supported by Education staff but was mainly planned by Stewardship (Volunteer Coordinator and Assistant Reserve Manager), Coastal Training Programs and the Tijuana River Action Network partners (*see Stewardship and CTP*).

4. Environmental education and interpretive capacity and leadership roles
The EC was not as active this reporting period due to a leave of absence.

Task: COASTAL TRAINING PROGRAM (CTP)
Dr. Kristen Goodrich, TRNERR CTP Coordinator,
Southwest Wetlands Interpretive Association

1. Deliver training and technical assistance to coastal decision-makers
CTP continued to lead and collaborate on several NERRS Science Collaborative (NSC) transfer grant projects. During this reporting period, for the NSC transfer project 'Transferring Knowledge to Understand the NERRS Niche in Addressing Marine Debris,' (NERRS' Niche) the Roadmap was published and shared with the national system and its partners. CTP continued to participate in the Resilient Roads and Reserves project to leverage California Reserves' experiences to inform how they, their state partner agencies, other California coastal managers, and the whole NERRS can better engage in planning processes involving dual management concerns for flood-vulnerable roads and adjacent coastal habitats. In this reporting period, CTP participated in related legislative and agency visits in Sacramento. CTP continues to serve as collaborative lead on the Habitat Heartbeats project, assessing management applications for bivalve biosensors and communicating about research findings more broadly.

As part of CTP's ongoing effort to understand and elevate elements of cultural heritage within TRNERR and its trinational community, CTP continued to serve as site custodians for TRNERR as part of National Geographic's Preserving Legacies project. CTP co-hosted a workshop on cultural heritage literacy and continues to be involved in strategic planning for a series of workshops that will serve to understand the vulnerability of cultural heritage at the Tijuana Estuary in partnership with California State Historic Resource Office and Scripps Institution of Oceanography. These workshops will continue in the next reporting period, building upon previous work involving scenario planning and further engaging with tribes.

In support of these workshops and effort, CTP provided input during development of and participated in a meaningful engagement training as part of efforts to increase capacity to partner with tribes in Reserve initiatives. Continued training will occur. In support of advancing cultural heritage literacy, CTP held a workshop at San Diego Mesa College during a campus-wide event sponsored by the San Diego Bird Alliance (formerly San Diego Audubon) on this topic. In addition, CTP participated in a knowledge exchange with Kachemak Bay NERR as part of a NERRS Science Collaborative project on cultural ecosystem services (CES). This meeting was an opportunity to understand how cultural heritage and CES frameworks may be applied at TRNERR as a natural heritage site.

In this reporting period, CTP collaborated with the U.S. Consulate General in Tijuana to address the improper disposal of used tires from California in Baja California as well as

hosted the U.S. Consulate. During their visit to the Reserve, CTP facilitated discussions on pressing environmental concerns, focusing on pollution, cross-border impacts, and opportunities for collaborative efforts.

Additional convenings supported by CTP in this reporting period provided valuable insights into the shared environmental challenges and highlighted potential avenues for joint action between both countries including:

- priority restoration projects in the region led by the Undersecretary for Environmental Policy and Natural Resources of Mexico
- efforts organized by the Secretaría de Medio Ambiente y Desarrollo Sustentable of Baja California in collaboration with POLEA and supported by the UK Government through the Mexico-UK PACT Program
- *Las Voces del Río*, an event designed to foster dialogue on social and environmental issues in the Tijuana River Watershed. The event featured an open public film screening followed by a panel discussion that brought together filmmakers, academics, activists, and community members.
- SEA Project, supported by the Binational Resilience Initiative (BRI) of the San Diego Foundation and led by Un Mar de Colores and Km 1

CTP continues its active participation in the Minute 320 meetings, which address the transboundary environmental challenges between the U.S. and Mexico, particularly in the areas of water quality, sediment, and waste management in the Tijuana River Watershed. Through its efforts to develop a binational debris response guide, CTP has identified opportunities for implementation leveraging the working group structure which will be explored in the next reporting period. Furthermore, CTP contributed to the Tijuana-San Diego Cross-Border Strategic Group, an initiative aimed at enhancing collaboration across government, the private sector, academia, and civil society. Organized by El Colegio de la Frontera Norte (COLEF) and supported by The Border Group and the Smart Border Coalition, this initiative focuses on identifying key challenges and opportunities in mobility, economic development, and sustainability toward a shared vision for the TJ-SD 2030 region.

In collaboration with the World Design Capital, CTP facilitated a visit to the Tijuana Estuary, which provided an important opportunity to address the region's environmental challenges and discuss potential avenues for improved cross-border cooperation in ecosystem management. During this period, CTP also led the coordination of Tijuana River Action Month (TRAM) in the Mexican section of the Tijuana River Watershed, fostering environmental stewardship through active involvement with local communities and organizations.

CTP continues to support coastal decision-making regarding the inclusion of green infrastructure policies at the state level in Baja California. This includes a presentation of the Green Infrastructure Handbook during a meeting of the Consejo Estatal de Protección al Ambiente del Estado de Baja California (CEPA), with the goal of incorporation in state law. Additionally, in partnership with UABC Valle de las Palmas and Fundación La Puerta, CTP initiated the "Green Infrastructure for Environmental and

Community Resilience in Tijuana and Playas de Rosarito, Mx." project. Supported by BRI, this funding will help implement green infrastructure solutions designed to enhance both environmental sustainability and community resilience in the region.

Additional, and varied, technical assistance was provided to coastal decision-makers in this reporting period, including facilitating meetings, providing survey and evaluation assistance, and offering field experiences for California State Parks, San Diego State Geography Department, Water Education for Latino Leaders (WELL), Parks California, American Rivers, the Society for American City and Regional Planning History (SACRPH), the National Park Service, Coastal Defenders, the Surfrider Foundation, and Four Walls International.

Presentations in this reporting period include (but not limited to):

- NOAA/Sea Grant Marine Debris Symposium
- Kumeyaay Diegueño Land Conservancy
- NERRS/NERRA Annual Meeting Professional Sharing Session

In October at the NERRS Annual Meeting, the CTP Coordinator was elected as President of the Board of the National Estuarine Research Reserve Association and continues to serve on various local, regional, and national advisory bodies. Also, the CTP Coordinator continues to serve as Reserve mentor for the Margaret A. Davidson Fellow.

2. Report training and technical assistance outcomes

In this reporting period, after training delivery, CTP administered post-workshop evaluations and collected and analyzed data. During the transition of the national CTP performance monitoring database, CTP staff developed an internal database system for tracking and will continue to populate a catalog until the new performance monitoring database is launched. Staff continues to populate the detailed technical assistance catalog that reflects offerings from FY16 to present. The catalog includes a separate worksheet with ongoing (i.e., multi-year) CTP technical assistance.

TASK: STEWARDSHIP PROGRAM

Lorena Warner-Lara, TRNERR Assistant Reserve Manager, California State Parks

1. Protection and Restoration of the Tijuana River Valley

Engineering/Environmental Resources Group Inc. exported approximately 20,000 cubic yards of sediment from the processing pad and excavated approximately 20,000 cubic yards of deposition material from the Goat Canyon Sediment Basin in Fall 2024.

The Goat Canyon Sediment Basins currently contain two types of debris capture infrastructure: stationary bollards and floating booms. The facility was originally constructed with the stationary bollards (2005) which were designed to capture large to medium sized debris and later upgraded with two floating trash boom systems (2011)

designed to increase the capture efficiency of floating debris such as plastics and foam. Currently, the Goat Canyon Sediment Basins contain two floating trash booms, one in the upper basin, and one in the lower basin.

The existing trash capture infrastructure is effective at capturing and consolidating large volumes of debris within the Sediment Basins; however, the system can be overwhelmed with repeated storms and high volume of debris, reducing debris capture efficiency. In recent transborder flows, the existing trash boom interception technology in Goat Canyon has flipped over due to the high velocity flash flood nature of rain events in this ephemeral creek as well as the large volume of debris. A debris interception technology specialist has been consulted in order to address these vulnerabilities and the unique challenges of using trash boom technology in Goat Canyon's event dominated system, compared to more common aquatic environments with deep water, lower velocity, and year-round flows. Through competitive grant contests and by leveraging operational funding opportunities, the Reserve as acquired support funding through two sources, to upgrade the existing trash booms and implement clean-up and educational programming. These funding sources include:

- NOAA Marine Debris Program NOAA-NOS-ORR-2022-2007199; $269,000
- NOAA NERRS Operations Award Supplemental NA23NOS4200172; $80,000

The Reserve Management Team continued work on the Nelson Sloan Quarry Restoration and Beneficial Reuse of Sediment Project with the State Coastal Conservancy (SCC), San Diego County Parks, and consultant (Dudek) on final design and permitting. This project will help with long-term stabilization of Goat Canyon sediment management activities and can provide a receiving site for future sediment excavated from the Tijuana Estuary Tidal Restoration Program (TETRP). SCC granted $250,000 in 2017, and an additional $250,000 in 2020, to the California State Parks to support environmental compliance and the development of a use agreement for restoration of the abandoned Nelson Sloan Quarry in the Tijuana River Valley (TRV). These grants supplemented approximately $800,000 additional funds from CA Department of Water Resources and San Diego County Water Authority toward this effort. On July 6, 2023, California State Parks issued a Notice of Determination (NOD) to certify the Final Environmental Impact Report (FEIR) for the Nelson Sloan Quarry Restoration and Beneficial Reuse of Sediment Project. The NOD and the FEIR were published on the State Clearinghouse on July 6, 2023. The project is anticipated to be an important part of sediment management in the TRV and this phase of planning will be completed in early 2025.

During this reporting period, efforts of the above project focused on the regulatory permitting needs for a Coastal Development and Site Development Permits through the City of San Diego; the development of a report of waste discharge to acquire a waste discharge waiver from the San Diego Regional Water Quality Control Board; an endangered species take permit for CA gnatcatcher, and a Low-Effect Habitat Conservation Plan for the Quino checkerspot butterfly through the US Fish and Wildlife Service. Additional effort was coordinated to develop updated cost estimates for project implementation with input from the CA State Parks Southern Service Center.

The Reserve Management Team, Research Coordinator, SWIA Project Manager, USFWS, and project team continued work on the Tijuana Estuary Tidal Restoration Program II Phase I. The State Coastal Conservancy granted $340,000 (2017) and $3.192 million (2023) to Southwest Wetlands Interpretive Association to support planning related to TETRP II Phase I, a tidal prism and wetland restoration project in the Tijuana Estuary. These grants supplemented approximately $900,000 additional funds from the CA Wildlife Conservation Board toward this effort. California State Parks issued a Notice of Determination on the Final EIR which was published in the State Clearinghouse on March 24, 2023. A Record of Decision for the Final EIS was issued by the U.S. Fish and Wildlife Service in May 2023 and the Notice of Availability was published in the Federal Register on March 31, 2023. Under Alternative 2, approximately 68 acres of coastal wetlands and 15 acres of native transitional and upland habitat would be restored within the Tijuana Estuary. In January 2024, the Coastal Conservancy Board approved a $30 million grant to SWIA for project implementation- this represents about 50% of needed implementation funds. During this reporting period, the team continued to advance elements of the project design and regulatory permit application packages. (*see also Research*)

2. Sensitive plant and animal species habitat protected

The Stewardship Program maintained fencing and signage along dunes and coastal bluffs with US Fish and Wildlife Service.

3. Critical monitoring needs identified to maintain habitat health and monitor impacts to sensitive species and restoration projects

The Stewardship Program facilitated continued monitoring of the CA least tern and Western snowy plover in the dune habitat of the Reserve through the end of the bird breeding season in September. Regular plover and tern monitoring will begin again in March 2025. This work is largely accomplished through a contract with a private consultant and through our partnership with the US Fish and Wildlife Service staff at Tijuana Slough National Wildlife Refuge. (*see also Refuge Manager Report, 2. Wildlife*)

The Stewardship Program supported survey work for annual monitoring of CA gnatcatcher and least Bell's vireo in the Goat Canyon drainage and Bunker Hill. Monitoring will begin again in February/March 2025.

4. On-going restoration and enhancement projects continue trajectory toward healthy vegetation communities and integrate into functional ecosystem components with continued outreach opportunities

During this period, the Retired Annuitant Environmental Scientist, the Manager and Assistant Reserve Manager continued to work with Stewardship staff to develop skills and understanding of projects to support healthy vegetation communities. One of the Stewardship Maintenance Aide positions is funded through a combination of funds from the NOAA Marine Debris and the CA State Parks Wildfire and Forest Resilience programs. The other is a split position between the Stewardship (CA State Parks) and Research (SWIA) programs funded by this NOAA operations award. The Assistant

Reserve Manager also works as an Environmental Scientist for the Stewardship Program, however, is not funded by this award but is partially counted as match.

Retired Annuitant Environmental Scientist and Stewardship Maintenance Aides continued maintenance of priority restoration sites when feasible. However, access to much of Border Field State Park was restricted due to the prolonged rainy season, a malfunctioning pump station in the river valley, sewage contamination, and flooding in the park. (*see also Oversight & Implementation*)

Due to the park access issues, the CSP San Diego Coast District Natural Resources Staff was unable to access the Orcutt's liveforever (*Dudleya attenuata ssp. attenuata*) stewardship project during this reporting period.

During this period, the Volunteer Coordinator, Stewardship Maintenance Aides, and the USFWS Refuge Manager worked with the Reserve's weekly Stewardship Volunteers to maintain trails and a healthy native habitat primarily around the visitor center and the northern part of the Reserve. Another regular stewardship volunteer program is our Wednesday Marine Debris crew who work at Border Field when the park is accessible, and during months that avoid the bird breeding season. Each week, the crew typically consists of approximately five volunteers working with the Stewardship Maintenance Aides and/or the Volunteer Coordinator. During this reporting period, the volunteer crew cleaned the beach and marsh to help maintain native habitat for protected shorebirds, including the tern and plover nesting sites, for a total of ten times, averaging about 150 pounds of trash per visit. The Urban Corps crew also joined in a few of the clean-up events and helped haul off trash after several of the sessions (*see also Invasive Plant Control*). The efforts this fall and winter were especially important as the Reserve was not able to host the annual Coastal Cleanup Day (a large volunteer event that happens as part of TRAM) in September at Border Field State Park as the park remained closed.

The Reserve Volunteer Coordinator, always eager to find new ways to engage volunteers, worked with the Research and Stewardship programs bring the *Ocean Travelers* program to the beach at Border Field. The program, led by Smithsonian Environmental Research Center, monitors the presence of organisms (barnacles, clams, etc.) on trash carried by the waves. The official dataset for the program is collected every three months, but this has turned into a monthly data collection opportunity for Reserve volunteers. (*see also Research*)

The 15th year of Tijuana River Action Month (TRAM), a series of education and stewardship events held during September and October to benefit the Tijuana River Watershed, ran from September 16 - October 14, 2024 and was mostly in-person. TRNERR (CTP, Education, and Stewardship) worked to coordinate over 30 different partners that put together events in Imperial Beach, the river valley, and Tijuana and Tecate. The first weekend of events were canceled due to an air quality scare in the Tijuana River Valley. This year TRAM consisted of 27 events; however, results are in for only ten of the events: 956 participants, 704 pounds of trash, 185 pounds of recyclables, and 87 tires.

5. Support public access within the Reserve

Stewardship staff supported the Reserve Manager in coordination with public and Reserve partners to identify high priority access issues and, where feasible, worked to maintain and enhance public access at key locations throughout the Reserve. Work was restricted to the northern part of the Reserve as public access to the southern portion at Border Field was closed during this reporting period. CA State Parks Maintenance continued caring for public use facilities at Monument Mesa and Friendship Park. After the bird breeding season ended, the Urban Corps of San Diego County cleared vegetation from the edge of the beach trail to facilitate access for research, stewardship, and emergency services. (*see also Oversight and Implementation*)

TASK: INVASIVE PLANT CONTROL

Lorena Warner-Lara, TRNERR Assistant Reserve Manager, California State Parks

1. High quality nesting habitat for CA Least Tern and Western Snowy Plover

No actions during this reporting period. Treatment of ice plant is typically completed in January/February.

2. High Quality Habitat for Riparian Birds

CSP Retired Annuitant Environmental Scientist and the Stewardship Maintenance Aides continued work to increase the footprint of primary treated areas and follow-up on previously treated areas. The main plants treated were castor bean (*Ricinus communis*), tree tobacco (*Nicotiana glauca*), giant reed (*Arundo donax*) and Tamarisk (*Tamarix ramosissima*) throughout the Goat Canyon drainage this period. Manual removal strategies, including hand pulling, saw, weed-wacker, and mower were used in addition to Roundup Custom for Aquatic and Terrestrial Use (broad spectrum, post-emergent herbicide), and Pathfinder II (formulated for treating woody species). During this reporting period, the San Diego Coast District funded a contractor to treat *Arundo donax*.

CA State Parks has allocated approximately $90,000/year through a five-year program to control the invasive non-native giant reed (*Arundo donax*) in Border Field State Park. The effort is funded by CA State Parks Wildfire and Forest Resilience Program. In September, a five-person crew from the Urban Corps of San Diego County started working at the Reserve, the crew is funded by the Ocean Corps Pilot Program grant from the Ocean Protection Council and will be at TRNERR for a year. The corpsmember crew has been focusing on removal of Arundo donax from the Goat Canyon basin. They have been working at Border Field State Park to cut and remove Arundo four times a week and dispose of the cuttings in a designated dumpster. In addition to assisting with the aforementioned weekly beach cleanup, the crew also collected seeds from coastal goldenbush (*Isocoma menziesii*) and broom baccharis (*Baccharis sarothroides*).

Some annual forbs were mowed before herbicide treatment, as well as 3 to 5 acres of black mustard (*Brassica nigra*). Annual weeds were hand pulled around native plantings. Other plants treated included Russian thistle (*Salsola tragus*), crystalline iceplant (*Mesembryanthemum crystallinum*), mustard (*Brassica nigra*), globe daisy (*Glebionis coronaria*), stinging nettle (*Urtica urens*), bristly ox-tongue (*Helminthotheca echioides*), lens-pod white top (*Lepidium draba*), Stinkwort (*Dittrichia graveolens*), tocalote (*Cantaurea melitensis*) and fennel (*Foeniculum vulgare*).

Appropriate native plants including Arroyo Willow *(Salix lasiolepis),* Sycamore *(Plantanus racemosa),* Cottonwood *(Populus fremontii),* Coast live Oak (*Quercus agrifolia*), Bishop Pine (*Pinus muricata ssp. anthonii*), Torrey pine (*Pinus torreyana*), Tecate Cypress (*Hesperocyparis forbesii*), Mexican Elderberry (*Sambucus nigra*), Toyon (*Heteromeles arbutifolia*), Laurel sumac (*Malosma laurina*), San Diego sagewort (*Artemisia palmeri*), Spiny rush (*Juncus acutus ssp. leopoldii*), shrubs, and grasses were planted to maintain plant cover.

TASK: TEACHERS ON THE ESTUARY
Jessie Looney, TRNERR Education Specialist, California State Parks

1. Educators increase their knowledge of and appreciation of estuarine and watershed environments, as well as the necessary skills, to act as stewards of estuarine and watershed resources.
No trainings were conducted during this reporting period.

TASK: IMPROVEMENTS TO GOAT CANYON SEDIMENT BASINS TRASH CAPTURE
Chris Peregrin, TRNERR Reserve Manager, California State Parks

1. Purchase and install five pontoon hydrodynamic float units
TRNERR Reserve Manager is working with CA State Parks district administrative staff to prepare for the purchase of for the interception technology (trash boom) equipment. TRNERR staff and CA State Parks engineer have been discussing the value and need of additional hydrological assessment prior to purchase of the interception technology. This assessment may ultimately result in a change to the type and quantity of hydrodynamic float units. (*see also Stewardship*)

TASK: RESEARCH COORDINATION AND IMPLEMENTATION
Dr. Crooks, TRNERR Research Coordinator,
Southwest Wetlands Interpretive Association

1. Research by TRNERR staff increases local knowledge
The Research Program consists of four full-time employees: the Research Coordinator and three Research Associates. The three part-time Research Assistants are also part-

time California State Park employees, and their work across TRNERR programs helps with program integration. TRNERR employees are supported in part by this award (NOAA and matching funds from the State of California and the National Fish and Wildlife Foundation), as well as leveraged external funding. A contract with M.Cordrey, a former Research Associate, advances the Reserve's GIS and SWMP efforts.

The Reserve Research program uses the Tijuana Estuary as a centerpiece for understanding a range of Southern California systems. The work in the Tijuana Estuary is complemented by studies the Research team does in other local estuaries, including South San Diego Bay (managed by the US Fish and Wildlife Service), Mission Bay, and Los Peñasquitos Lagoon (managed by California State Parks). TRNERR Researchers also work collaboratively on projects throughout the region (and beyond). These efforts are discussed in more detail below.

Volunteers form an important of the research program, and R.Echols-Booth leads our volunteer involvement. Volunteers participate in the Smithsonian Environmental Research Center-led Ocean Travelers program, which is examining the origins, abundances, and identities of the epibionts (surface-dwelling organisms) traveling on marine debris. Volunteers also do the field sampling for the State of California's Marine Biotoxin Monitoring Program, as well as assist with field work such as minnow trapping and vegetation monitoring. Soil samples collected as part of the vegetation monitoring program are being analyzed for salinities at an impressive rate, thanks to the influx of eager volunteers seeking out research experience.

2. The Reserve offers attractive opportunities for researchers

Research projects are listed in the Research and Monitoring Database. Some examples are included below:

- TRNERR continues to collaborate with SDSU researchers looking at pollutants and patterns of circulation in the estuary and river valley. This work is being done using deployed sensors as well as field sampling. Work during this time period includes maintaining sites next to the Boca Rio SWMP station and on the main stem of the Tijuana River (at Hollister Bridge). The Reserve also worked with SonTek (using their River Surveyor) to examine velocities at the river mouth.
- The Reserve has started coordinating with the SDSU Geography Department on remote sensing for bacterial assessment. TRNERR will be providing them with small amount of water from our SWMP ISCO and grab samples so they can assess spectral properties of this water. This is likely to be a monthly event and will pair nicely with the SWMP nutrient sampling and water quality monitoring.
- The Reserve Research program continues to work on data analyses for the region-wide estuarine monitoring program, Bight '23, led by the Southern California Coastal Water Research Project. This effort is focusing on a variety of indicators, including fish, invertebrates, eDNA, vegetation, sediments, and water quality. TRNERR has a student at the University of San Diego who is leading some of the fish analyses.
- Luke Miller (San Diego State University) is a PI on the project, Habitat

Heartbeats, which is funded by the NERRS Science Collaborative and is expanding on the use of biosentinel shellfish (mussels and oysters wired to detect heartbeats and shell gape) to pair with abiotic water quality data. The project is nearing is completion.
- Other multi-Reserve Science Collaborative projects being wrapped up include NAMASTE and MAREA, both examining different aspects of vegetation communities.
- A SDSU PhD student, Devon Kelley, continues to work on marsh crabs and burrowing activities in the Tijuana Estuary and San Diego Bay.
- Nikki Vanelli, a M.S. student at Cal State Long Beach, continues her thesis on the role of vegetation in sediment trapping.
- Researchers in the SDSU Geology Department are starting a project looking at faulting in the Tijuana River Valley, and its potential connections to geomorphology and tidal action.
- Researchers at Scripps continue to work on pollution transport in the nearshore zone, including field sampling and modelling.
- TRNERR has been monitoring a marsh/dune mitigation site at Los Peñasquitos Lagoon by conducting both qualitative visual assessments and quantitative point-intercept sampling to characterize the success of the project. This is showing a continued increase in native species cover and decreases in both unvegetated and invasive species cover.
- The Reserve continues the long-term monitoring of physical and biological processes occurring within the Los Peñasquitos Lagoon. This includes river mouth profiling, vegetation sampling, baited minnow trapping, and water quality monitoring.

The Research Coordinator, Dr. Crooks is involved in advising or supporting a number of graduate student research projects, and serves on the committees of several University of San Diego (USD) students. These students are examining:
- The relationship between marsh vegetation structure and spider communities.
- Estuarine fish diversity using community science, traditional methods (e.g. seines), and eDNA.
- Long-term spatial and temporal patterns in nekton (fish and large, mobile invertebrates such as crabs and shrimp) using minnow trap data from Los Peñasquitos Lagoon, Mission Bay, San Diego Bay, and the Tijuana Estuary.
- Mosquito communities along an estuarine gradient.
- Habitat association of the endangered Ridgway's rails in the Southern California Bight, using data dating back 40 years.

3. Restoration offers opportunities for coupled science / management

The Tijuana Estuary Tidal Restoration Program (TETRP) began over 30 years ago as a multiphased effort to advance science-based salt marsh restoration. The project team continues to advance the final design and seek additional funding for implementation. The TRNERR Research program also continues prerestoration monitoring by assessing nekton with minnow traps, crabs with pitfall traps (using protocols developed at the NERR system), and vegetation (using SWMP Biomonitoring protocols). Reserve

Researchers also are using SWMP sondes and supplemental dataloggers (pressure transducers) to assess water quality and tidal action in the project footprint and reference sites.

4. TRNERR is used as a reference site

The Tijuana Estuary has been used a reference site in the mitigation monitoring program for the impacts of the San Onofre Nuclear Generating Station (SONGS). However, because of very low abundances of fish and invertebrates driven by recent increases in sewage input and resultant anoxia, annual sampling in the estuary was suspended in the fall of 2024. The estuary's status as a long-term reference is in question, but, if conditions improve, this will be reconsidered. The new reference site is in Los Peñasquitos Lagoon, and is leveraging TRNERR's long-term monitoring program there.

The Tijuana Estuary is also being considered as a potential reference site for a new mitigation project in the Otay River (in the South San Diego Bay National Wildlife Refuge), but given poor conditions it is unlikely that this will be selected at this point. It is likely Los Peñasquitos Lagoon will again be chosen, and TRNERR is supporting this decision-making however possible.

5. Communication of key research findings and perspectives

During this reporting period, the Reserve presented to a variety of audiences in a variety of venues. Examples of this work include:

- Dr. Crooks participated as a Science Advisor for the Los Peñasquitos Lagoon Restoration planning effort (with separate funding).
- The Research Coordinator worked with the Southern California Wetlands Recovery Project to develop a regional monitoring program (with EPA WDPG funding to the State Coastal Conservancy).
- Dr. Crooks again presented on Tijuana Estuary anoxia and impacts to estuarine biota to the San Diego Regional Water Quality Control Board, as well as the CalEPA Secretary.
- Participated in the BEST 30x30 (Bay and Estuary Science Toward 30x30). This collaborative effort is providing expert scientific input to the state of California to ensure estuaries, coastal wetlands, and bays are prioritized and durably protected through California's 30x30 Initiative.
- Hosted a field trip associated with World Design Capital San Diego / Tijuana 2024.
- Participated in the update of the San Diego Bay Integrated Natural Resource Management Plan (INRMP), led by the US Navy and Port of San Diego.
- Did a media interview on natural resources of the Tijuana Estuary with the local CBS television station.
- Hosted a tour for Parks California, a non-profit supporting California State Parks.
- Hosted a tour associated with the Pacific Marine and Estuarine Fish Habitat Partneship (PMEP) meeting in San Diego.
- Provided tours to school groups from local schools.

- Featured in a story in the San Diego Union Tribune was TRNERR's monitoring program and the role of hypoxia in affecting resident biota.
- Participated in the Southern California Wetlands Recovery Project Directors Group meeting in San Diego.
- Worked with CA Coastal Commission staff on a presentation to Commissioners on sewage impacts to conditions in the Tijuana Estuary.
- At the ESRI User Conference in July 2024, Monica co-presented on the three-year Science Collaborative project titled "Tracking Estuary Change: Informing Conservation Decision Making through Historical and Elevation-Based Mapping." This project involved collaboration among reserve staff, technical advisors, local and national partners to map the historical and current extents of the 30 estuaries in the NERR System to gain a more accurate understanding of the estuaries' past, present, and future.

Papers published during this reporting period:

- Endris, C, S Shull, A Woolfolk, LS Brophy, DR Brumbaugh, JA Crooks, KL Reinl, R Fuller, DM Sanger, RA Stevens, M Almeida, and K Wasson. Lost and found tidal wetlands: Lessons learned from mapping estuaries across the USA. Biological Conservation 299: 1110799.
- Mladenov, N, T Biggs, K Ford, S Garcia, Y Yuan, A Grant, E Piazza, E Rivera, F Pinongcos, SP Keely, C Summerlin, JA Crooks, D Liden. 2024. Evaluation of real-time fluorescence sensors and benchtop fluorescence for tracking and predicting sewage contamination in the Tijuana River Estuary at the US-Mexico border. Science of the Total Environment 950: 175137.
- Koontz, EL, SM Parker, AE Stearns, BJ Roberts, CM Young, L Windham-Myers, PY Oikawa, JP Megonigal, GL Noyce, EJ Buskey, RK Derby, RP Dunn, MC Ferner, JL Krask, CM Marconi, KB Savage, J Shahan, AC Spivak, KA St Laurent, JM Argueta, S J Baird, KM Beheshti, LC Crane, KA Cressman, JA Crooks, SH Fernald, JA Garwood, JS Goldstein, TM Grothues, AHabeck, SB Lerberg, SB Lucas, P Marcum, CR Peter, SW Phipps, KB Raposa, AS Rovai, SS Schooler, RR Twilley, MC Tyrrell, KA Uyeda, SH Wulfing, JT Aman, A Giacchetti, SN Cross-Johnson, JR Holmquist. 2024. Controls on spatial variation in porewater methane concentrations across United States tidal wetlands. Science of the Total Environment 957: 177290.
- Zavacki, EM, NB Reyns, JA Crooks, and MA Boudrias. 2024. Temporal and spatial dynamics of the non-indigenous bryozoan, *Amathia verticillata*, and its associated invertebrate community, Estuarine, Coastal, and Shelf Science 311: 109021.

6. Reporting and Database Entry

Projects were entered in the database.

TASK: IMPLEMENTATION OF THE SYSTEM-WIDE MONITORING PROGRAM
Dr. Crooks, TRNERR Research Coordinator,
Southwest Wetlands Interpretive Association

1. High quality meteorological and water quality data

NOAA SWMP funding allows SWIA and TRNERR to leverage partnerships to maintain a robust monitoring program that addresses issues relevant to the Reserve specifically, and the region as a whole. Our partners and funders include California State Parks, the USFWS, the State Coastal Conservancy, the Los Peñasquitos Lagoon Foundation, and the National Fish and Wildlife Foundation.

The Reserve operates two SWMP stations in the Tijuana River Estuary. One of these sites, Boca Rio, is associated with an enhanced suite of monitoring conducted by Reserve partners (see above). This includes a web camera deployed as part of the High-Performance Wireless Research and Education Network (HPWREN). Two sites are monitored in South San Diego Bay, both SWMP. In addition to the formal SWMP sites, loggers are also deployed at additional sites. There are three telemetered sites in Los Peñasquitos Lagoon, and this data is available at torreypines.trnerr.org. Also, TRNERR had previously operated an additional site in the southern part of the Tijuana Estuary, but it needed to be pulled due to shifting channel configurations. In order to track water level changes in this area, Hobo pressure transducers are deployed to complement SWMP loggers to the north.

These water quality data are used for a variety of research and management efforts, including management of tidal inlets. Monitoring data are also being used to inform active restoration planning and post-construction monitoring, including TETRP, South San Diego Bay salt ponds restoration, and Los Peñasquitos Lagoon restoration as part of a TMDL (Total Maximum Daily Load) associated with excess sediment and freshwater.

To improve geodetic control, the Reserve began a project to convert passive local bench mark network and continuously operating base station within reserve to updated reference coordinates within the National Spatial Reference System (NSRS) which will be usable for ongoing GNSS surveys within the reserve.

Dr. Crooks continues to serve as Chair of SWMP Oversight Committee, which helps ensure that high-quality data is produced by the Reserves. As part of this, he attended the annual SWMP Data Management Committee meeting in South Carolina.

2. Understanding of long-term vegetation dynamics

TRNERR conducted semi-annual vegetation monitoring in the fall, with the aid of volunteers. These sites include transects sampled using SWMP biomonitoring protocols. The Reserve is also using vegetation monitoring data in a paper on transient increases in sea level associated with marine heat waves, which has been submitted for publication.

3. Integration of monitoring with education and outreach programming
SWMP remains a centerpiece of TOTE activities. However, the fall TOTE was cancelled, but TRNERR continues to consider SWMP in the context of educational opportunities. For example, staff is planning SWMP-based elements for the upcoming annual Science Expo.

TASK: PROFESSIONAL DEVELOPMENT, TRAINING, PRESENTING
Dr. Crooks, TRNERR Research Coordinator,
Southwest Wetlands Interpretive Association

1. NERRs Integration and Leadership Development
The Research Coordinator, CTP Coordinator, Reserve Manager, Assistant Reserve Manager, CTP Associate, and Education Specialist attended the NERRS / NERRA meeting in Maine. Participation at the national meeting allows different disciplines to share ideas and enrich their programs through increased integration.

2. Staff Development
This task outcome did not occur during this reporting period.

3. TRNERR Staff Program Support and Enhancement
Travel associated with field work and meetings occurred during this reporting period.

TASK: INVASIVE SPECIES - APPLICATION OF RESEARCH TO MANAGEMENT
Dr. Crooks, TRNERR Research Coordinator,
Southwest Wetlands Interpretive Association

1. Improved understanding of local invaders
A central element of the long-term biotic monitoring program is to detect and track invasive species. SWMP vegetation monitoring is to examine the distribution and abundance of invasive plants, which is being used in the development of a planting plan for the TETRP site. The Reserve also track invasives with our nekton monitoring efforts. The Research Coordinator is adjunct faculty in the Department of Environmental and Ocean Sciences at the University of San Diego, and advises students who are working on invasive species. A paper on an invasive fouling species in Mission Bay was published during this reporting period (Zavacki et al. 2024).

2. Improved regional, national, and international information sharing
Dr. Crooks is Co-President of the Society for the Study of Marine Bioinvasions, and the society is currently planning for the next meeting, to be held in Portugal in 2025. Dr. Crooks also routinely shares information about invasive species issues in outreach efforts (*see Task 1*).

TASK: MARGARET A. DAVIDSON FELLOWSHIP SUPPORT
Dr. Crooks, TRNERR Research Coordinator,
Southwest Wetlands Interpretive Association

1. Successful implementation of Davidson Fellowship

During this reporting period, the former TRNERR Davidson Fellow, N.Grayson, completed her fellowship but still continues to work on the natural product chemistry of local species. The Reserve's new Davidson Fellow, S.Sylman, is conducting a social science project (including assessment of cultural ecosystem services). She is working closely with the Reserve CTP Coordinator and attended the national meeting in Maine.