



2025

Wetland Annual Report

SAN ONOFRE NUCLEAR GENERATING STATION

MITIGATION MONITORING PROGRAM (SONGS MMP)

**Kathryn M. Beheshti, Rachel S. Smith, H. Mark Page
and Daniel C. Reed**



Contributors:

General Data Collection and Analyses

Lindsey Chamberlain¹

Lindsay Cullen¹

Andres Deza¹

Graham Gusterson¹

Justin Hoesterey¹

David Huang¹

Russell Johnston¹

Kyle McCaffrey¹

Denise Weisman¹

Science Advisory Panel

Richard Ambrose²

Peter Raimondi³

Russell Schmitt¹

¹Marine Science Institute, University of California
Santa Barbara

²University of California Los Angeles

³University of California Santa Cruz

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Photography by Ilene Klein and SONGS MMP





Executive Summary

This report summarizes the 2025 performance monitoring results for the San Dieguito Wetlands Restoration Project (SDW), an out-of-kind mitigation project required by the California Coastal Commission (CCC) to compensate for impacts to nearshore fish populations caused by the operations of the San Onofre Nuclear Generating Station Units 2 and 3 by Southern California Edison (SCE). Monitoring is conducted independently of SCE by the SONGS Mitigation Monitoring Program (SONGS MMP), which is affiliated with the Marine Science Institute at the University of California, Santa Barbara.

In 2025, the 14th year of monitoring SDW, SCE did not receive mitigation credit. To date, SCE has earned 0 of the 32 years of mitigation credit required by the permit. The underperformance of the mitigation project is largely driven by 1) unplanned habitat conversions (mudflat to vegetated marsh) that prevent the project from meeting established habitat acreage targets and (2) lack of similarity in some biological attributes relative to co-monitored natural reference wetlands.

This report describes the ongoing performance monitoring results and examines potential mechanisms of underperformance through investigations designed to inform adaptive management decisions that support the goal of timely compensatory mitigation. All data described in this report are publicly available at <https://marinemitigation.msi.ucsb.edu/data>.

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INTRODUCTION

1.1 SONGS IMPACTS

In 1974, the California Coastal Zone Conservation Commission, now known as the California Coastal Commission (**CCC**¹), issued a permit (CDP 6-81-330-A; formerly 183-73) to Southern California Edison (**SCE**) and its partners for the construction of Units 2 and 3 of the San Onofre Nuclear Generating Station, hereafter, SONGS (**Fig. 1.1**). One of the permit conditions required analysis and mitigation for adverse impacts to marine resources.

The SONGS cooling water system caused three primary impacts to marine resources (Murdoch et al. 1989). The first two impacts were related to the intake of seawater. First, the amount of small immature fishes, larvae, and eggs entrained and killed in the nuclear facility (**Fig. 1a**) was projected to cause a substantial reduction in nearshore adult fish populations throughout the Southern California Bight. Second, larger fish impinged and killed by screens designed to keep organisms from entering the plant (**Fig. 1.1b**) caused a measured reduction in local adult fish populations. Third, the discharge of power-plant heated cooling water (19°F above ambient) that passed through a complex diffuser system resuspended sediment, creating a turbidity plume that substantially reduced the size of the San Onofre Kelp Forest and associated community (**Fig. 1c**).

1.2 MITIGATION REQUIREMENTS

The permit was amended (CDP 6-81-330A) in 1991 to require specific mitigation conditions be met by SCE and its partners to compensate for the assessed impacts (Murdoch et al. 1989). Three of these conditions are relevant to the SONGS Mitigation Monitoring Program (**SONGS MMP**): (1) Condition A² required at least 150 acres of southern California wetlands be created or substantially restored as **out-of-kind** mitigation for the fish losses due to entrainment and impingement (**Fig. 1.1a-b**; see [Smith et al. 2025](#)), (2) Condition C required a 300-acre kelp reef be constructed as **in-kind** mitigation for the loss of the San Onofre Kelp Forest and associated community due to turbidity plumes (**Fig. 1.1c**), and (3) Condition D required funding for independent monitoring and technical oversight of the mitigation projects by CCC contract scientists (**Fig. 1.2**).

This report describes the monitoring approach and associated results for the wetland restoration project (Condition A). The restoration project is assigned mitigation credit annually. To meet permit conditions, the project must earn 32 years of mitigation credit,

¹ Bolded text indicates terms or acronyms defined in the Glossary (see Pg. 37)

² Condition A was later amended (1997) to allow the SCE to meet its 150-acre wetland acreage requirement by receiving up to 35 acres enhancement credit for permanently maintaining an open inlet at San Dieguito Lagoon.

which is equivalent to the operating life of SONGS Units 2 and 3 (1982–2013), as determined by the CCC.

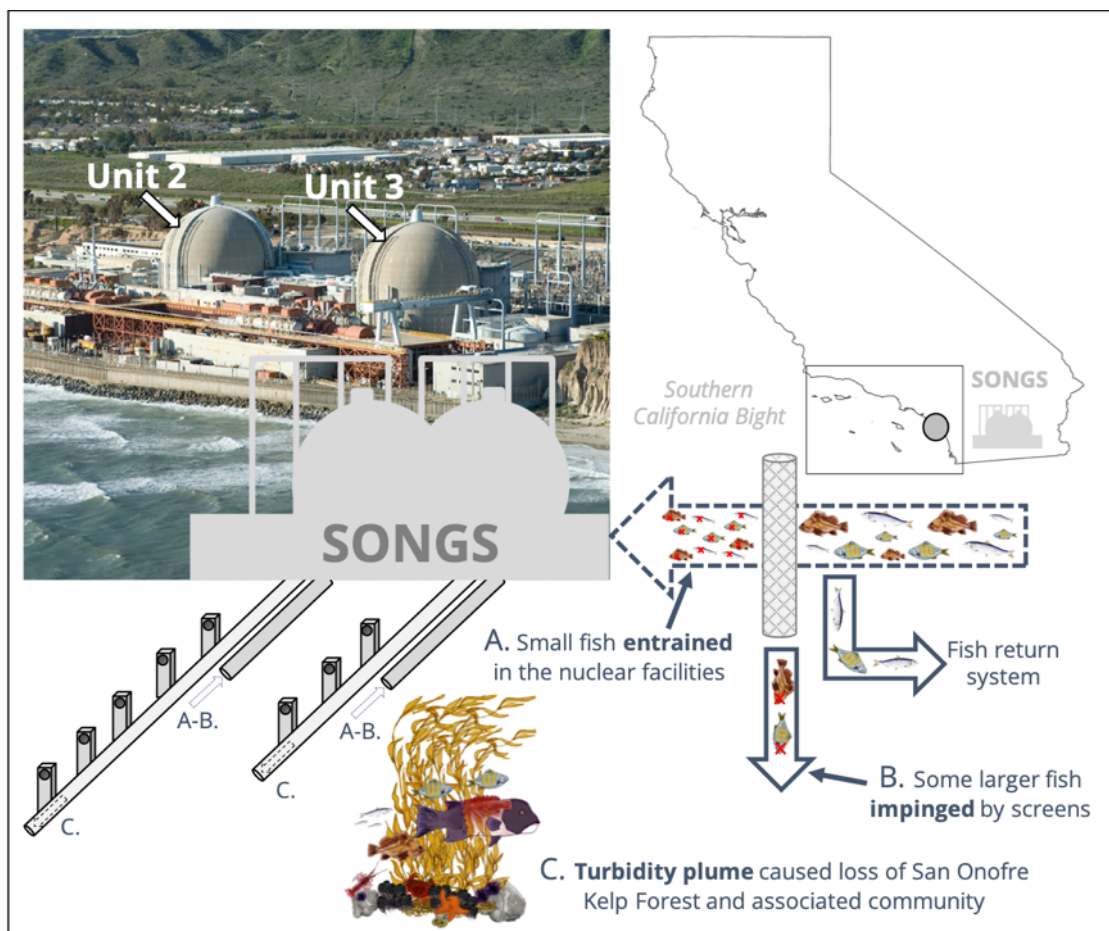


Figure 1.1. Schematic of impacts to marine resources from SONGS Units 2 & 3 located in north San Diego County, California. Units 2 and 3 had separate intake lines located in ~30 ft of water offshore of the power plant. Discharge lines (6,000 and 8,600 ft long) extended beyond the intake lines in up to 50 ft of water, with numerous diffuser ports designed to distribute the power-plant heated effluent.

SONGS MMP PRINCIPAL INVESTIGATORS (UC SANTA BARBARA)				SCIENCE ADVISORY PANEL	
					DR. RICHARD AMBROSE UCLA
DR. KATHRYN BEHESHTI KATBEHESHTI@UCSB.EDU	DR. MARK PAGE PAGE@UCSB.EDU	DR. DANIEL REED DANREED@UCSB.EDU	DR. RACHEL SMITH RSSMITH@UCSB.EDU		DR. PETER RAIMONDI UC SANTA CRUZ
					DR. RUSSELL SCHMITT UC SANTA BARBARA

Figure 1.2. Condition D of the permit requires technical oversight and independent monitoring by staff retained by the California Coastal Commission, including a Science Advisory Panel; collectively referred to as the SONGS Mitigation Monitoring Program (SONGS MMP). The SONGS MMP is currently led by four Principal Investigators (Drs. Beheshti, Page, Reed, and Smith).

1.3 PROJECT DESCRIPTION

San Dieguito Lagoon in Del Mar, California was chosen as the site for wetland restoration to fulfill the requirements of Condition A. Most construction of the San Dieguito Wetlands Restoration Project (SDW; 2006–2011; **Fig. 1.3**) was completed by 2008. Construction included excavating and grading of old agricultural fields and ruderal upland to intertidal

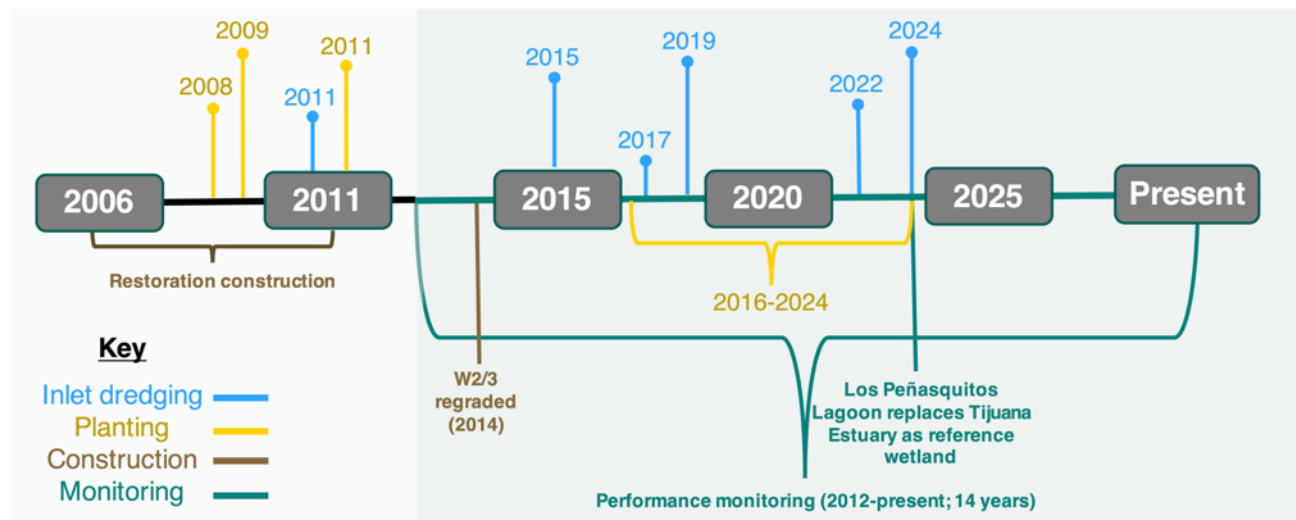


Figure 1.3. Project timeline (2006–Present) indicates years of construction in brown, inlet dredging in blue, and planting in gold. Performance monitoring began in 2012 and is ongoing. This document reports on the 14th year of performance monitoring of the SDW.

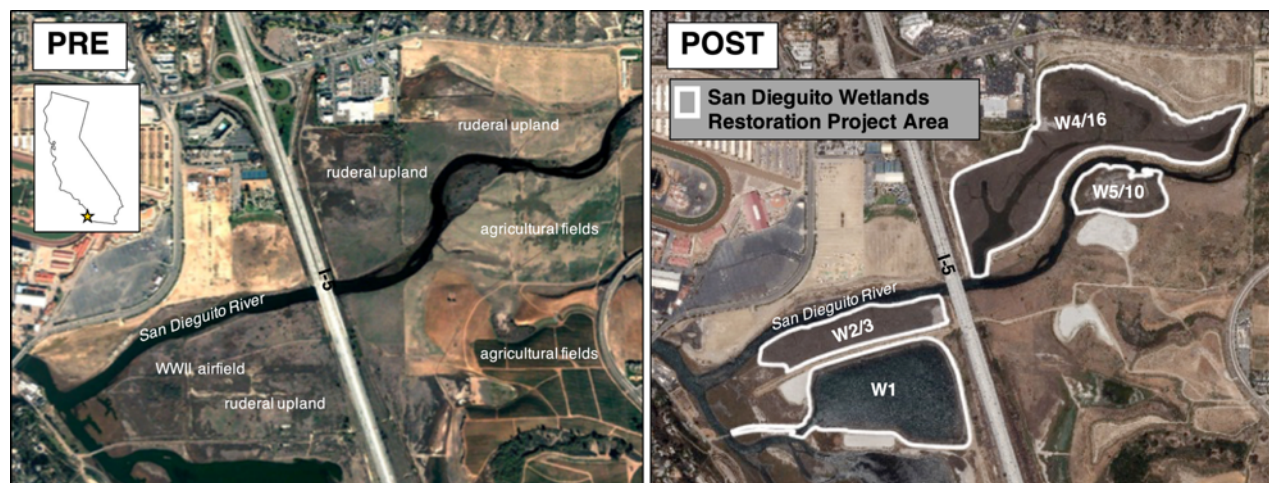


Figure 1.4. San Dieguito Lagoon pre- (2003) and post-restoration construction (2016). The San Dieguito Wetlands Restoration Project Area (SDW) is outlined in white and each module (W1; W2/3; W4/16; W5/10) is labeled in the right panel.

elevations designed to support mudflat (24.9 planned acres) and salt marsh (92.6 planned acres) habitats (**Fig 1.4**). A World War II airfield and ruderal upland area were excavated and graded to create a subtidal basin (majority of the 32 planned acres; **Fig 1.4**). In total, over 2 million cubic yards of material were excavated. Restoration also included native plantings of salt marsh vegetation.

Construction also included built tidal creeks not originally in the Final Restoration Plan and berms designed to limit erosion or sedimentation from storm runoff along the effective flow area of the San Dieguito River. Berms and transitional upland habitat were not included in the required 150-acres. Modules west of the I-5 (W2/3, W1) were opened to tidal exchange in January 2008 and areas east of the I-5 (W4/16, W5/10) were opened to tidal exchange in December 2008 (**Fig. 1.4**). In 2014, W2/3 was regraded to lower the marsh plain elevation to improve drainage and facilitate vegetation development. Initial inlet dredging occurred in September 2011 and performance monitoring began in 2012 (**Fig. 1.3**). To adaptively manage slow vegetation development at SDW, SCE led a planting program from 2018–2025 that installed and irrigated 336,540 nursery-grown plantings (**Fig. 1.3**).

METHODS

The methods for all of the standards reported in sections 3.1 and 3.2 are described in detail in the Monitoring Plan for the SONGS' Wetland Mitigation Project ([Page et al. 2026](#)), hereafter referred to as the Wetland Monitoring Plan. Only when pertinent to understanding or interpreting the results do we provide a brief overview of standard methods in the text below.

2.1 RESPONSIBILITIES OF CONDITION D

From Condition D of the permit, mitigation monitoring aims to (1) evaluate performance of the restored wetland based on specific standards prescribed by Condition A, (2) determine mechanisms of underperformance associated with the restored wetland, and (3) develop recommendations for adaptive management or remediation to address restored wetland underperformance, as needed.

2.2 ABSOLUTE PERFORMANCE STANDARDS

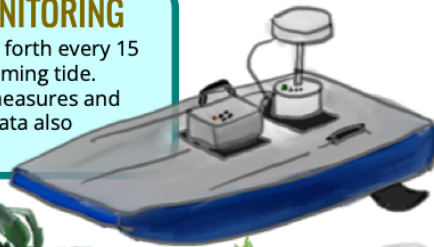
Absolute performance standards are evaluated only at San Dieguito Wetlands. The five absolute standards evaluated for compliance are described in **Box 1**. All absolute standards are evaluated based on the current year, and all absolute standards must be met in a given year for SDW to receive mitigation credit.

ABSOLUTE STANDARD SAMPLING DESIGN

TIDAL PRISM

RIVER SURVEYOR + WATER LEVEL MONITORING

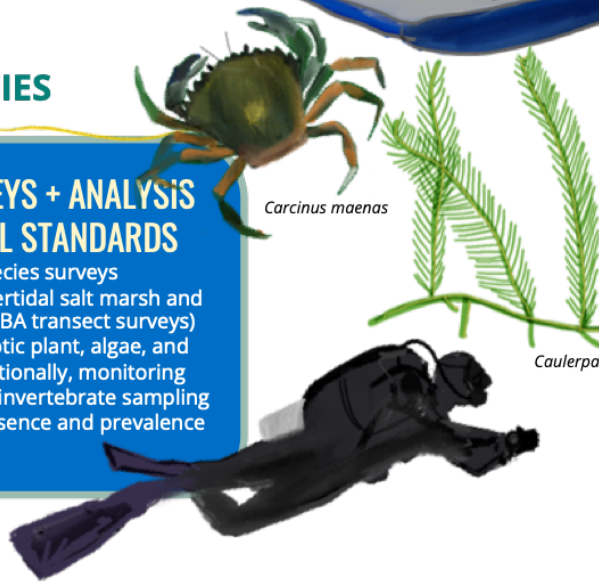
A SonTek River Surveyor (ADCP) is towed back and forth every 15 minutes across San Dieguito River channel on incoming tide. Discharge (acre-feet) is derived from instrument measures and merged with water surface elevation monitoring data also collected every 15 minutes.



EXOTIC SPECIES

VISUAL SURVEYS + ANALYSIS OF BIOLOGICAL STANDARDS

Targeted exotic species surveys throughout the intertidal salt marsh and subtidal basin (SCUBA transect surveys) focus on visible exotic plant, algae, and invertebrates. Additionally, monitoring data from fish and invertebrate sampling (Box 2) identify presence and prevalence of exotic species.



REPRODUCTIVE SUCCESS

COLLECTIONS + MICROSCOPY

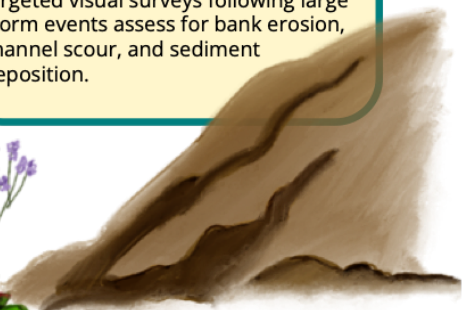
Seven flowering salt marsh plant species are collected from the field and seeds are examined under a microscope in the lab to evaluate seed maturity.



TOPOGRAPHY

VISUAL SURVEYS

Opportunistic visual surveys during other scheduled field work and targeted visual surveys following large storm events assess for bank erosion, channel scour, and sediment deposition.



HABITAT AREAS

AERIAL IMAGERY + ELEVATION CONTOURS

Overflights (2012-2025 fixed wing aircraft, 2026+ UAV) collect aerial imagery (multispectral, RGB). Elevation contour surveys using Real Time Kinematic Global Positioning System (RTK GPS) delineate planned elevation boundaries of salt marsh, mudflat, and subtidal habitat. Post-processing of imagery to assign habitat types in 10 x 10 m grids integrates elevational boundaries and classification of vegetation cover using Geographic Information System (GIS) software.



Box 1. Sampling design for absolute standards assessed only at San Dieguito Wetlands. Details can be found in the Wetland Monitoring Plan ([Page et al. 2026](#)). The different colored boxes describe the methods used to evaluate the five absolute standard.

2.3 RELATIVE PERFORMANCE STANDARDS

Relative performance standards are evaluated with data collected using aerial imagery and on-the-ground field sampling at San Dieguito Wetlands (SDW) and three nearby natural wetlands: Los Peñasquitos Lagoon, Mugu Lagoon, and Carpinteria Salt Marsh. The 15 relative standards used to evaluate the performance of SDW are described in **Box 2**. To receive mitigation credit, the proportion of relative standards met at SDW must equal or exceed the proportion of standards met by the lowest performing reference wetland.

2.3.1 Reference sites

Spatiotemporal variability in natural wetland dynamics requires concurrent monitoring of the restored wetland and multiple reference wetlands for the evaluation of the relative performance standards. The permit requires reference wetlands to be relatively undisturbed, tidal, and located within the **Southern California Bight (SCB)**. Forty-six wetlands within the SCB were evaluated and Tijuana River Estuary (TJE), Mugu Lagoon, and Carpinteria Salt Marsh were initially chosen as best meeting the permit criteria for reference wetlands (**Fig. 2.3.1**). In 2024, Los Peñasquitos Lagoon replaced TJE, which was no longer considered an appropriate reference wetland due to impacts from anthropogenic sewage flows (**Fig. 2.3.1**).

2.4 SAMPLING DESIGN

Details of the sampling design are described in the Wetland Monitoring Plan ([Page et al. 2026](#)). Considered a living document, the monitoring plan has been periodically updated since its original drafting in early 2005, when it was vetted by state and federal agencies and then approved by the CCC.





Figure 2.3.1. Locations of the SONGS impact site (gold triangle), San Dieguito Wetlands (brown star), and the three initially chosen reference wetlands (Carpinteria Salt Marsh, Mugu Lagoon, Los Peñasquitos Lagoon; white symbols). Los Peñasquitos Lagoon replaced Tijuana Estuary (white square) as a reference wetland in 2024 (see [Page et al. 2026](#)). Aerial imagery of each of the wetlands is shown below the map.

RELATIVE STANDARD SAMPLING DESIGN



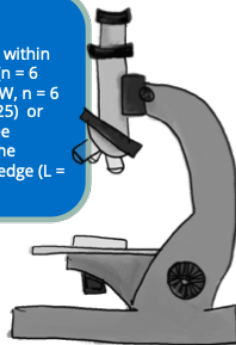
INVERT DENSITY & RICHNESS*

CORES + QUADRATS

Sampled from five locations within each monitored tidal creek (n = 6 from 2012-2023, n = 4 at SDW, n = 6 at references from 2024-2025) or main channel (n = 6) at three elevations extending from the thalweg to the marsh-bank edge (L = Low, M = Mid, H = High)



*invertebrates caught in enclosure traps or seines are noted and used for assessing invertebrate richness



WATER QUALITY

WATER QUALITY INSTRUMENTS

Water quality stations equipped with HOB0 U26-001 loggers and/or YSI EXO sondes record dissolved oxygen (DO) every 15-minutes.



VEGETATION COVER & ALGAL COVER

AERIAL IMAGERY

Overflights (2012-2025 fixed wing aircraft, 2026+ UAV) collect aerial imagery (multispectral, RGB). Post-processing of imagery includes classification using Geographic Information System (GIS) software.



SPARTINA CANOPY ARCHITECTURE

QUADRATS

Number and height of *Spartina foliosa* stems are assessed in thirty 0.1 m² circular quadrats spread along three 20 m transects within stands of *S. foliosa*.

BIRD DENSITY & RICHNESS

FOOD CHAIN SUPPORT (FCS) TO BIRDS

BIRD OBSERVATIONS

All species are identified and counted and feeding shorebirds (FCS) are recorded in 5-minute surveys conducted at each of the 20 (100 x 150 m) plots.



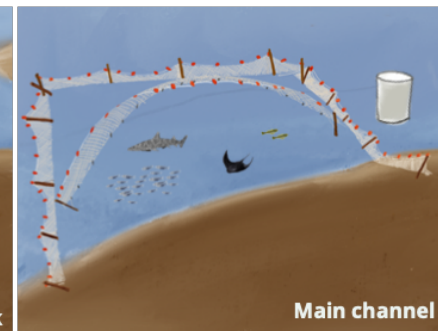
FISH DENSITY & RICHNESS

SEINE + ENCLOSURES

Beach seines are used sample fishes, and enclosure traps are used to measure those species not well sampled by seines (e.g., gobies). Enclosure traps are deployed in five locations within each tidal creek and main channel and sampled 1x. Beach seines, with blocking nets, are used to survey each tidal creek and main channel 3x; each day a new section of the creek or channel is seined.



Tidal creek



Main channel

Box 2. Sampling design for relative performance standards. Further details can be found in the Wetland Monitoring Plan ([Page et al. 2026](#)). The colored boxes describe the methods used to assess the 15 relative standards.



RESULTS

3.1 ABSOLUTE PERFORMANCE STANDARDS

3.1.1 Tidal prism

The designed tidal prism shall be maintained, and tidal flushing shall not be interrupted.

We define tidal prism as the volume of water exchanged between an estuary and the open ocean during a complete tidal cycle. The tidal prism varies by tidal cycle, which varies daily, biweekly, seasonally, and over tidal epoch (19 years). Assessment of tidal prism requires a standardized approach that accounts for this variability over time.

In 2025, we adopted a new analytical approach to assess the standard that accounts for natural variability in tidal cycle over time and is sensitive enough to detect changes to tidal prism caused by management activities occurring nearby, but outside of the SONGS San Dieguito Wetlands (SDW) Restoration project area (e.g., other tidal restorations within San Dieguito Lagoon, local beach nourishment projects). The details of this approach are described in [Page et al. 2026](#). Briefly, the new analysis uses the same survey source data as assessments from 2012–2024. Data are collected using a SonTek River Surveyor equipped with a portable Acoustic Doppler Current Profiler (ADCP) system that is towed back and



Figure 3.1.1.1 San Dieguito Lagoon has undergone multiple large-scale restorations in recent years. The SONGS project area, outlined in white, completed construction in 2011, with additional regrading in 2014. The **CalTrans**- and **SANDAG**-led W6 and W19 restoration projects (outlined in teal) completed construction and were open to tidal flow by December 2023 and June 2024, respectively. JDB (white circle), the location for the tidal prism surveys, is located west of both projects (SONGS and CalTrans/SANDAG).

forth across Jimmy Durante Bridge (JDB), located west of the SONGS project area (**Fig. 3.1.1.1**). JDB extends across the San Dieguito River, which fills and drains the San Dieguito Lagoon and its restored and natural tidal habitats.

Using similar surveys at the inlets of the **W6** and **W19** (**Fig. 3.1.1.1**) restoration projects, we estimated the tidal prism associated with each area. We subtracted these estimates from the overall tidal prism measured at JDB to ensure that the assessment of this performance standard is restricted to the SDW project area and is comparable to assessments made prior to the restoration of W6 and W19 (2012–2024).

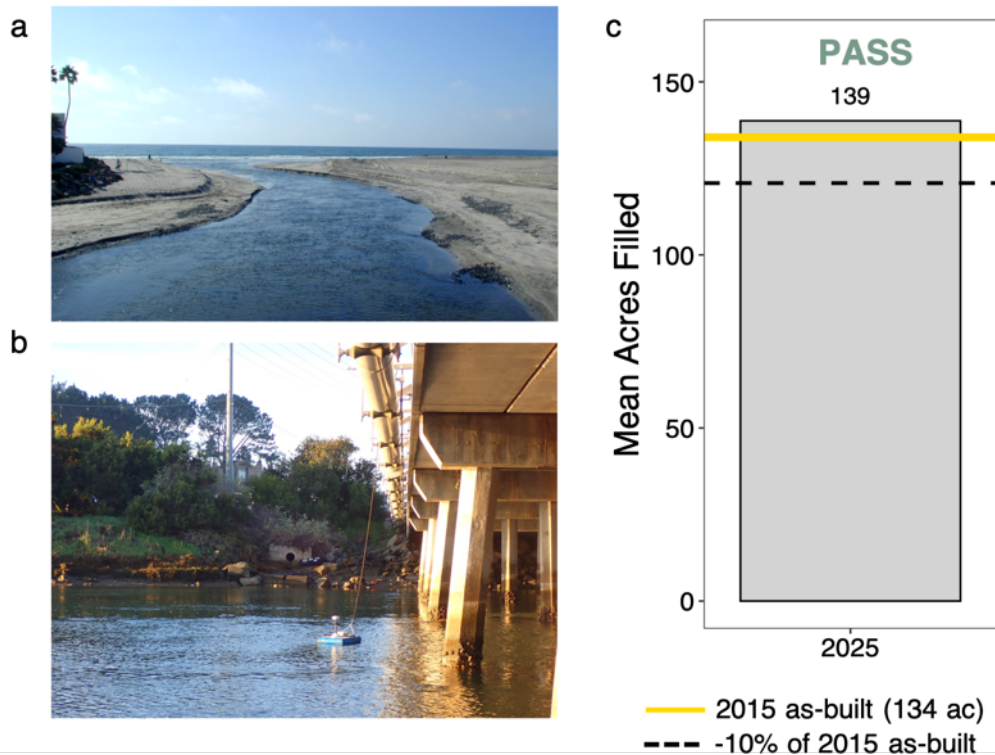


Figure 3.1.1.2 The tidal prism is strongly influenced by the condition of the inlet (a) and surveys at Jimmy Durante Bridge (b) are designed to capture substantial interruptions to tidal flushing. The annual value for the mean acres of wetland filled exceeded the minimum threshold of -10% of the 2015 as-built value (dashed black line), indicating that the tidal prism was maintained and tidal flushing was not interrupted; the yellow solid line indicates the 2015 as-built value. Therefore, the standard passed in 2025.

The approach measures tidal prism as the acres of wetland filled as a function of tidal elevation. SDW passes this standard if the value for a given year exceeds the minimum threshold of -10% of the 2015 as-built condition of 134 acres. The 2025 value of 139 acres exceeded the minimum as-built threshold (-10% of 134 acres, or 120 acres) and SDW passed this standard (**Fig. 3.1.1.2**).

3.1.2 Habitat area

The areas of different habitats shall not vary by more than 10% from the areas indicated in the final restoration plan.

The habitat areas standard is designed to preserve the mix of habitats in the Final Restoration Plan (SCE 2005) and guard against large-scale conversion of one habitat type to another (e.g., salt marsh to mudflat, or vice versa). The three planned habitat types (subtidal, mudflat, and salt marsh) are defined by elevation and other necessary characteristics outlined in Table 3.1.2. SDW was designed to support 32 acres of subtidal

habitat, 24.9 acres of mudflat, and 92.6 acres of salt marsh, totaling 149.5 acres (**Table 3.1.2**). After monitoring began, a third unplanned habitat type was identified. This “other” habitat is too high in elevation to be classified as mudflat or too sparsely vegetated to be classified as salt marsh (**Table 3.1.2**). Table 3.1.2 lists the acreage totals for each habitat type in 2025. Subtidal and salt marsh habitats fell within 10% of the planned acres but mudflat, at 13.4 acres, was 9.0 acres short of the 22.4 minimum acres required. Therefore, SDW did not pass this standard in 2025.

Habitat	Elevation (ft, NGVD)	Necessary characteristics	Planned acres	± 10% planned acres	2025 acres
Subtidal	< -0.9	Continuously submerged	32	28.8 – 35.2	31.1
Mudflat	-0.9 to 3.5	Intertidal, < 5% vegetation cover	24.9	22.4 – 27.4	13.4
Salt marsh	-0.9 to 4.5	Intertidal, ≥ 30% vegetation cover	92.6	83.3 – 101.9	93.1
Other*	-0.9 to 3.5	Intertidal, 5 - 30% vegetation cover	0	NA	11.6
	3.5 to 4.5	Intertidal, < 30% vegetation cover			
Total			149.5		

Table 3.1.2. Areas of planned subtidal, mudflat, and salt marsh habitats as defined in the Final Restoration Plan. Areas identified as “other” (*) are considered unplanned habitat and are not included in the total acres of planned habitat. The elevations of each habitat, their characteristics, the acceptable range of acres for each and the acres in 2025 are also listed.

The habitat areas standard has yet to be met at SDW. Initially, this standard was not met due to slow vegetation development (**Fig. 3.1.3**). Salt marsh habitat has gradually increased over time, with an appreciable increase in salt marsh habitat from 2018–2024 that led the project to surpass the minimum acres of required salt marsh habitat (83.3 acres) for the first time in 2023 (**Fig. 3.1.3**).

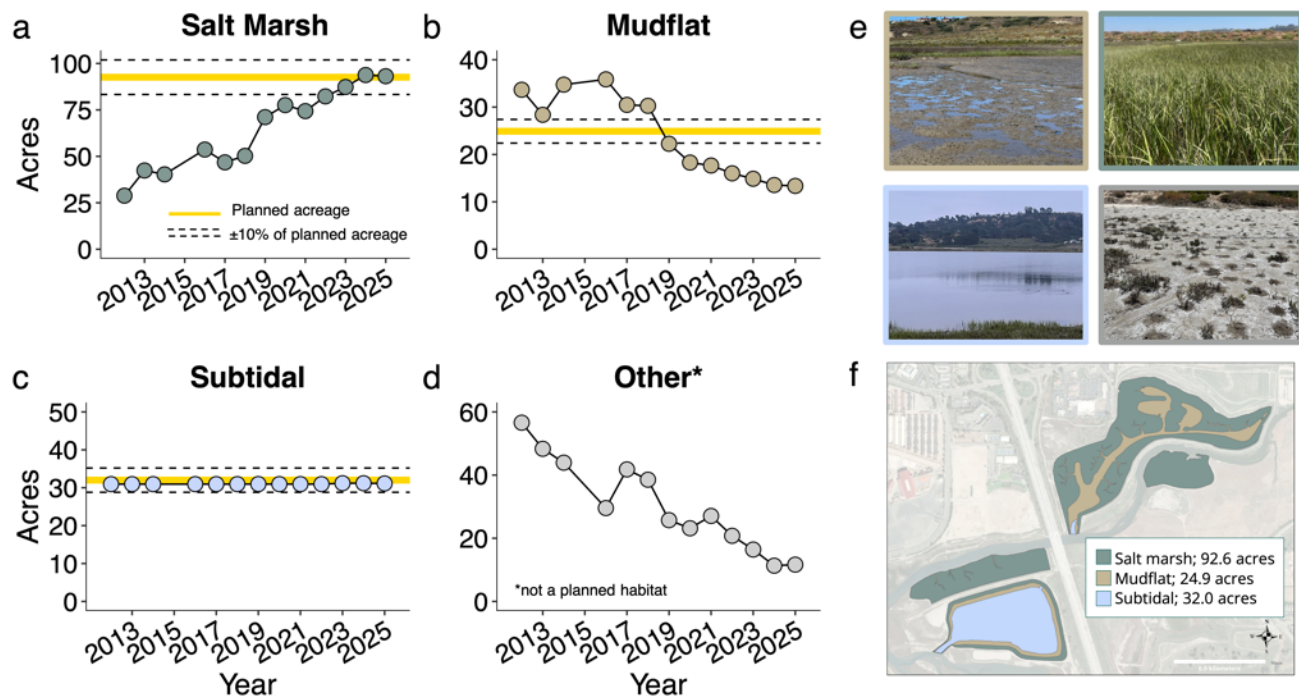


Figure 3.1.2 Time series of planned salt marsh (a), mudflat (b), subtidal (c) and unplanned other (d) habitat acreages from 2012–2025. Yellow lines indicate the planned acres for each habitat and dashed black lines indicate $\pm 10\%$ of planned acres. Over time, salt marsh habitat has increased, mudflat and other habitats have decreased, and subtidal habitat has remained stable. Examples of each habitat type are shown in (e) and the design of habitats built at SDW in 2011 is shown in (f). 2015 is excluded from the time series because different contours were used to delineate the habitat types that year due to short-term changes in water level.

As salt marsh habitat at SDW has increased over time, mudflat habitat has declined below the minimum threshold, causing SDW to fail the habitat areas standard (**Fig. 3.1.2**). Mudflat loss is due in part to encroachment of salt marsh into areas planned as mudflat. Acreage of “other”, an unplanned habitat, has also decreased over time (**Fig. 3.1.2**), gradually converting to salt marsh habitat. The remaining “other” habitat is at high elevations (> 3.5 ft NGVD) that can only convert to salt marsh because it is too high to be defined as mudflat. Subtidal habitat has remained stable over time (**Fig. 3.1.2**).

3.1.3 Topography

The wetland shall not undergo major topographic degradation (such as excessive erosion or sedimentation).

Data from field observations (**Box 1**) indicated that the wetland did not undergo major topographic degradation (i.e., excessive erosion). Thus, SDW passed this standard in 2025.

3.1.4 Reproductive success

Certain plant species, as specified in the work program, shall have demonstrated reproduction (i.e. seed set) at least once in three years.

All seven plant species specified in the work program (Parish's glasswort, Saltgrass, Alkali heath, Marsh jaumea, Spiny rush, California sea lavender, and Pickleweed; see [Page et al. 2026](#) for details) were collected from the field and processed in the lab (**Box 1**). All species produced seed in every year from 2020 to 2025. Therefore, SDW passed this standard in 2025.

3.1.5 Exotic species

The important functions of the wetland shall not be impaired by exotic species.

Targeted and opportunistic surveys (**Box 1**) at SDW showed that exotic species occur either in small areas (e.g., *Limonium ramosissimum* observed along the southern portion of the salt marsh bordering W1 near the Least Tern Nesting Site, see **Fig 1.4**) or at low densities (e.g., *Bunodeopsis* sp. observed on the *Zostera marina* within the W1 basin). SONGS MMP staff remove exotic plant species (e.g., *Tamarisk*, *L. ramosissimum*) on the marsh plain manually by hand to minimize flowering opportunities for exotics which can help maintain low densities. Densities of exotic species remain very low at SDW and there is no evidence that exotic species impaired wetland functions in 2025.

3.1.6 Absolute standard requirement

All absolute standards must be met for SCE to earn mitigation credit in a given year. In 2025, SDW did not meet the absolute standard requirement because the wetland did not pass the habitat areas standard (see **section 3.3**).

3.2 RELATIVE PERFORMANCE STANDARDS

The SONGS permit requires certain biological attributes of SDW be similar to those of reference wetlands. We use a 4-year running average (i.e., the current year and the preceding three years) for each standard to assess similarity among the wetlands, with a few exceptions. An annual average was used to assess the relative standards in the first three years following the completion of wetland construction (2012–2014). The absence of data from Los Peñasquitos Lagoon (LPL) before 2024—the year it replaced Tijuana Estuary as a reference wetland—precluded the calculation of a 4-year running average for all relative standards except water quality in 2024 and 2025. In 2025, we use 2-year running averages (2024, 2025) to evaluate most relative standards, except for those related to birds (i.e., bird density, bird richness, food chain support to birds) and water quality. Bird standards are based on the annual average because 2025 is the first year with complete

data at LPL. Whereas, we apply a 4-year running average for the water quality standard using available time series data from LPL maintained by the Tijuana River Estuary National Estuarine Research Reserve and the water quality time series maintained by the SONGS MMP at the other three wetlands (CSM, MUL, and SDW). As project monitoring continues, the number of years used to calculate running averages for these other standards will increase until 2028, when data will be available to calculate 4-year running averages for all relative standards at all four wetlands. The figures in this section (**Figures 3.2.1–3.2.9**) show the years used to assess similarity for each relative standard.

Each year, we use the running averages of each standard to assess their similarity among the four wetlands. Similarity is evaluated individually for each standard for each wetland using a one sample, one-tailed t-test (**Box 3**), and the proportion of standards met by each wetland is calculated. If the proportion of standards met by SDW equals or exceeds the proportion of standards met by the lowest performing reference wetland, then the biological attributes of SDW (as defined by the permit) are considered to be similar to natural wetlands in the region and SDW meets the relative standards requirement for that year.



a. STATISTICAL TESTS TO ASSESS PASS/FAIL OUTCOMES

- For each relative standard measured at a wetland, a one sample, one tailed t-test compares the 4-year running average* from that wetland to that of the next lowest performing wetland
 - The floating alpha (α) associated with the t-test is compared to the effect size

Effect size	Condition	Outcome
< 0.5	$\alpha \leq \text{effect size}$	Wetland fails
	$\alpha > \text{effect size}$	Wetland passes
≥ 0.5	$\alpha \leq 0.5$	Wetland fails
	$\alpha > 0.5$	Inconclusive

*For food chain support to birds, 4-year running median values calculated from a resampled distribution are used for comparison

b. FIGURE VISUALIZATION

- We plot the **Performance Threshold Confidence Limit (PTCL)**, which represents the boundary between **passing** and **failing**, relative to the 4-year running averages for each wetland

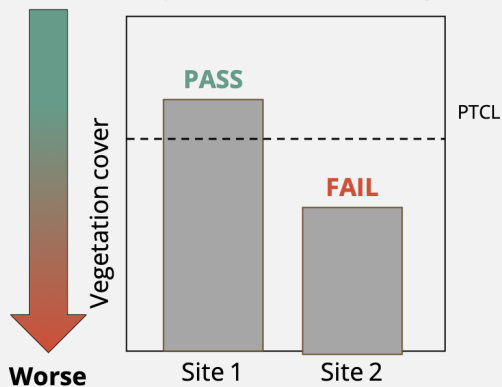
Larger values indicate **better** performance

- PTCL = $(1 - \alpha) * \text{mean value of second lowest performing wetland}$
- Values **above** the PTCL indicate wetland **passed**, value **below** indicate wetland **failed**

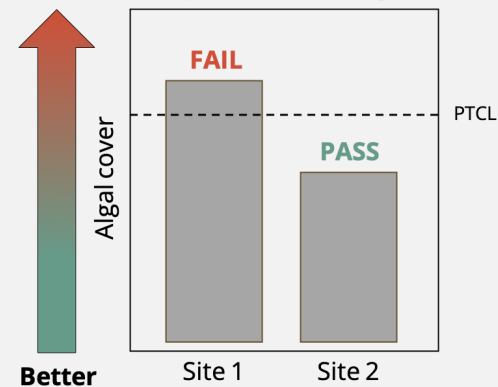
Larger values indicate **worse** performance

- PTCL = $(1 + \alpha) * \text{mean value of second lowest performing wetland} * (-1)$
- Values **above** the PTCL indicate wetland **failed**, value **below** indicate wetland **passed**

Better Vegetation cover - example



Worse Algal cover - example



Box 3. (a) The statistical method used to evaluate pass/fail outcomes for each relative standard with statistical tests and (b) how figures are visualized and interpreted.

3.2.1 Water quality

Water quality variables [to be specified] shall be similar to reference wetlands.

Dissolved oxygen (DO) was the metric chosen to assess the water quality standard, as DO approximates wetland health and inlet condition. Specifically, sustained hypoxia (DO < 3 mg/L) can negatively affect estuarine biota and indicate inlet closure or eutrophic

conditions. For this standard, greater durations of hypoxia indicate worse performance (**Box 3**).

The mean number of hours of continuous hypoxia at SDW has been consistently within the range of the reference wetlands (**Fig. 3.2.1.a**) and this standard has passed from 2012–2025. In 2025, all wetlands passed the water quality standard (**Fig. 3.2.1.b**).

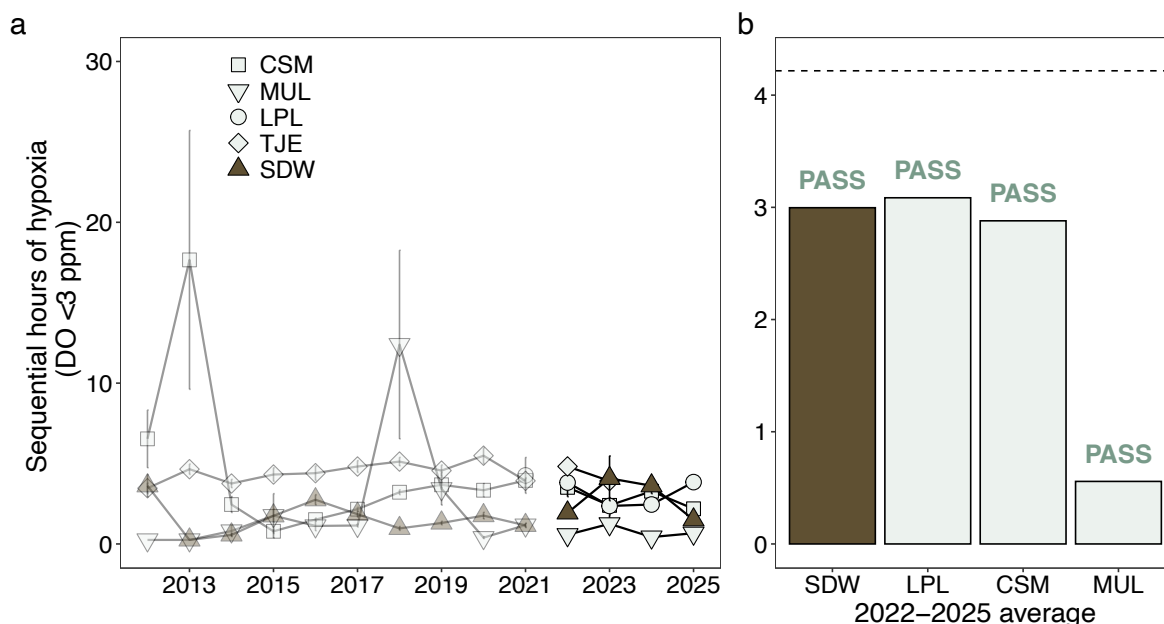


Figure 3.2.1 (a) Time series of the annual mean sequential hours of hypoxia (DO < 3 mg/L) and (b) the running average from 2022–2025. In this and subsequent figures, points indicate mean values $\pm$ standard error, dashed lines indicate the Performance Threshold Confidence Limit (PTCL), and the highlighted values on the far right of panel (a) indicate the years that are included in the running average used to assess performance for 2025. Wetland abbreviations in this and subsequent figures are: CSM = Carpinteria Salt Marsh, MUL = Mugu Lagoon, LPL = Los Peñasquitos Lagoon, TJE = Tijuana Estuary, SDW = San Dieguito Wetlands.

3.2.2 Algal cover

The percent cover of algae shall be similar to the percent cover found in the reference sites.

The purpose of the algal cover standard is to guard against the development of unusually dense mats of filamentous green macroalgae at SDW. Thick macroalgal mats can interfere with wetland structure and function by smothering benthic invertebrates, inhibiting bird feeding (Everett 1991), negatively affecting salt marsh vegetation (Wasson et al. 2017), and lowering DO concentrations during decomposition (Jeppesen et al. 2018).

Algal cover is assessed using aerial imagery that is classified at the pixel-scale (**Box 2**). All algae pixels are totaled to produce the annual value. Since 2012, the annual percent cover of algae in SDW has been lower than MUL, the reference wetland with the highest value (**Fig. 3.2.2.a**). Algal cover at Mugu Lagoon (MUL) has been 3–10 times higher than the other monitored wetlands since 2017. This pattern is reflected in the 2-year running average and in 2025, SDW passed this standard and MUL failed (**Fig. 3.2.2.b**).

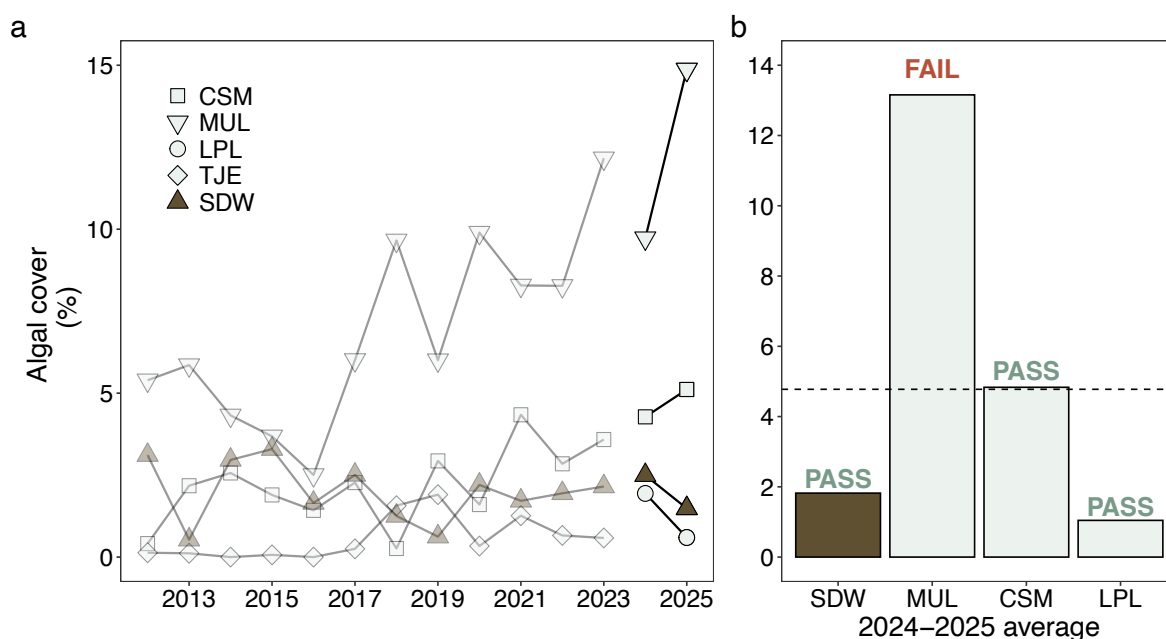


Figure 3.2.2 (a) Time series of annual algal cover and (b) the running average from 2024-2025.

3.2.3 Vegetation cover

The proportion of total vegetation cover and open space in the marsh shall be similar to those proportions found in the reference sites.

Vegetation cover is assessed using aerial imagery that is classified at the pixel-scale and evaluated in 10 x 10 m grids overlaid on the pixel-based classification (**Box 2**). Only grids defined as salt marsh habitat (see **Table 3.1.2**) are used to assess this standard. Each year (**Fig. 3.2.3.a**) the vegetation cover for all grids defined as salt marsh are averaged to produce the annual average vegetation cover value.

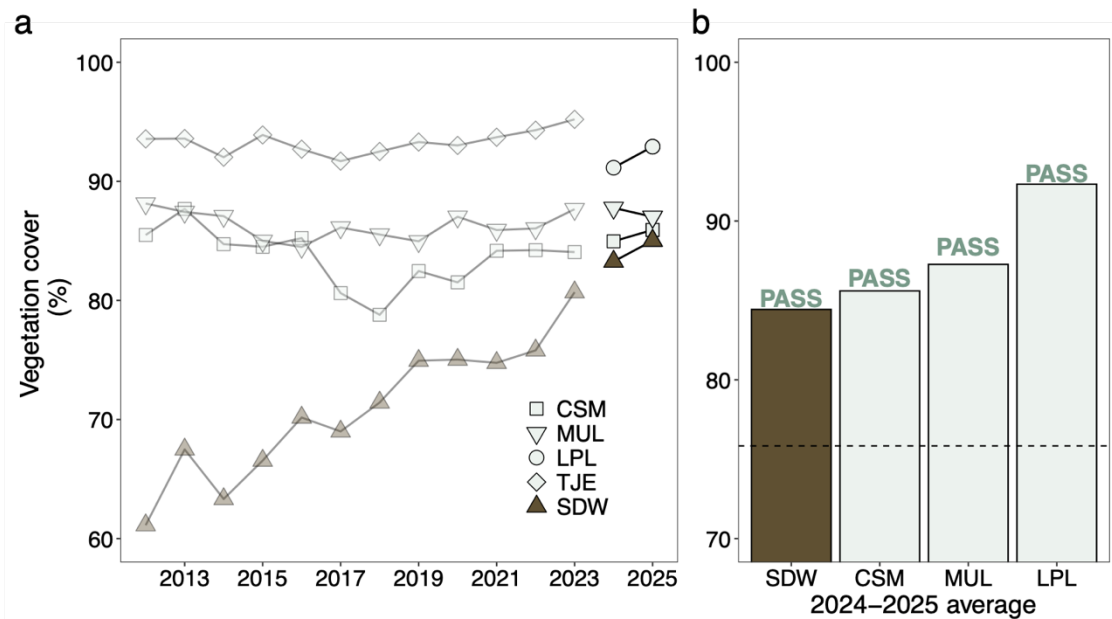


Figure 3.2.3 (a) Time series of annual vegetation cover and (b) the running average from 2024-2025.

Vegetation cover at SDW has been slowly increasing since monitoring began in 2012 and 2025 was the first year that all wetlands, including SDW, passed this standard (**Fig. 3.2.3.b**). The increase in vegetation cover is partially due to the success of SCE's planting program (2018–2025), combined with favorable conditions for growth and natural recruitment in 2022–2024.

3.2.4 *Spartina* canopy architecture

The restored wetland shall have a canopy architecture that is similar in distribution to the reference sites, with an equivalent proportion of stems over 3 feet tall.

The *Spartina* standard was designed to ensure that stands of the cordgrass *Spartina foliosa* that developed at SDW would be tall enough for use by nesting Ridgway's Rail, a federally endangered species that requires *Spartina* to be at least 3 feet tall for their nests to remain afloat at high tide (Zedler 1993).

Historically, this standard was evaluated at SDW and TJE, the two monitored wetlands with sufficient *Spartina* sampling areas. Recently, *Spartina* stands at MUL expanded substantially and we have monitored the site from 2018–present. In 2024, with the replacement of TJE with LPL, MUL was used as the reference site for this standard as *Spartina* remains absent from CSM and is too patchy and sparse at LPL to evaluate for this standard.

Since 2018, no stems > 3' have been observed at MUL (**Fig. 3.2.4.a**). This pattern continued in 2025 and SDW had a greater proportion of *Spartina* stems > 3' (**Fig. 3.2.4.b**), despite the proportion of *Spartina* stems > 3' dropping by approximately 50% from 2024 (0.19) to 2025 (0.09) at SDW. SDW passed this standard in 2025, whereas MUL failed.

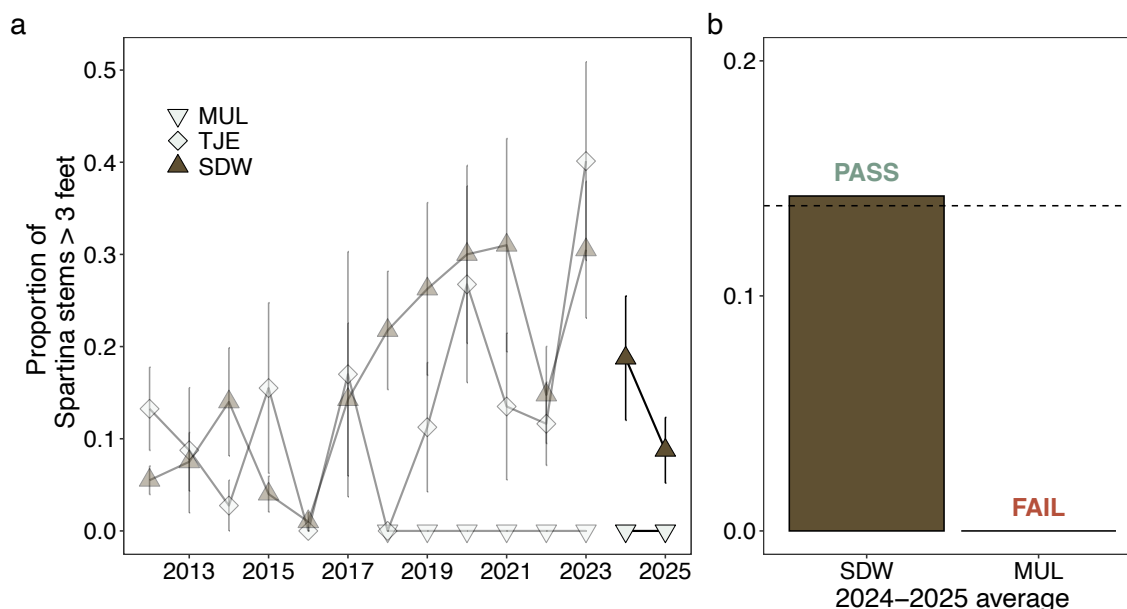


Figure 3.2.4 (a) Time series of the annual mean proportion of *Spartina* stems > 3 feet tall and (b) the running average from 2024-2025.

3.2.5 Bird density & richness

The total densities and number of species of birds shall be similar to the densities and number of species in similar habitats in the reference wetlands.

Bird density at SDW has been relatively stable and comparable to CSM throughout the time series (**Fig. 3.2.5.1.a**). Yet, SDW failed the bird density standard in 2025 (**Fig. 3.2.5.1.b**) as densities were ~20% lower at SDW relative to LPL and ~40% lower than CSM, and assessment was based only on 2025 data. SDW is likely to pass the standard in future years as the running average builds out over time, assuming the temporal patterns among wetlands do not deviate from historical (2012-2025) interannual variability observed.

Bird richness has been consistently highest at SDW compared to the reference wetlands over time (**Fig. 3.2.5.2.a**) and 2025 showed a similar pattern as SDW, and all reference wetlands passed (**Fig. 3.2.5.2.b**).

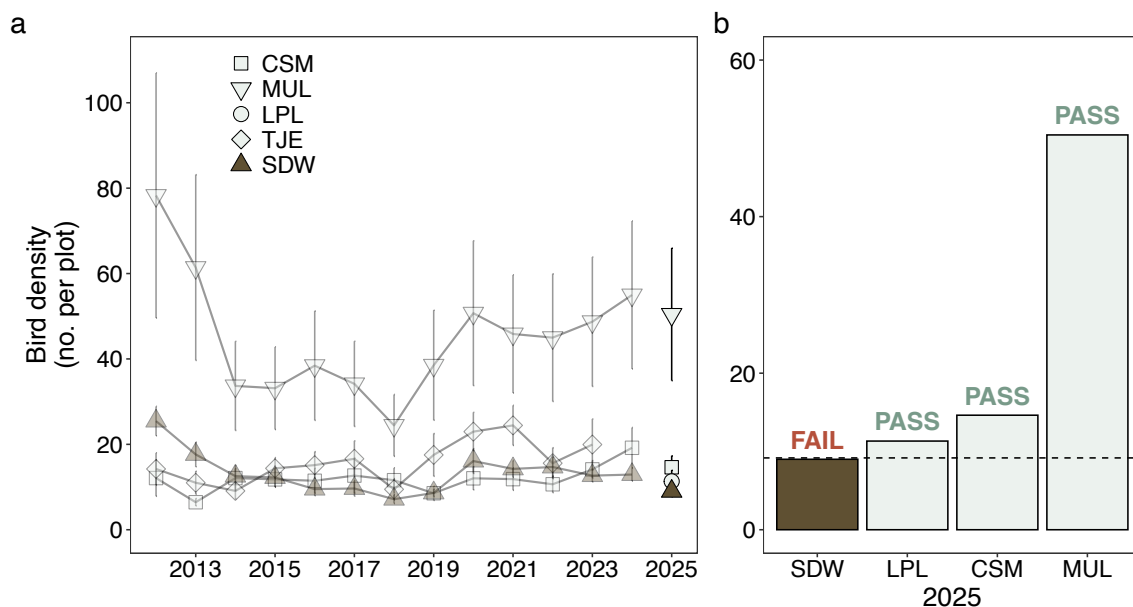


Figure 3.2.5.1 (a) Time series of annual mean bird density and (b) the 2025 average.

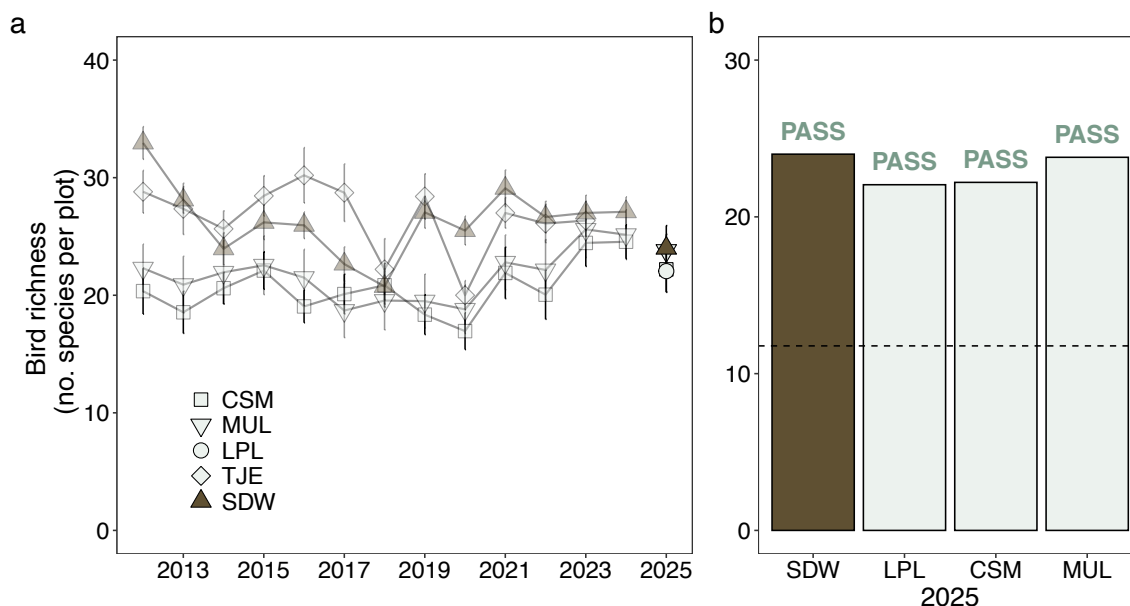


Figure 3.2.5.2 (a) Time series of annual mean bird richness and (b) the 2025 average.

3.2.6 Food chain support to birds

The food chain support provided to birds shall be similar to that provided by the reference sites, as determined by feeding activity of the birds.

Food chain support (FCS) to birds is a critical wetland function that reflects bird use of wetlands for feeding. Data related to shorebird foraging are analyzed using resampling and

the running average median values compared among wetlands (see [Page et al. 2026](#) for details).

SDW had the lowest densities of feeding birds from 2017–2024 (**Fig. 3.2.6.a**). However, in 2025, the average density of feeding birds at SDW was ~13% and ~50% greater than both CSM and LPL, respectively. Thus, SDW passed FCS for the first time in nine years, and LPL failed this standard (**Fig. 3.2.6.b**). Assessment of this standard is based only on data collected in 2025, and whether or not SDW’s historic pattern of underperformance returns in future years will depend on how the running averages for the four wetlands build out over time.

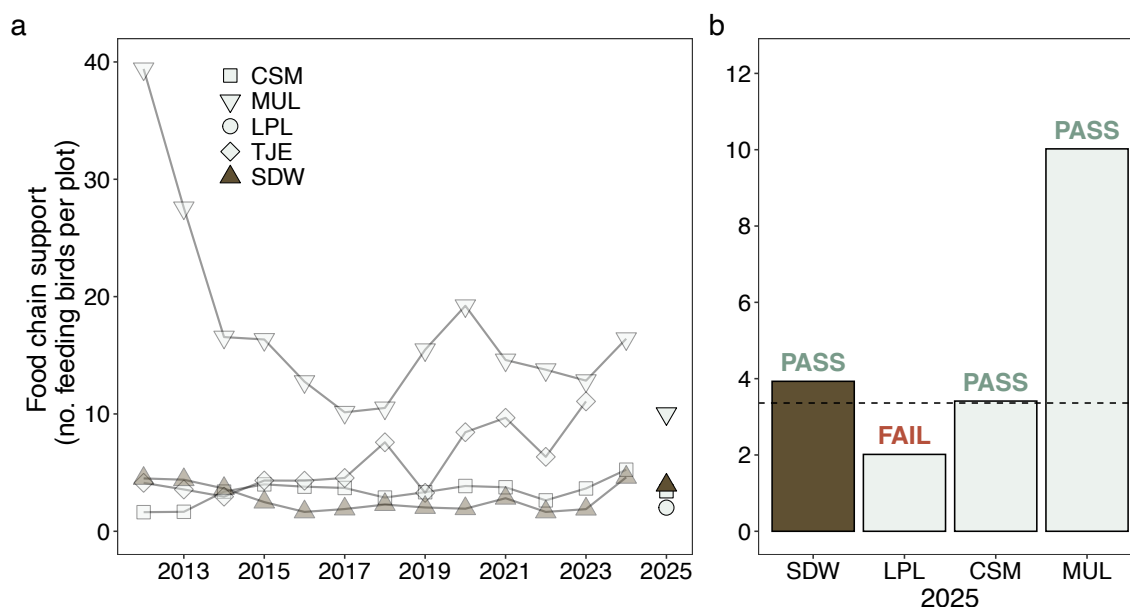


Figure 3.2.6 (a) Time series of annual median food chain support to birds and (b) the 2025 average.

3.2.7 Fish density & richness

The total densities and number of species of fish shall be similar to the densities and number of species in similar habitats in the reference wetlands.

Fish density and richness standards are assessed in main channel and tidal creek habitats (**Box 2**). For each wetland, data collected in a given year are aggregated across all sampling methods (seines, enclosure traps), dates, and locations for each main channel or tidal creek replicate. These spatial replicates are averaged to produce the annual and running averages for main channel and tidal creek habitats. In 2024 and 2025, only four tidal creeks were sampled at SDW for fish density and richness (see **section 3.2.9**) due to salt marsh encroachment into constructed tidal creeks. The sampled creeks at SDW included two

creeks that naturally formed to feed and drain the mudflat habitat in W4/16 and statistical analyses were updated to account for the unequal sample size (details in [Page et al. 2026](#)).

In main channel habitats, fish density has generally been highest at CSM, but comparable between SDW and the other reference wetlands (MUL, LPL, TJE; **Fig. 3.2.7.1.a**). In 2024, fish densities were comparable between SDW and MUL (within 5% of one another) but in 2025, densities remained low at SDW and increased by 70% at MUL, causing SDW to fail the standard in 2025 (**Fig. 3.2.7.1.b**).

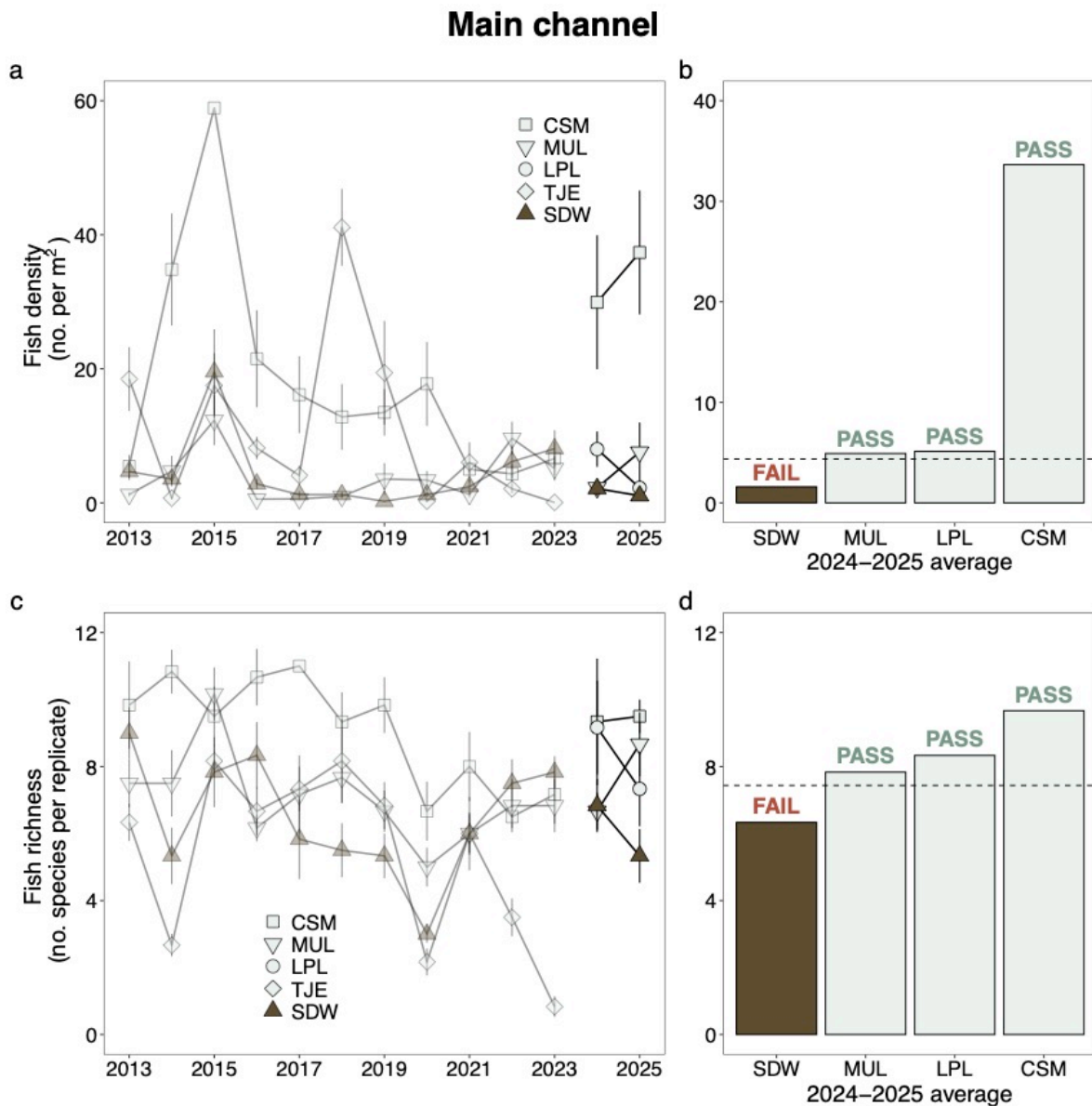


Figure 3.2.7.1 Time series of annual values and 2024–2025 running averages for (a, b) fish density and (c, d) fish richness in main channel habitats.

Fish richness in main channel habitats at SDW has historically been greater than one or more reference wetlands (except 2017–2019). In 2024, fish richness at SDW was most similar to MUL and all wetlands passed the standard, the assessment for which was based on the one year of data (**Fig. 3.2.7.1.c**). In 2025, fish richness increased at MUL by over ~20% and decreased at SDW by ~20%, causing SDW to fail the standard (**Fig. 3.2.7.1.d**).

Given the high variability of these standards and SDW's comparable historical performance relative to reference wetlands, it is possible that SDW will meet fish density and richness standards in main channel habitats in future years as the running average builds out over time. In tidal creek habitats, fish density has been consistently highest at CSM and generally lowest at SDW, with a few exceptions (2014, 2016, 2023–2025; **Fig. 3.2.7.2.a**). Fish densities were lowest at LPL from 2024–2025, and SDW passed the standard in 2025 and LPL failed (**Fig. 3.2.7.2.b**).

Fish richness in tidal creeks has generally been higher at the northern sites (MUL, CSM) compared to the southern sites (SDW, LPL, TJE); this pattern persisted in 2024–2025 (**Fig. 3.2.7.2.c**). Fish richness at SDW rose to its highest levels in 2024 but declined in 2025 and also decreased from 2024–2025 at LPL. All wetlands passed this standard in 2025 (**Fig. 3.2.7.2.d**).



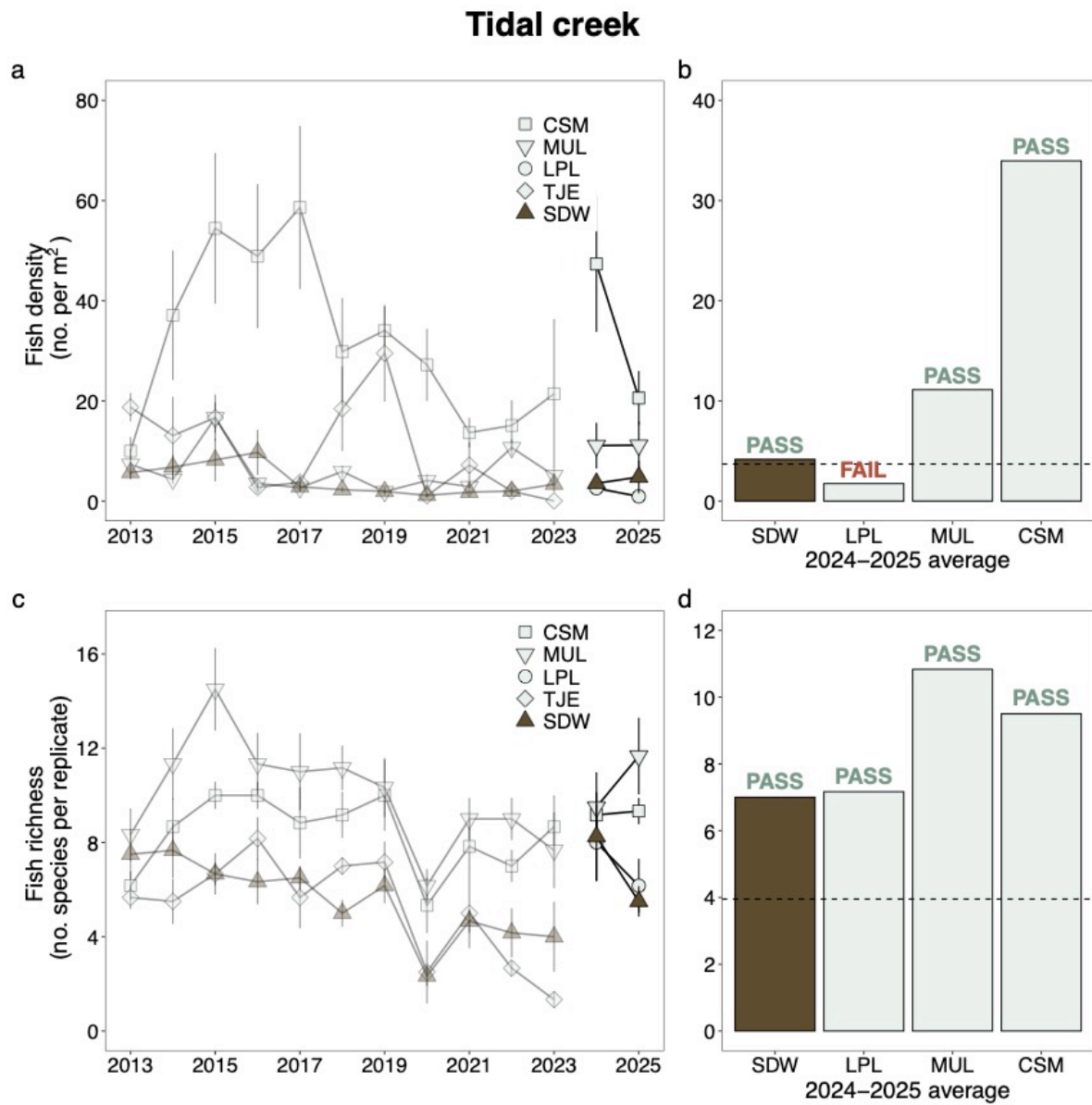


Figure 3.2.7.2 Time series of annual values and 2024–2025 running averages for (a, b) fish density and (c, d) fish richness in tidal creek habitats.



3.2.8 Invertebrate density & richness

The total densities and number of species of macro-invertebrates shall be similar to the densities and number of species in similar habitats in the reference wetlands.

Invertebrate density and richness standards are assessed in main channel and tidal creek habitats (**Box 2**). In 2024 and 2025, as was the case for assessing fish standards in tidal creeks, only four tidal creeks were sampled at SDW for invertebrate density and richness due to salt marsh encroachment into constructed tidal creeks (see **section 3.2.9**) and analyses were updated accordingly as indicated above.

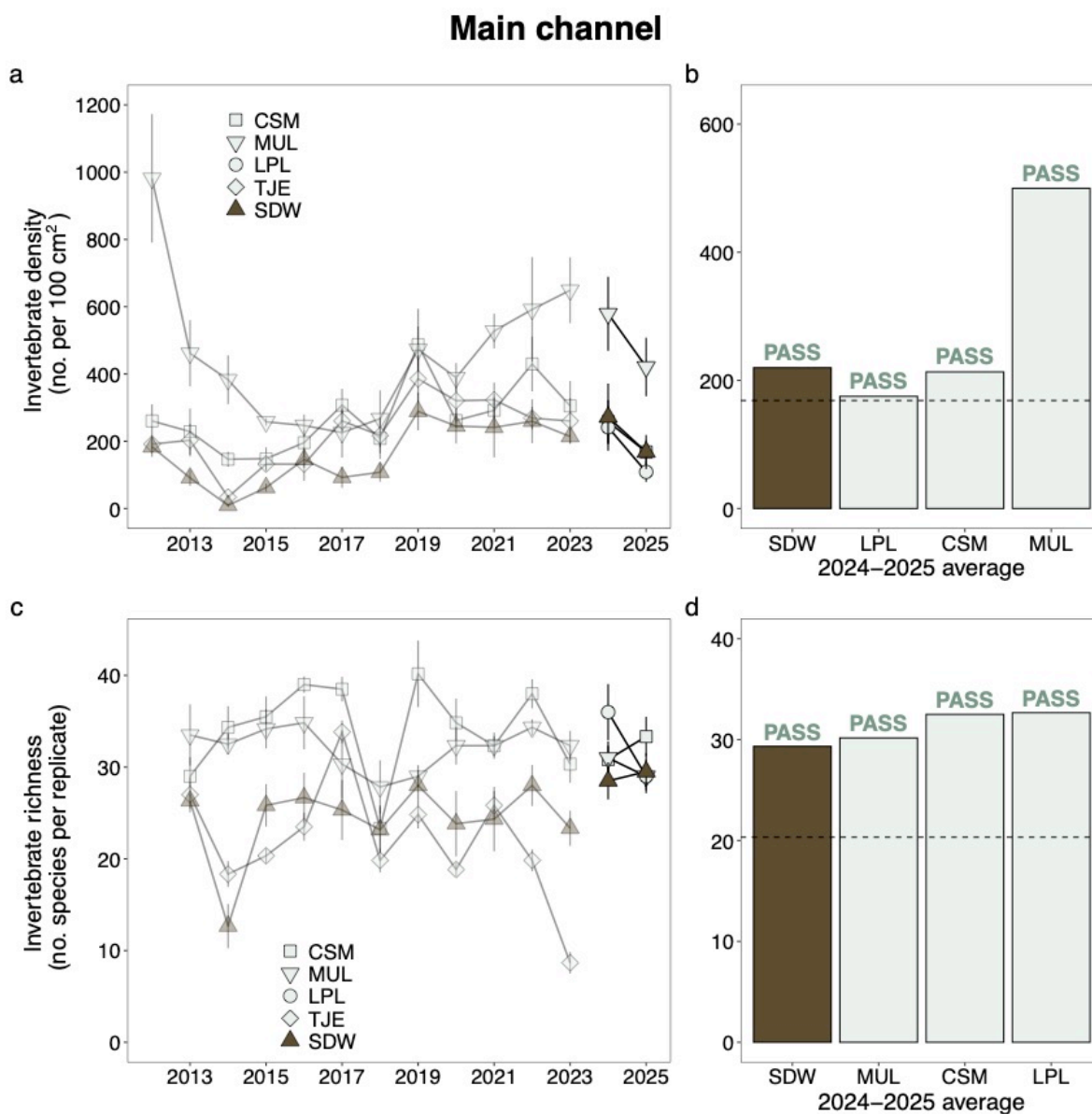


Figure 3.2.8.1 Time series of annual values and 2024–2025 running averages for (a, b) invertebrate density and (c, d) invertebrate richness in main channel habitats.

In main channel habitats, invertebrate density has been generally highest at MUL and lowest at SDW (**Fig. 3.2.8.1.a**). In 2024 and 2025, invertebrate density declined at all wetlands and was lowest at LPL in both years. In 2025, all wetlands passed the standard (**Fig. 3.2.8.1.b**).

Invertebrate richness in main channel habitats has been generally highest for the northern wetlands (CSM, MUL) and lowest for the southern wetlands (SDW, LPL, TJE), with the exception of 2024 and 2025, where the wetlands were more comparable to one another (**Fig. 3.2.8.1.c**). All wetlands passed this standard in 2025 (**Fig. 3.2.8.1.d**).

In tidal creek habitats, invertebrate density has generally been highest at MUL and lowest at SDW. This pattern persisted in 2024 and 2025, and invertebrate density declined at all wetlands, with SDW supporting the lowest densities (**Fig. 3.2.8.2.a**). SDW has never passed this standard, including in 2025 (**Fig. 3.2.8.2.b**).

As in main channel habitats, invertebrate richness in tidal creek habitats has historically been higher in the northern wetlands (MUL, CSM) compared to the southern wetlands (SDW, LPL, TJE). This regional pattern dissolved in 2024 and 2025 as invertebrate richness increased by 15% at SDW, reaching its highest levels recorded in 2025, which were comparable to values measured at CSM and LPL (**Fig. 3.2.8.2.c**). The running average (2024-2025) for the two lowest performing wetlands, SDW and LPL, was identical (24 spp. per replicate), therefore, no PTCL was calculated due to the tie and all wetlands passed the standard in 2025 (**Fig. 3.2.8.2.d**).



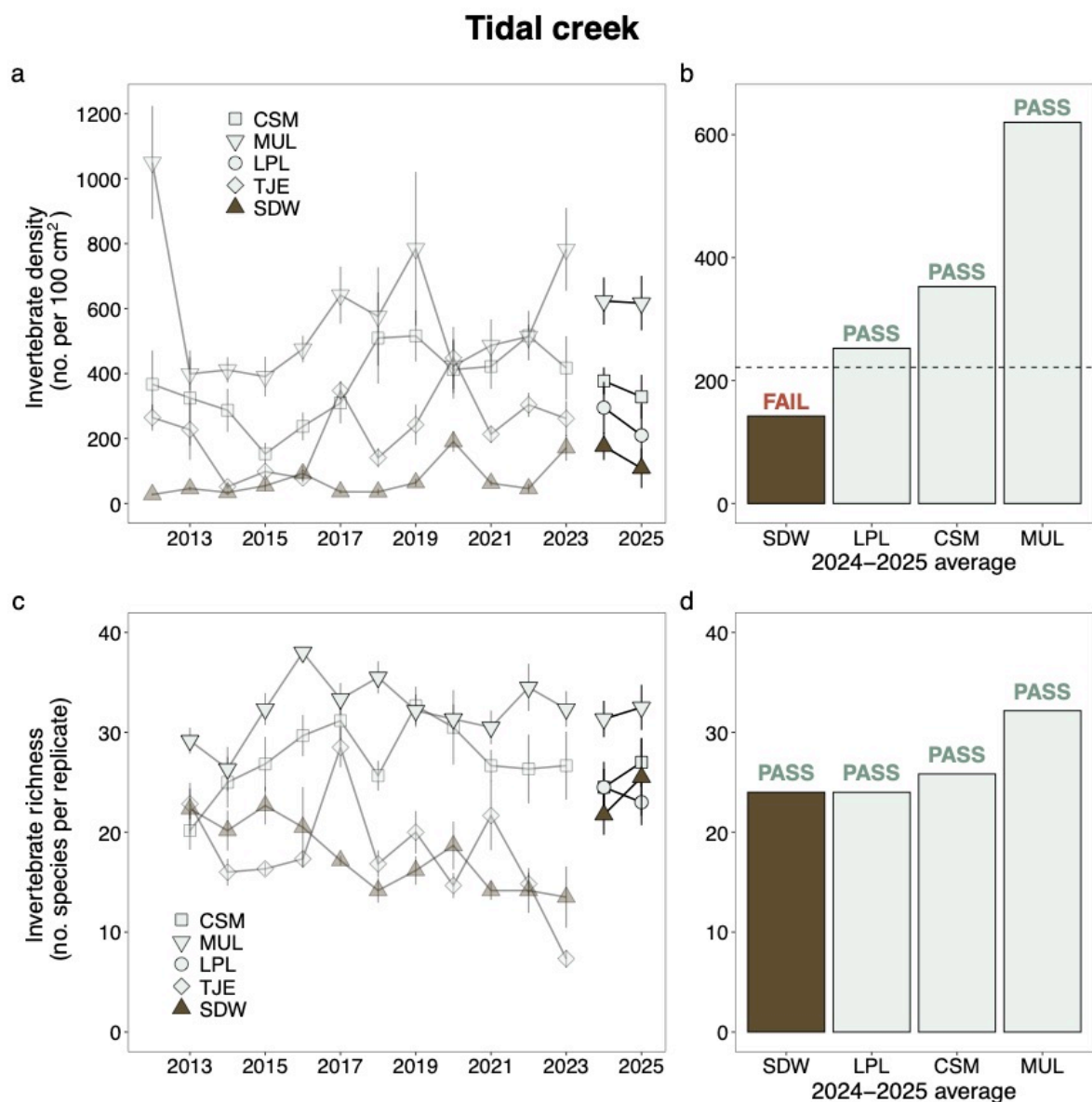


Figure 3.2.8.2 Time series of annual values and 2024–2025 running averages for (a, b) invertebrate density and (c, d) invertebrate richness in tidal creek habitats.

3.2.9 Salt marsh encroachment into tidal creek habitats

Marsh cordgrass, *Spartina foliosa*, has encroached into six tidal creeks that are sampled for fish and invertebrate density and species richness. The cordgrass restricts the use of seines and enclosure traps for sampling. Beginning in 2019, fish and invertebrate sampling has been: (1) repeatedly moved to creeks without cordgrass, (2) compressed, or (3) moved to

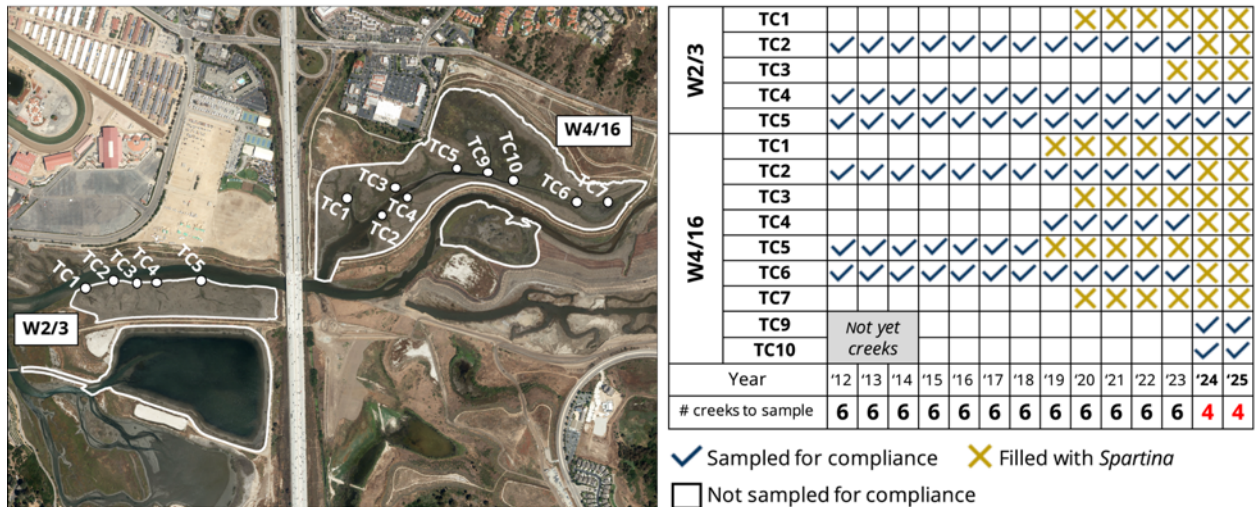


Figure 3.2.9.1 (a) Map of tidal creek locations within the San Dieguito Wetlands Restoration Project. (b) Time series of tidal creek monitoring status from 2012–2025, including creeks not sampled for compliance (blank boxes), creeks sampled for compliance (blue checks), and creeks that are unable to be sampled because they are filled with marsh cordgrass *Spartina foliosa* (gold “X”s).

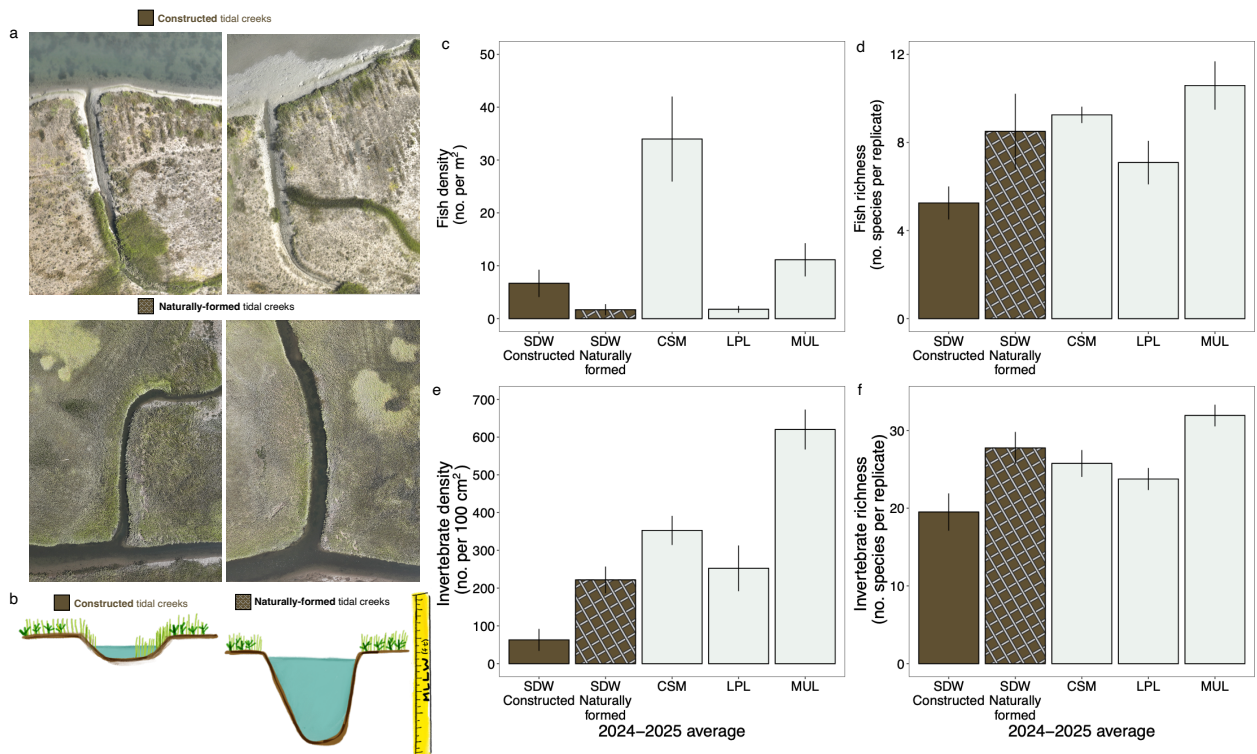


Figure 3.2.9.2 (a) Aerial imagery of constructed and naturally formed tidal creeks collected on the same day at similar water surface elevations. Constructed tidal creeks are encroached with vegetation and drained whereas naturally formed creeks are open and full of water. These differences indicate (b) different geomorphologies of the two creek types, as constructed creeks are higher in elevation, wider, and shallower relative to the naturally-formed creeks. 2024–2025 running averages ($\pm$ standard error) for (c) fish density and (d) richness and (e) invertebrate density and (f) richness in tidal creek habitats, divided by wetland (SDW in brown; references in pale green). In all panels, constructed creeks are indicated with solid brown and naturally formed creeks are indicated with hatched brown.

lower order branches within partially encroached creeks (**Fig. 3.2.9.1**). Additionally, two creeks have naturally developed over time to feed and drain mudflat habitat in W4/16 (TC9; TC10; **Fig. 3.2.9.1**). In 2024 and 2025, with the loss of all but two constructed tidal creeks (TC4 and TC5 in W2/3), TC9 and TC10 were sampled for performance monitoring (**Fig. 3.2.9.2**). That said, only four tidal creeks were sampled at SDW in 2024–2025, whereas six tidal creeks were sampled at the references; the analytical testing approach was updated for these standards to account for this unequal sample size (details in [Page et al. 2026](#)). Although these two types of tidal creeks (constructed, naturally formed) were grouped to assess compliance of the four relative standards measured in tidal creeks (fish and invertebrate density and richness), comparison of the data by tidal creek type illustrates the relative contributions of constructed versus naturally formed creeks (**Fig. 3.2.9.2**).

The constructed and naturally formed creeks have distinct geomorphologies (**Fig. 3.2.9.2a, b**). Constructed creeks are higher in elevation, wider, and shallower relative to naturally formed creeks (**Fig. 3.2.9.2a, b**). Aside from fish density (**Fig. 3.2.9.2c**), values for the other fish and invertebrate relative standards were lower in the constructed creeks relative to the naturally formed creeks (**Fig. 3.2.9.2d–f**). The values collected in the naturally formed creeks were also more similar to the reference wetlands. Thus, grouping constructed and naturally formed creeks together in assessing the performance of SDW may mask the relatively low performance of constructed creeks.



3.2.10 RELATIVE PERFORMANCE STANDARDS REQUIREMENT

In 2025, San Dieguito Wetlands did not meet the relative standards requirement (**Table 3.2.10**). SDW passed 73% of standards, failing 4 of the 15 standards assessed at the restored wetland: bird density, main channel fish density and richness and tidal creek invertebrate density (**Table 3.2.10**). The lowest performing reference wetland, Los Peñasquitos Lagoon, passed 86% of standards, failing 2 of the 14 standards assessed: food chain support to birds and fish density in tidal creeks (**Table 3.2.10**).

		SDW	LPL	MUL	CSM
Key  Pass  Fail  Not assessed	Water quality				
	Algal cover				
	Vegetation cover				
	<i>Spartina</i> canopy				
	Bird density				
	Bird richness				
	Food chain support to birds				
	Main channel Fish density				
	Main channel Fish richness				
	Main channel Invertebrate density				
	Main channel Invertebrate richness				
	Tidal creek Fish density				
	Tidal creek Fish richness				
	Tidal creek Invertebrate density				
	Tidal creek Invertebrate richness				
Proportion of standards met in 2025		0.73	0.86	0.87	1.00

Table 3.2.10. Pass/fail outcomes for the relative standards. San Dieguito Wetlands met 11 of 15 standards assessed (73%). The lowest performing reference wetland, Los Peñasquitos Lagoon, met 12 of 14 standards assessed (87%). The proportion of standards met at San Dieguito Wetlands is less than Los Peñasquitos Lagoon; therefore, the relative standards requirement was not met in 2025. Blue checks indicate standards passed; gold "X"s indicate standards failed.

3.3 MITIGATION CREDIT SUMMARY

Since monitoring began, SDW has consistently met four of the five absolute standards. The continual failure of the habitat areas standard (**section 3.1.2**) has prevented SDW from meeting the absolute standard requirement, which requires all absolute standards be met for SDW to receive mitigation credit. Initially, SDW failed this standard due to slow vegetation development, but recently, loss of mudflat due to habitat conversion from mudflat to salt marsh has caused SDW to fail this standard.

	Water quality	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Algal cover	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Vegetation cover	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓
	<i>Spartina</i> canopy	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Bird density	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✗
	Bird richness	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Food chain support to birds	✓	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓
Main channel	Fish density	—	✓	✓	✓	✓	✓	✓	✗	✗	✗	✗	✓	✓	✓	✗
	Fish richness	—	✓	✓	✓	✓	✓	✓	✗	✗	✗	✓	✓	✓	✓	✗
Main channel	Invertebrate density	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓	✓
	Invertebrate richness	—	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tidal creek	Fish density	—	✓	✓	✗	✓	✓	✗	✓	✗	✗	✗	✓	✓	✓	✓
	Fish richness	—	✓	✓	✓	✓	✓	✗	✗	✓	✗	✓	✓	✓	✓	✓
Tidal creek	Invertebrate density	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
	Invertebrate richness	—	✓	✓	✓	✓	✓	✓	✗	✗	✗	✓	✓	✓	✓	✓
Key		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
✓ Pass																
✗ Fail																
— Not assessed																

Table 3.3.1 Pass/fail outcomes for the relative standards for San Dieguito Wetlands from 2012–2025. Blue checks indicate standards passed; gold “X”s indicate standards failed.

Absolute standards	Tidal prism	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Topography	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Plant reproduction	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Exotic species	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Habitat areas	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Relative standards requirement		✗	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✗	✗
Mitigation credit		✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Key		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
✓ Pass																
✗ Fail																

Number of years of credit needed = 32
Number of years of credit earned = 0

Table 3.3.2. Mitigation credit summary table (2012–2025). San Dieguito Wetlands continues to fail the habitat areas standard and therefore did not meet the absolute standard requirement in 2025. The relative standards requirement was not met in 2025 as the proportion of relative standards met at San Dieguito Wetlands was lower than the lowest performing reference wetland (see Table 3.2.10). Of the 32 years of mitigation credit required, San Dieguito Wetlands has accrued 0 years of credit. Blue checks indicate standards passed; gold “X”s indicate standards failed.

SDW has failed to meet the relative standard requirement (**Table 3.3.1**) in all years except 2013, 2014, and 2023. Historically, this requirement has not been met due to consistently underperforming standards, including vegetation cover, food chain support to birds, and fish and invertebrate standards measured in tidal creeks (**section 3.2**). In particular, underperformance of standards measured in tidal creeks may be affected by salt marsh encroachment (**section 3.2.9**), though the severity of these effects may be masked by changes in sampling location and the use of naturally formed creeks to supplement tidal creek sample size (**Fig. 3.2.9**). In 2025, SDW failed the absolute and relative standards requirements. Thus, after 14 years of performance monitoring SCE has yet to receive any of the 32 years of required mitigation credit (**Table 3.3.2**).

4.0 PROGRESS TOWARDS MITIGATION REQUIREMENTS

Examination of the progress of SDW towards meeting the 32 years of mitigation credit required by the SONGS CDP requirements has led SCE to fund a modeling study to determine the optimum density, geomorphology, and location of tidal creeks within the restoration project area considering the hydrology, topography, and bathymetry of the entire San Dieguito Lagoon. The SONGS MMP will use the data collected as part of the SCE study (e.g., Light Detection and Ranging Digital Elevation Model, LiDAR DEM) to evaluate the fate of mudflat habitat within the SONGS project area and estimate mudflat acres of the entire lagoon. The findings from the SCE study are anticipated by late 2026 and will be reviewed by the SONGS MMP and external reviewers. Following review of the report and subsequent analysis of the model outputs by the SONGS MMP, the CCC, with consultation from the SONGS MMP, will make recommendations on next steps aimed at meeting CDP requirements. These recommendations may include adaptive management or remediation actions.



GLOSSARY

CCC: California Coastal Commission

Out-of-kind mitigation: compensatory action that is not the same habitat or does not provide equivalent ecological value as the impacted habitat(s)

In-kind mitigation: compensatory action that replaces habitat equivalent to impacted habitat

SONGS: San Onofre Nuclear Generating Station, nuclear power plant in San Clemente, California. SONGS operations required both in-kind and out-of-kind mitigation.

SONGS MMP: San Onofre Nuclear Generating Station Mitigation Monitoring Program, led by CCC contract scientists at UC Santa Barbara

SCE: Southern California Edison, the public utility company that is the majority owner of SONGS

SCB: Southern California Bight, a region that extends from Point Conception to Baja California, Mexico (Punta Colonet) and spans 1,500 square miles of coastline, including the Channel Islands

W6: Mitigation parcel to be used as mitigation for impacts to high marsh habitat within the SONGS project area caused by tidal muting from W19 mitigation project

CalTrans: California Department of Transportation, state agency co-leading W19 and W6 mitigation projects

SANDAG: San Diego Association of Government, council of governments co-leading W19 and W6 mitigation projects

W19: Mitigation project in the southeast portion of San Dieguito Lagoon that compensates for regional impacts from the North Coast Corridor (NCC) Public Works Plan, led by CalTrans and SANDAG.

Absolute performance standards: Five performance standards (Tidal prism, Topography, Exotic Species, Plant Reproductive Success, Habitat Areas) evaluated only at San Dieguito Wetlands using the values measured for the assessed year. All absolute standards must be met for SCE to earn mitigation credit in a given year.

Relative performance standards: Fifteen performance standards evaluated at San Dieguito Wetlands and three natural reference wetlands using a four-year running average to assess whether San Dieguito Wetlands is functioning similar to reference wetlands. To meet the Relative Performance Standards Requirement, San Dieguito Wetlands must meet at least as many relative performance standards as the lowest performing reference wetland in a given year.

REFERENCES

CCC (California Coastal Commission). 1997. San Onofre Nuclear Generating Station (SONGS) Coastal Development Permit 6-81-330-A.

Page H.M., Schroeter S.S., Beheshti K.M., Smith R.S., Reed D. and Steele M. 2026. [Monitoring Plan for the SONGS' Wetland Mitigation Project](#). Report to the California Coastal Commission.

SCE (Southern California Edison Company). 2005. [San Dieguito Wetlands Restoration Project: Final Restoration Plan Submitted to the California Coastal Commission](#), November 2005.

Murdoch W.W., Fay R.C., and Mechalas B.J. 1989. Final report of the Marine Review Committee to the California Coastal Commission (MRC Document No. 89-02). Marine Review Committee.

Everett, R.A. 1991. Intertidal distribution of infauna in a central California lagoon: the role of seasonal blooms of macroalgae. *Journal of Experimental Marine Biology and Ecology* 150:223-247.

Smith R.S., Beheshti K.M., Page H.M., and Reed D. 2025. [2024 Annual Report of the Status of Condition A: Wetland Mitigation](#). Report to the California Coastal Commission.

Wasson K., Jeppesen R., Endris C., Perry D., Woolfolk A., Beheshti K., Rodriguez M., Eby R., Watson E., Rahman F., Haskins J., and Hughes B.B. 2017. Eutrophication decreases salt marsh resilience through proliferation of algal mats. *Biological Conservation* 212: 1-11.

Jeppesen, R., Rodriguez M., Rinde J., Haskins J., Hughes B., Mehner L., and Wasson K. 2018. Effects of Hypoxia on Fish Survival and Oyster Growth in a Highly Eutrophic Estuary. *Estuaries and Coasts* 41, 89-98.

Zedler, J.B. 1993. Canopy architecture of natural and planted cordgrass marshes – selecting habitat evaluation criteria. *Ecological Applications* 3:123-138.