# Benthic Macroinvertebrate Bioassessment

# Data Summary Memo

# 2024

Morro Bay National Estuary Program
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## List of Acronyms

| Acronym | Definition |
|---|---|
| BMI | Benthic macroinvertebrate |
| CDFW | California Department of Fish and Wildlife |
| CCRWQCB | Central Coast Regional Water Quality Control Board |
| CSCI | California Stream Condition Index |
| EPT | Ephemeroptera, Plecoptera, and Trichoptera |
| Estuary Program | Morro Bay National Estuary Program |
| RWB | Reach-wide benthos (biotic sampling method) |
| MLML | Moss Landing Marine Laboratory |
| SAFIT | Southwest Association of Freshwater Invertebrate Taxonomists |
| SoCal B-IBI (IBI) | Southern California Coastal Index of Biotic Integrity |
| SWAMP | Surface Water Ambient Monitoring Program |
| WY | Water Year (Oct 1 to September 30; named for the year in which it ends) |

## Suggested Citation

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## Acknowledgements

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- The Harold J. Miossi Charitable Trust for their generous grant, which has funded this monitoring effort since 2013.
- Our dedicated volunteers who have donated their time to help ensure the success of the project.
- The many landowners who have allowed access for this monitoring.

## Introduction

The Morro Bay National Estuary Program (Estuary Program) is a nonprofit organization that brings together the community, local governments, nonprofits, agencies, and landowners to protect and restore the Morro Bay estuary and the surrounding watershed. The monitoring conducted by staff and volunteers has three main goals: 1) assess long-term ambient trends, 2) track the effectiveness of specific implementation projects, and 3) establish protection and restoration targets.

The Estuary Program conducts monitoring within the Morro Bay watershed, which is approximately 77 square miles. The watershed is largely dominated by agricultural use, with some urban land use primarily along the coast. The inland watershed drains west into the Morro Bay estuary via two primary creeks, Chorro Creek and Los Osos Creek.

This report summarizes the results of benthic macroinvertebrate sampling from 1994 to 2024[1] from Chorro Creek, Los Osos Creek, and their tributaries. Benthic macroinvertebrates (BMIs) are bottom-dwelling organisms, composed mainly of insects in their larval stage as well as other small aquatic species. These organisms are sensitive to changes in stream chemistry and substrate conditions, and therefore provide a means of assessing waterbody health over time (Barbour, 1999).

Macroinvertebrate samples are collected during annual spring bioassessment surveys. Surveys are conducted per the Surface Water Ambient Monitoring Program (SWAMP) *Standard Operating Procedures (SOP) for the Collection of Field Data for Bioassessments of California Wadeable Streams* (Ode et. al, 2016). This protocol incorporates physical, chemical, and biotic factors that can be used to measure and assess impacts to surface water ecosystems over time.

## Sites

The Estuary Program conducts bioassessment surveys each spring at various locations throughout the Morro Bay watershed[2]. Typically, ten site locations are selected for monitoring each year when adequate water is present. The site selection process is dictated by several factors, including site status ("core" or "rotating"), site access, creek conditions, and adequate staffing. There are six core sites that are monitored every year and a number of rotating sites that are generally monitored every other or every third year. The Estuary Program is also working to establish a reference site, which would represent a benchmark of biological conditions in a minimally disturbed environment. Sites not listed as either core, rotating, or reference are historic sites that are no longer monitored due to access issues or unfavorable monitoring conditions.

During the 2024 effort, Estuary Program staff and volunteers conducted ten surveys, including the six core sites, three rotating sites, and one potential reference site (Table 1).

***Table 1.*** *Bioassessment sites codes and locations monitored in 2024.*

| Site Code | Location | Type |
|---|---|---|
| 310TWB | Lower Chorro Creek | Core |

[1] Prior to 2002, data was collected by the Central Coast Regional Water Quality Control Board (CCRWQCB).
[2] For a map of all monitoring sites, refer to Appendix A.

| | | |
|---|---|---|
| 310ACR | Middle Chorro Creek below wastewater treatment plant (WWTP) | Rotating |
| 310UCD | Upper Chorro Creek above Chorro Reservoir | Potential reference |
| 310MNO | San Bernardo Creek | Core |
| 310LSL | Lower San Luisito Creek | Core |
| 310USL | Upper San Luisito Creek | Rotating |
| 310UPN | Pennington Creek | Core |
| 310DAU | Upper Dairy Creek | Core |
| 310WLM | Walters Creek | Rotating |
| 310CLK | Upper Los Osos Creek | Core |

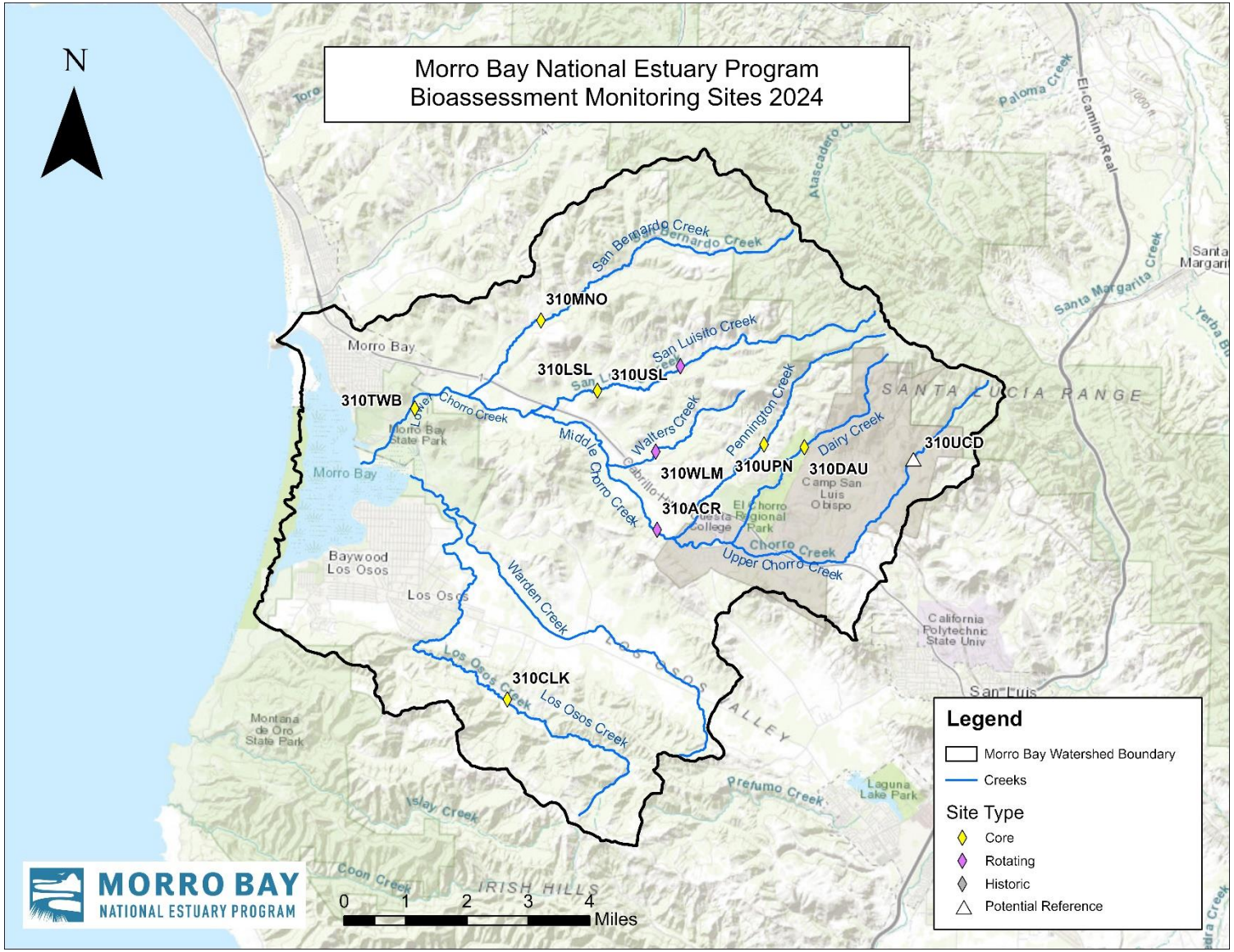


***Figure 1.*** *Bioassessment sites monitored in 2024. Core sites are monitored each year, and rotating sites are monitored approximately every other year. The potential reference site is located in the upper watershed and denoted with a white triangle.*

## Methods

The Estuary Program conducts bioassessment surveys per the SWAMP Standard Operating Procedures protocol (Ode et. al, 2016). Due to limited sampling resources, the Estuary Program does not conduct the algae collection module. All surveys are conducted under a scientific collection permit (SCP) from the California Department of Fish and Wildlife (CDFW). Sites within California State Parks property boundaries are also collected under a State Parks SCP. The Estuary Program conducts all required notifications and reporting to maintain the SCPs.

At each monitoring site, staff and trained volunteers conduct assessments along a pre-determined 150-meter reach. Measurements and observations are taken at 11 equidistant main transects and ten equidistant inter-transects. These measurements include wetted width, water depth, bankfull measurements, substrate size, canopy cover, slope, sinuosity, bank stability, algal observations, and anthropogenic modifications. Macroinvertebrate samples are collected from each of the 11 main transect locations using the reach-wide benthos method, rotating between the margins and center of the creek. The samples are then composited into a single sample and preserved before shipping to a certified laboratory for analysis.

In 2024, the Estuary Program sent macroinvertebrate samples to a certified taxonomy laboratory, EcoAnalysts Inc., for analysis per Southwest Association of Freshwater Invertebrate Taxonomists Level 2 protocols. The samples were sorted, counted, and identified by certified taxonomists until 600 organisms were identified. EcoAnalysts provided a spreadsheet containing the taxa classifications and several calculated metrics and indices. The Estuary Program contracted with Moss Landing Marine Labs (MLML) to calculate index scores using the California Stream Condition Index (CSCI) analysis method. The data obtained from EcoAnalysts and MLML provide the foundation for the analysis presented in this report.

The Estuary Program also collected environmental DNA (eDNA) samples as part of the SWAMP eDNA Metabarcoding Monitoring and Analysis Project (SeMMAP). Single replicate samples were collected at each of the ten sites monitored, and duplicates were collected at the six core sites using Jonah Ventures Next Generation Sequencing (NGS) sampling kits. While results are still pending from 2024, comparisons from 2023 showed low correlation between taxa identified using standard manual methods and taxa identified using eDNA. Because eDNA metabarcoding is still a relatively new method, it will likely improve with further refinement and the development of more robust reference libraries.

## Results

The following tables, graphs, and maps summarize the results of the 2024 macroinvertebrate sampling effort and provide context for the results by comparing them to historical data. The metrics and indices presented throughout this report typically decrease in response to disturbance, so higher values generally indicate optimal conditions and lower values indicate less ideal conditions. A dashed line within any table indicates that no monitoring occurred that year. On bar graphs, an absence of a bar indicates no monitoring occurred that year.

## Taxa Metrics

The calculated metrics included in this report are as follows:

- **Taxa richness** is a measure of the number of different species of organisms in the sample.
- **EPT richness** is a measure of the total number of taxa within the sensitive orders of Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies), which are collectively known as EPT.
- **EPT percent** is the percentage of EPT individuals within the total number of individuals in a sample.
- **Percent sensitive EPT** is the percentage of EPT individuals with associated tolerance values of 0 to 3.

***Table 2.*** *Benthic taxa metric scores from 2021 to 2024.*

| Site | Year | Taxa Richness | EPT Richness | % EPT | % Sensitive EPT |
|---|---|---|---|---|---|
| **ACR** (Chorro Creek below WWTP) | 2021 | 31 | 4 | 14.33 | 0.00 |
| | 2022 | --- | --- | --- | --- |
| | 2023 | 40 | 11 | 50.00 | 1.62 |
| | 2024 | 41 | 9 | 57.96 | 1.35 |
| **TWB** (Lower Chorro Creek) | 2021 | 40 | 6 | 7.37 | 0.95 |
| | 2022 | 44 | 8 | 13.38 | 2.40 |
| | 2023 | 40 | 6 | 10.76 | 1.05 |
| | 2024 | 46 | 11 | 17.26 | 2.64 |
| **UCD** (Above Chorro Reservoir) | 2021 | --- | --- | --- | --- |
| | 2022 | 81 | 22 | 21.86 | 11.55 |
| | 2023 | 40 | 10 | 31.00 | 9.64 |
| | 2024 | 66 | 19 | 28.87 | 14.88 |
| **CLK** (Upper Los Osos Creek) | 2021 | --- | --- | --- | --- |
| | 2022 | --- | --- | --- | --- |
| | 2023 | 39 | 5 | 4.91 | 1.29 |
| | 2024 | 47 | 16 | 39.04 | 1.35 |
| **WLM** (Walters Creek) | 2021 | --- | --- | --- | --- |
| | 2022 | --- | --- | --- | --- |
| | 2023 | --- | --- | --- | --- |
| | 2024 | 35 | 5 | 22.41 | 0.77 |
| **MNO** (San Bernado Creek) | 2021 | 47 | 11 | 12.20 | 3.08 |
| | 2022 | 66 | 15 | 21.44 | 7.96 |
| | 2023 | 33 | 4 | 43.01 | 0.93 |
| | 2024 | 57 | 14 | 43.50 | 2.08 |

| Site | Year | Taxa Richness | EPT Richness | % EPT | % Sensitive EPT |
|---|---|---|---|---|---|
| **LSL** (Lower San Luisito Creek) | 2021 | 48 | 16 | 42.43 | 8.62 |
| | 2022 | 58 | 17 | 40.78 | 13.77 |
| | 2023 | 27 | 9 | 67.35 | 3.93 |
| | 2024 | 46 | 19 | 46.04 | 8.46 |
| **USL** (Upper San Luisito Creek) | 2021 | --- | --- | --- | --- |
| | 2022 | 64 | 17 | 49.62 | 33.22 |
| | 2023 | --- | --- | --- | --- |
| | 2024 | 47 | 18 | 74.32 | 25.59 |
| **UPN** (Upper Pennington Creek) | 2021 | 61 | 15 | 19.69 | 15.37 |
| | 2022 | 60 | 17 | 20.70 | 11.68 |
| | 2023 | 45 | 9 | 31.81 | 7.36 |
| | 2024 | 58 | 20 | 56.43 | 50.18 |
| **DAU** (Upper Dairy Creek) | 2021 | 27 | 6 | 32.23 | 25.00 |
| | 2022 | 66 | 16 | 21 | 22.25 |
| | 2023 | 32 | 7 | 58.16 | 3.80 |
| | 2024 | 54 | 19 | 69.29 | 39.93 |

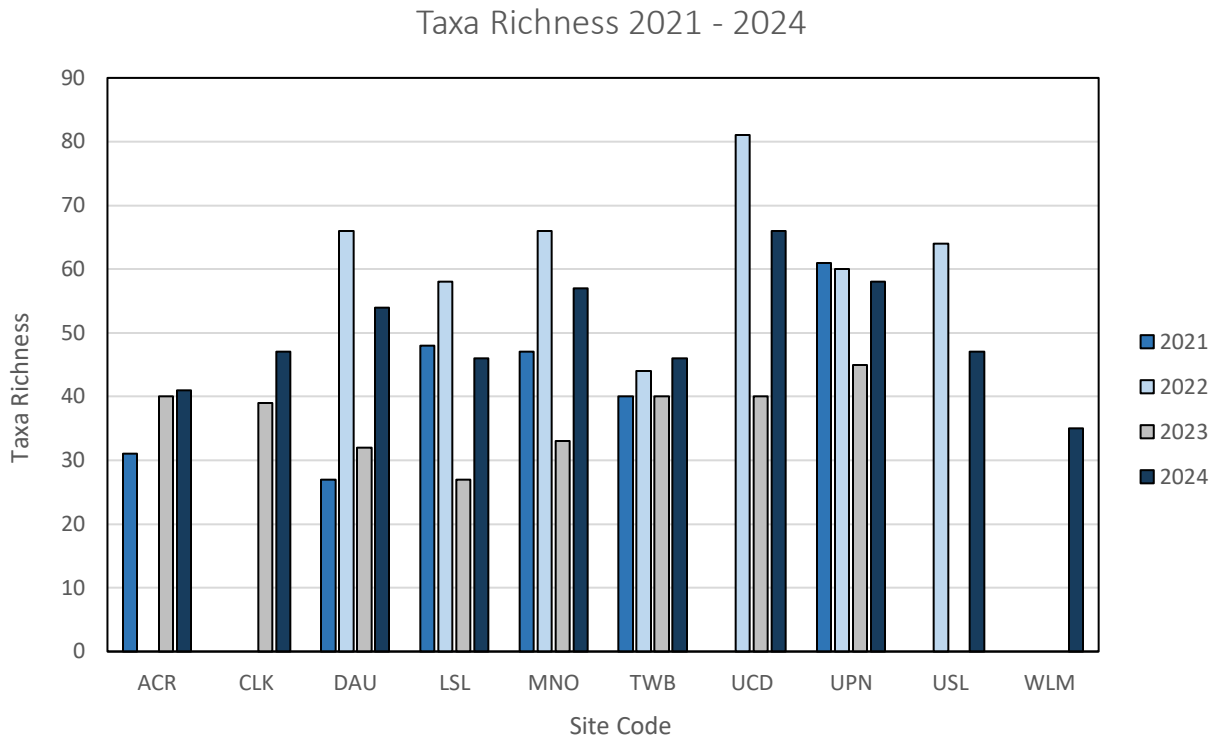


***Figure 2**. Taxa richness data for 2021 to 2024 macroinvertebrate sampling.*

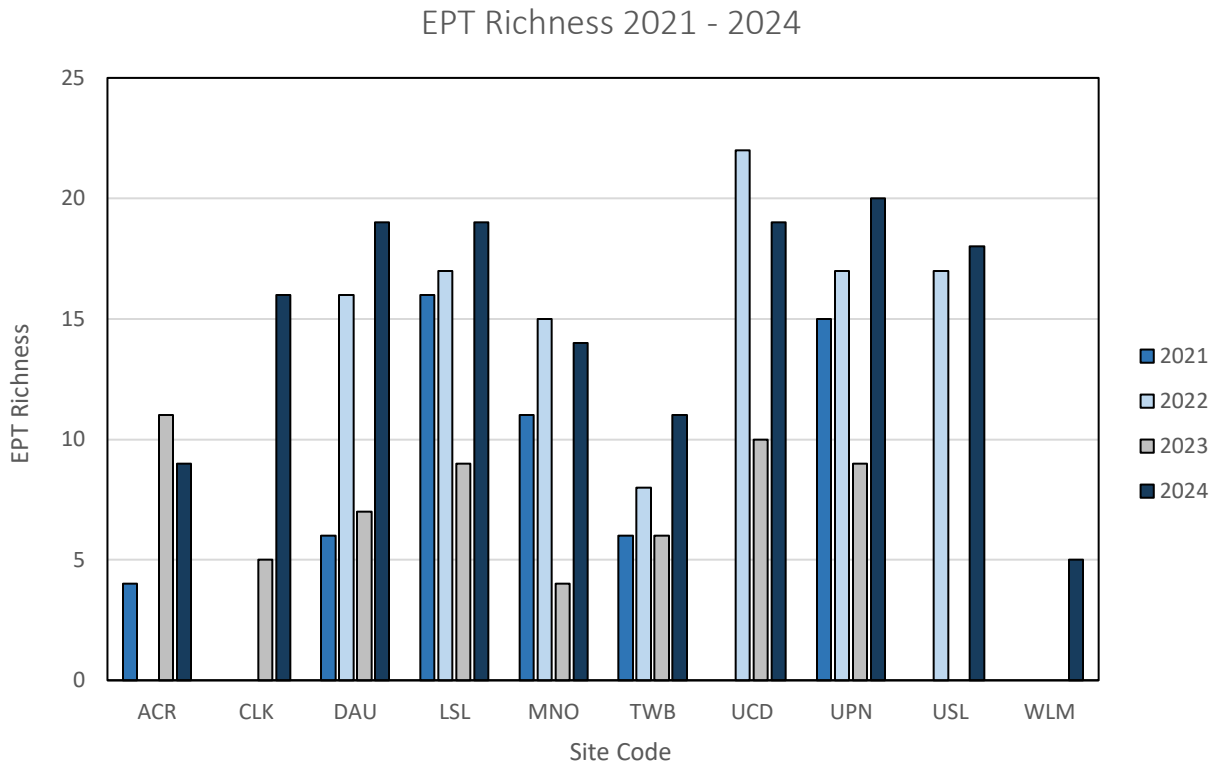


***Figure 3.*** *EPT richness data for 2021 to 2024 macroinvertebrate sampling.*

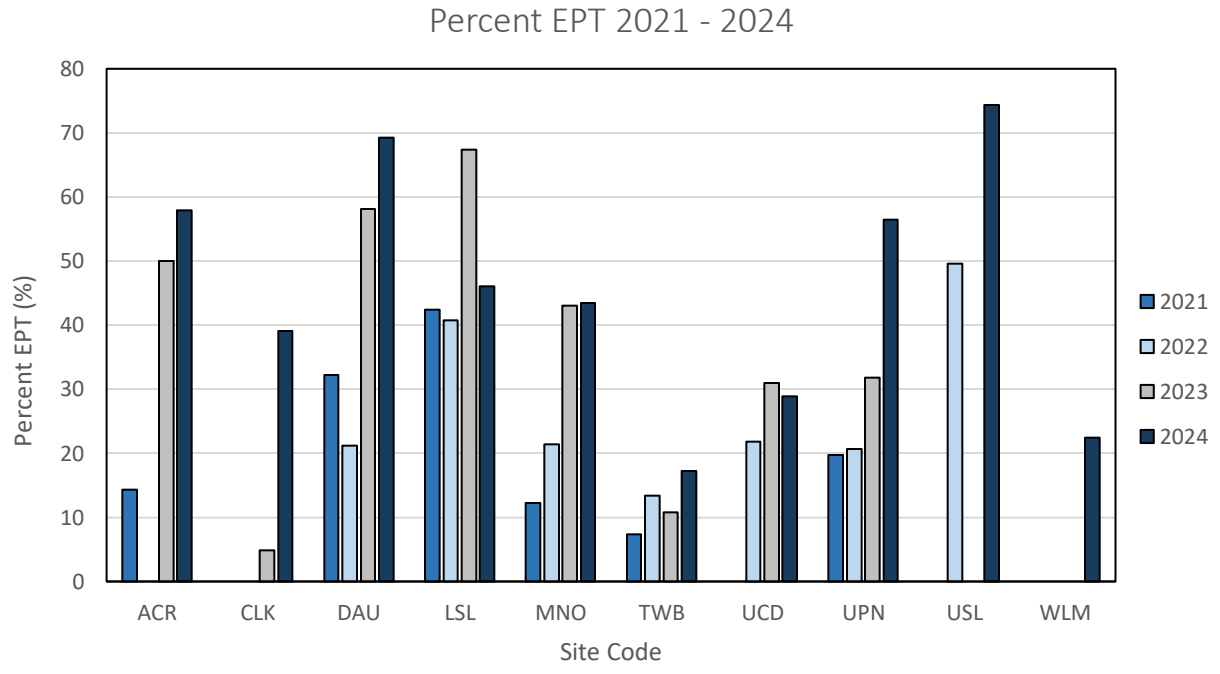


***Figure 4.*** *Percent EPT data for 2021 to 2024 macroinvertebrate sampling.*

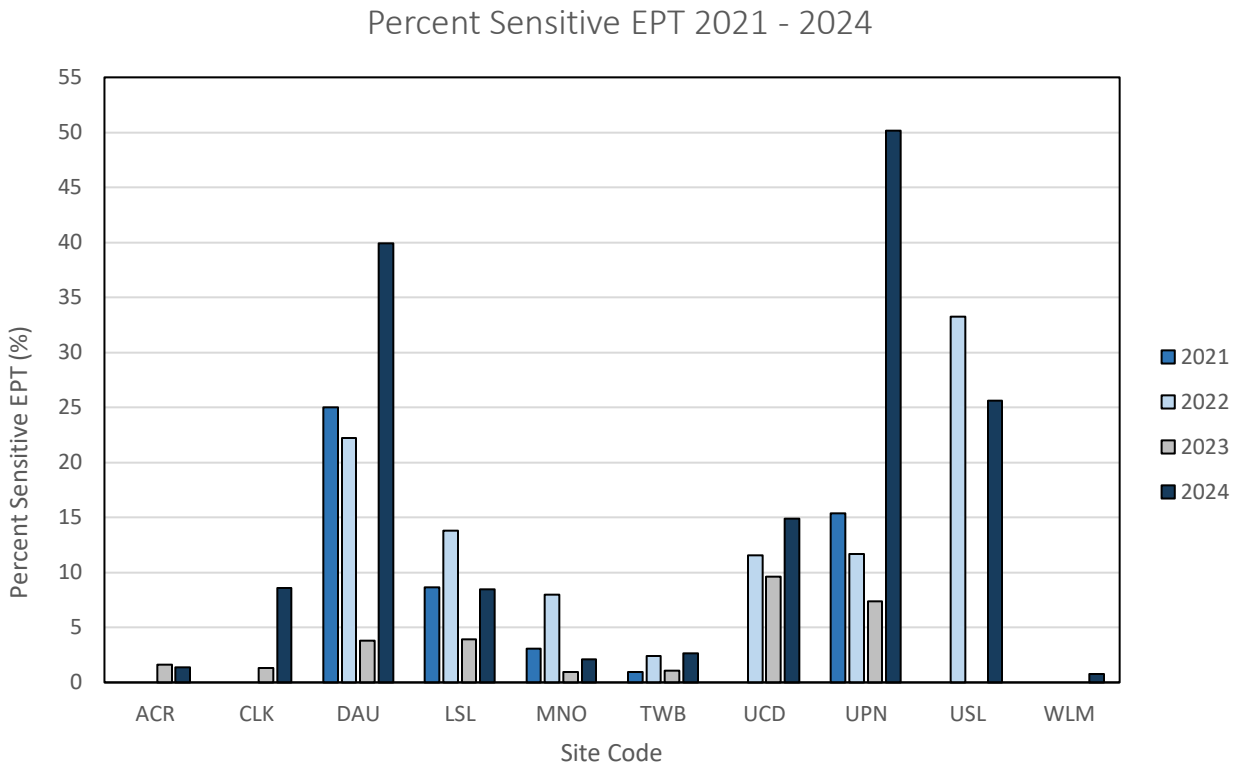


***Figure 5.*** *Percent sensitive EPT data for 2021 to 2024 macroinvertebrate sampling.*

## Biotic Indices

The Estuary Program uses a statewide biological scoring tool to assess overall stream health called the California Stream Condition Index (CSCI). The CSCI uses biotic and environmental data to measure how well a site's observed condition matches its expected condition using a numeric scoring system to interpret stream degradation, as shown in Table 3 (Rehn et al., 2015).

Historically, the Estuary Program used the Southern California Coastal Index of Biotic Integrity (SoCal B-IBI, or IBI) as a primary index for classifying stream health. But as the metric was designed for the coastal region from Monterey to San Diego[3], the method doesn't allow for direct comparison with data from outside of this geographic area. The Estuary Program recently adopted the use of the CSCI, which is not tied to a specific region in California. This was driven in part by a shift by the State Water Resources Control Board to utilize CSCI for its own analysis of waterbody impairment.

[3] The SoCal IBI score is only applicable in a range from Monterey to San Diego. This region tracks closely with the jurisdictions of Regional Water Quality Control Boards 3, 4, 8, and 9.

***Table 3.*** *CSCI score ranges and associated categories, adapted from Rehn et al, 2015.*

| CSCI Score | CSCI Score Category |
|---|---|
| > 1.00 | Better ecological and biological stream conditions than expected |
| ≥ 0.92 up to 1.00 | Likely intact stream conditions |
| ≥ 0.79 up to 0.92 | Possibly altered stream conditions |
| 0.63 to 0.79 | Likely altered stream conditions |
| ≤ 0.62 | Very likely altered stream conditions |

Table 4 shows a comparison of recent CSCI scores (2021 to 2024) using the classifications outlined in Table 3. A dashed line indicates that no monitoring occurred during that year. A table of all CSCI scores is available in Appendix B.

***Table 4.*** CSCI scores from 2021 to 2024.

| Site | Year | CSCI Score | CSCI Status |
|---|---|---|---|
| **ACR** (Chorro Creek below WWTP) | 2021 | 0.68 | Likely Altered |
| | 2022 | --- | --- |
| | 2023 | 0.82 | Possibly Altered |
| | 2024 | 0.89 | Possibly Altered |
| **TWB** (Lower Chorro Creek) | 2021 | 0.79 | Likely Altered |
| | 2022 | 0.85 | Possibly Altered |
| | 2023 | 0.90 | Possibly Altered |
| | 2024 | 0.96 | Likely Intact |
| **UCD** (Above Chorro Reservoir) | 2021 | --- | --- |
| | 2022 | 1.04 | Better than expected |
| | 2023 | 0.91 | Possibly Altered |
| | 2024 | 1.09 | Better than expected |
| **CLK** (Upper Los Osos Creek) | 2021 | --- | --- |
| | 2022 | --- | --- |
| | 2023 | 0.72 | Likely Altered |
| | 2024 | 0.88 | Possibly Altered |
| **WLM** (Walters Creek) | 2021 | --- | --- |
| | 2022 | --- | --- |
| | 2023 | --- | --- |
| | 2024 | 0.63 | Likely Altered |
| **MNO** (San Bernardo Creek) | 2021 | 0.82 | Possibly Altered |
| | 2022 | 0.94 | Likely Intact |
| | 2023 | 0.68 | Likely Altered |
| | 2024 | 1.02 | Better than expected |
| **LSL** (Lower San Luisito Creek) | 2021 | 0.98 | Likely Intact |

| Site | Year | CSCI Score | CSCI Status |
|---|---|---|---|
| | 2022 | 1.02 | Likely Intact |
| | 2023 | 0.83 | Possibly Altered |
| | 2024 | 1.05 | Better than expected |
| **USL** (Upper San Luisito Creek) | 2021 | --- | --- |
| | 2022 | 1.02 | Better than expected |
| | 2023 | --- | --- |
| | 2024 | 0.99 | Likely Intact |
| **UPN** (Upper Pennington Creek) | 2021 | 0.97 | Likely Intact |
| | 2022 | 1.13 | Better than expected |
| | 2023 | 0.77 | Likely Altered |
| | 2024 | 1.14 | Better than expected |
| **DAU** (Upper Dairy Creek) | 2021 | 0.8 | Possibly Altered |
| | 2022 | 0.94 | Likely Intact |
| | 2023 | 0.69 | Likely Altered |
| | 2024 | 1.19 | Better than expected |

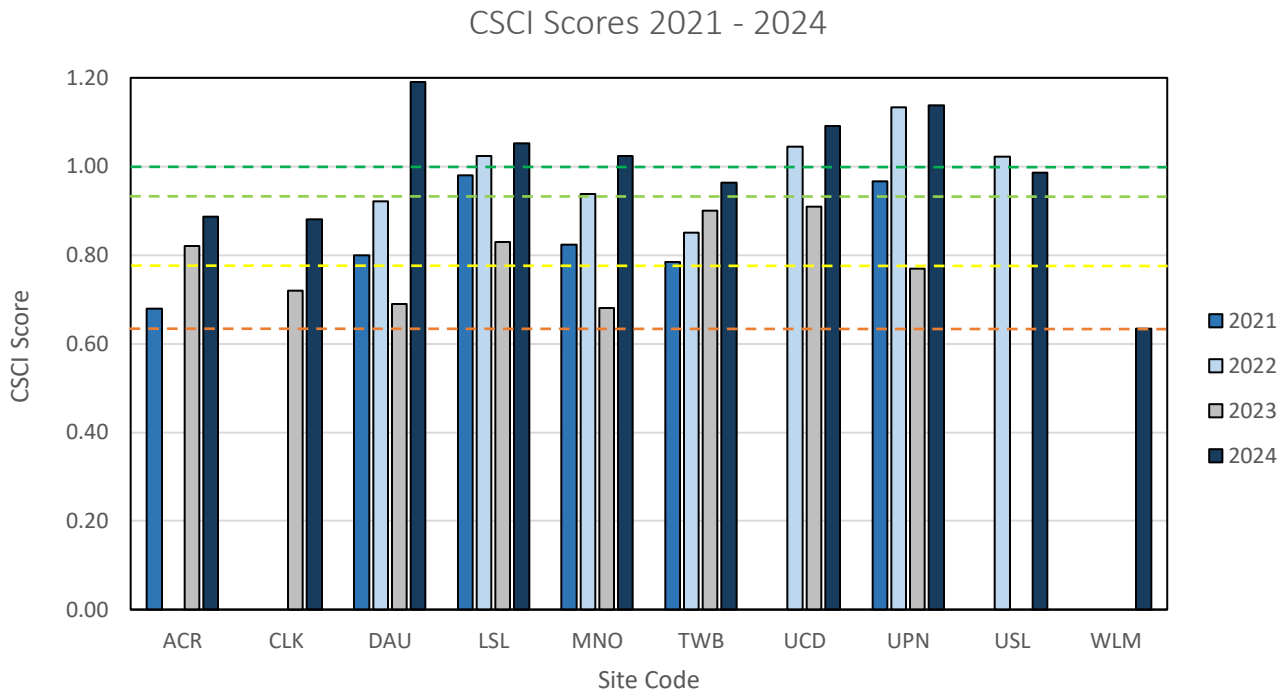


***Figure 6.*** *CSCI scores for 2021 to 2024 bioassessment monitoring.*

Figures 7 and 8 show the spatial distribution of CSCI scores along creek mainstems. Figure 7 shows the 2024 scores averaged by creek segment, and Figure 8 shows the average CSCI scores by creek segment from 1994 to 2024. For CSCI score criteria, refer to Table 3.

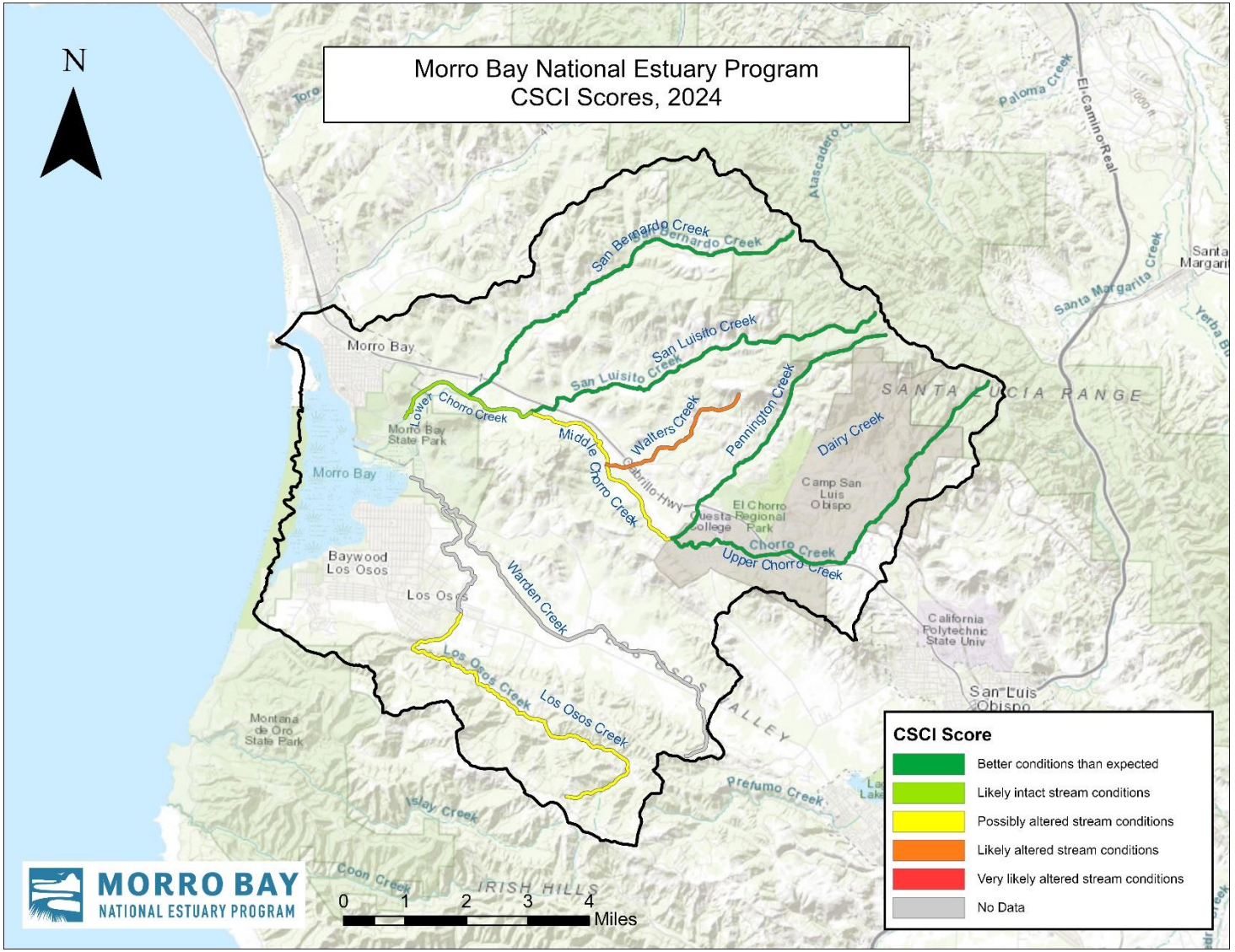


***Figure 7.*** *Mainstem stream segments and their ecological health designations based on 2024 CSCI scores averaged by creek segment.*

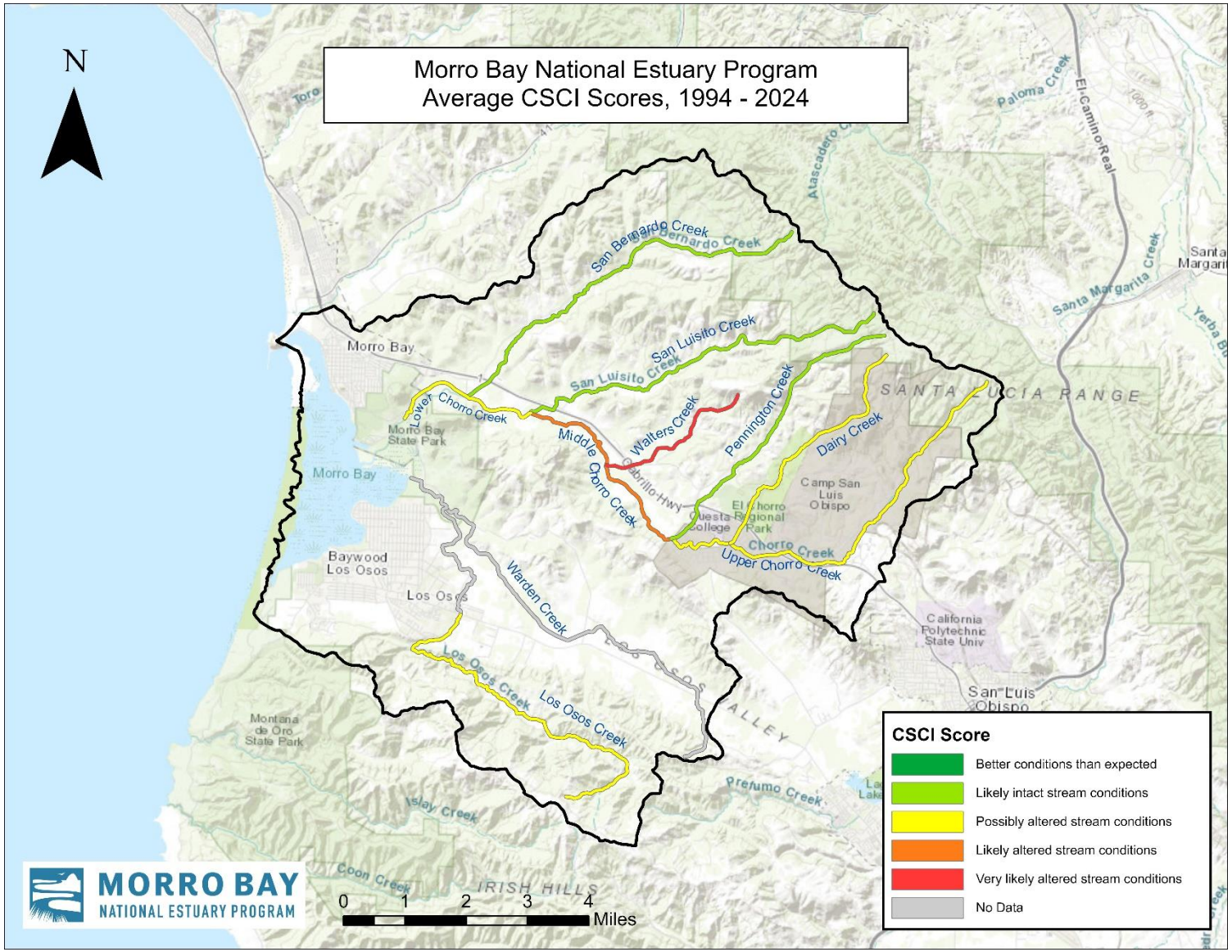


***Figure 8.*** *Mainstem stream segments and their ecological health designations based on average CSCI scores from 1994 to 2024. Refer to Appendix B for more detailed information regarding individual site scores and number of data points.*

## Conclusions

The results from the 2024 monitoring effort reflect an overall improvement in stream health throughout the Morro Bay watershed compared to 2023. Water year[4] (WY) 2023 was one of the wettest years on record. The County of San Luis Obispo's gauge at Canet Road (Station 753) recorded 31.9 inches of annual rainfall, which is nearly 46% higher than the area's average of 21.8 inches per year (Cal Poly, 2017). This led to widespread flooding and extensive scouring, which likely disrupted macroinvertebrate communities. While flooding and disturbance play a critical role in regulating macroinvertebrate species diversity and structure, research has shown that flooding events that alter streambed materials, remove vegetation, or change food availability may lower benthic macroinvertebrate biomass, disproportionately impacting sensitive taxa (Supp & Ernest, 2014).

By contrast, the 2024 results indicate significant ecological recovery throughout the watershed, with the most notable improvements observed in the tributaries. Upper Dairy Creek (DAU), for example, had a CSCI score that increased from 0.69 in 2023 (Likely altered), to 1.19 in 2024 (Better conditions than expected). This site also had a substantial increase in percent sensitive EPT, increasing from 3.8% to 39.9%. Upper Pennington Creek (UPN) also experienced a dramatic improvement, with CSCI increasing from 0.77 in 2023 (Likely altered), to 1.14 in 2024 (Better than expected). This site saw corresponding increases in metrics, with an increase in percent sensitive EPT from 7.4% in 2023, to 50.2% in 2024, which is the highest percent sensitive EPT recorded at UPN in over a decade. Similarly, San Bernardo Creek (MNO) exhibited recovery with a 51% increase in its CSCI score and marked improvements in taxa richness, EPT richness, and percent sensitive EPT. Upper Los Osos Creek (CLK), however, appears to be recovering more slowly than other tributaries, with only modest improvements in CSCI score and taxa metrics. This site's slower rebound may reflect unique site conditions or other site-specific stressors.

The mainstem of Chorro Creek saw only partial recovery, with CSCI scores on lower Chorro Creek (TWB) increasing by only 7% (0.90 to 0.96), and middle Chorro Creek (ACR) increasing by 8% (0.82 to 0.89). Metrics for percent sensitive EPT and taxa richness remained relatively stable on the mainstem, with slightly higher rates of recovery at TWB than ACR. The relatively minor increases at ACR may be partially attributed to its location downstream of a wastewater treatment plant, where elevated nutrients and water temperatures could potentially further stress the macroinvertebrate community, slowing its recovery relative to other sites.

During 2024, the Estuary Program monitored a site on Walters Creek (WLM) to serve as pre-project data for future restoration. While WLM did not score well during 2024, the results provide valuable baseline data to assess future project effectiveness.

## Monitoring Partnerships

In 2021, the Harold J. Miossi Charitable Trust approached the Estuary Program about a partnership to expand bioassessment monitoring into the neighboring San Luis Obispo watershed. While the Estuary Program typically limits its work to within the Morro Bay watershed, a goal of the program is to share expertise and resources that build capacity. Since then, the Estuary Program has worked with Cal Poly

[4] Water year 2023 is defined as October 1, 2022 to September 30, 2023.

and the City of San Luis Obispo to develop a bioassessment monitoring framework for the San Luis Obispo watershed.

The third year of monitoring was completed in 2024 at six stream segments in the San Luis Obispo watershed, with three sites on San Luis Obispo Creek and three sites on Stenner Creek. Results will be compiled into a final report available for download through the Cal Poly Digital Commons website at: https://digitalcommons.calpoly.edu/nres_rpt/50/

## Future Efforts

While more conventional methods of water quality monitoring may capture instantaneous conditions, they cannot measure as comprehensively the overall aquatic health of a water body. Biotic data collected during bioassessment allows for a more complete picture of creek health. This data is of value to the Estuary Program, its partners, and to the CCRWQCB who utilizes this data to assess impairment in Central Coast waterbodies. Due to the value of this data to the program and its partners, the Estuary Program plans to continue annual bioassessment monitoring for the foreseeable future.

## Data Availability

Bioassessment monitoring data and CSCI scores are publicly available from the California Environmental Data Exchange Network (CEDEN), a State Water Resources Control Board data portal.

To retrieve data, visit https://ceden.waterboards.ca.gov/.

- Click “Start” to retrieve data.
- Select “Process” as desired.
- For taxonomy data, select “Benthic (Taxonomy)” as the Category. For habitat data, including CSCI scores, select “Habitat” as the Category.
- Select “Morro Bay National Estuary Program” as the Program.
- Under “FromDate” and “ToDate,” select the date range desired.
- Click on “Submit” to retrieve data.

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# Appendix A. Bioassessment Monitoring Locations

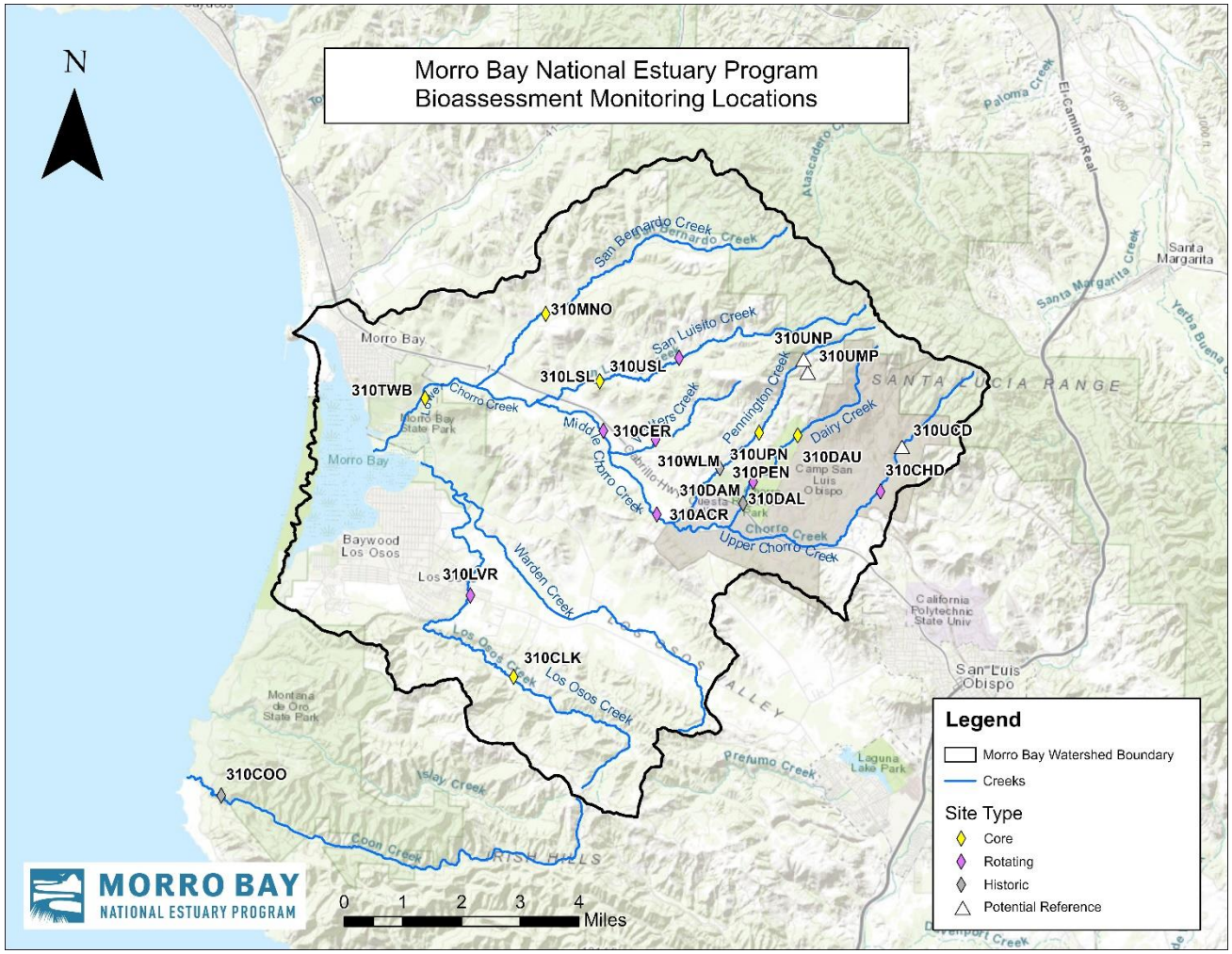


***Figure 9.*** *Core, rotating, and historic bioassessment monitoring locations. Potential reference sites are located in the upper watershed and denoted with a white triangle.*

# Appendix B: CSCI Scores 1994 – 2024

| Year | Chorro Creek | | | | | Dairy Creek | | | Pennington Creek | | | | Walters Creek | | San Luisito Creek | | San Bernardo Creek | Los Osos Creek | | Coon Creek |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Code | UCD | CHD | ACR | CER | TWB | DAU | DAM | DAL | PEN | UMP | UNP | UPN | WAL | WLM | LSL | USL | MNO | CLK | LVR | COO |
| 1994 | * | 0.70 | * | * | * | 0.94 | 0.62 | * | 0.94 | * | * | * | * | * | * | * | * | * | * | * |
| 1995 | * | 0.57 | * | * | * | 0.61 | 0.71 | * | 0.85 | * | * | * | * | * | * | * | * | * | * | * |
| 1996 | * | 0.76 | * | * | * | | 1.09 | * | 1.17 | * | * | * | 0.48 | * | * | * | * | 1.02 | 1.05 | * |
| 1997 | * | 0.84 | * | * | 0.73 | 1.12 | 1.09 | 1.13 | 1.13 | * | * | * | 0.49 | * | * | * | * | 1.02 | * | 1.13 |
| 1998 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 1999 | * | * | * | * | * | 0.40 | 0.87 | 0.88 | 1.04 | * | * | * | * | * | * | * | * | 1.06 | * | * |
| 2000 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 2001 | * | 0.76 | * | * | * | 1.07 | * | 1.18 | 0.98 | * | * | * | 0.75 | * | * | * | * | * | * | * |
| 2002 | * | * | * | * | 0.73 | * | * | * | * | * | * | * | * | * | * | * | * | 0.93 | * | 0.97 |
| 2003 | * | * | * | 0.82 | 0.74 | * | * | 0.87 | * | * | * | * | * | * | * | * | * | 0.96 | * | 0.98 |
| 2004 | * | 0.85 | * | 0.67 | * | * | * | 0.77 | 0.85 | * | * | * | * | * | * | * | * | 0.94 | * | * |
| 2005 | * | | * | 0.67 | * | * | * | 0.75 | * | * | * | * | * | * | * | * | * | 0.74 | * | * |
| 2006 | * | 0.71 | * | * | 0.90 | * | * | 0.83 | 0.82 | * | * | 0.97 | * | * | * | * | * | 0.88 | * | 1.05 |
| 2007 | * | 0.82 | * | 0.75 | 0.82 | * | * | * | * | * | * | 1.09 | * | * | * | * | * | * | * | 1.26 |
| 2008 | * | 0.81 | * | 0.77 | 1.03 | 1.02 | 0.82 | 0.85 | * | * | * | 1.17 | 0.44 | * | 0.98 | * | 1.03 | 0.76 | * | 1.13 |
| 2009 | * | * | * | 0.70 | * | 1.03 | 0.96 | * | * | * | * | * | * | * | 0.98 | * | * | * | * | * |
| 2010 | * | * | * | * | * | 1.08 | 0.70 | 0.74 | * | * | * | * | 0.56 | * | 1.03 | 1.15 | 1.01 | 0.95 | 0.57 | * |
| 2011 | * | 0.92 | * | 0.84 | * | 1.03 | 1.14 | * | * | * | * | | * | * | 1.00 | 1.09 | 0.99 | 1.06 | 0.91 | * |
| 2012 | * | * | * | 0.87 | 0.79 | * | * | * | * | * | * | 1.04 | * | * | 1.06 | * | 1.01 | 0.85 | * | * |
| 2013 | * | * | * | 0.59 | 0.91 | * | * | * | * | * | * | 1.13 | * | * | 0.68 | 0.92 | 1.02 | * | * | * |
| 2014 | * | * | * | 0.66 | 0.78 | * | * | * | * | * | * | 1.04 | * | * | 0.86 | 0.89 | 0.61 | * | * | * |
| 2015 | * | 0.77 | * | 0.79 | 0.61 | * | * | * | * | * | * | 0.88 | * | * | 0.97 | 1.03 | 0.72 | * | * | * |
| 2016 | * | 0.82 | * | 0.81 | 0.71 | * | * | * | 0.83 | * | * | 1.04 | * | * | 1.00 | 1.09 | 0.86 | * | * | * |
| 2017 | * | 0.78 | * | 0.82 | 0.98 | 0.98 | 0.81 | * | * | * | * | 1.10 | * | 0.64 | 1.04 | * | 0.98 | 0.76 | 0.64 | 1.07 |
| 2018 | * | 0.92 | * | 0.79 | 0.96 | 1.20 | * | * | * | * | * | 1.06 | * | * | 1.10 | 1.17 | 1.06 | 0.75 | * | 0.97 |
| 2019 | * | * | 0.86 | 0.76 | 0.91 | 0.92 | 0.82 | * | * | * | * | 0.98 | * | * | 1.05 | * | 1.11 | 0.90 | 0.65 | * |
| 2020 | * | * | 0.83 | * | 0.97 | * | * | * | * | * | * | 0.98 | * | * | 0.88 | 0.97 | 0.97 | 0.97 | * | * |
| 2021 | * | * | 0.68 | 0.58 | 0.79 | 0.80 | 0.82 | * | * | 0.96 | 0.79 | 0.97 | * | * | 0.98 | * | 0.82 | * | * | * |
| 2022 | 1.04 | 0.88 | * | * | 0.85 | 0.92 | * | * | * | 0.89 | 0.84 | 1.13 | * | * | 1.02 | 1.02 | 0.94 | * | * | * |
| 2023 | 0.91 | * | 0.82 | 0.78 | 0.90 | 0.69 | 0.69 | * | * | * | * | 0.77 | * | * | 0.83 | * | 0.68 | 0.72 | 0.67 | * |
| 2024 | 1.09 | * | 0.89 | * | 0.96 | 1.19 | * | * | * | * | * | 1.14 | * | 0.63 | 1.05 | 0.99 | 1.02 | 0.88 | * | * |
| **Average CSCI** | **1.02** | **0.79** | **0.81** | **0.74** | **0.85** | **0.94** | **0.86** | **0.89** | **0.96** | **0.92** | **0.82** | **1.03** | **0.54** | **0.64** | **0.97** | **1.03** | **0.93** | **0.90** | **0.75** | **1.07** |

| CSCI Score | CSCI Score Category |
|---|---|
| > 1.00 | Better ecological and biological stream conditions than expected |
| ≥ 0.92 up to 1.00 | Likely intact stream conditions |
| ≥ 0.79 up to 0.92 | Possibly altered stream conditions |
| 0.63 to 0.79 | Likely altered stream conditions |
| ≤ 0.62 | Very likely altered stream conditions |