



# 6-8 Middle School Science Enrichment

## Coastal Systems, Field Science, and Conservation

These mixed-grade middle school (grades 6-8) enrichment classes allow students to investigate Southern California coastal systems through field science, data collection, topography and map analysis, habitat comparison, and conservation efforts. Across 12 weeks, students study in La Jolla, Mission Beach and Mission Bay, and Torrey Pines while exploring relationships among erosion, engineering, biodiversity, water conditions, watershed processes, and human decision-making.

The 1.5 hour-long classes are held each Friday, in 4-week sessions. The course is structured as three of these 4-week sessions that can be taken individually or as a full sequence over 12 weeks. Students maintain field journals, work with partners, collect structured observations and measurements, and produce evidence-based work through models and art-based projects.

## Course Rationale

Middle school students are ready to investigate coastal environments as interacting systems. This course emphasizes cause-and-effect relationships, systems thinking, and the use of evidence to explain how geoscience processes and human choices influence ecosystem stability.

Repeated exposure to multiple field sites in La Jolla, Mission Beach and Mission Bay, and Torrey Pines will help students compare dynamic coastal processes, analyze human impact, and develop stronger scientific communication and problem-solving skills.

## Fieldwork and Lab-Style Learning

Because the course includes recurring investigations, field notebooks, structured counts, water testing, map analysis, and performance assessments, it functions as a rigorous science enrichment experience with lab-style expectations. Students will be documenting their field work and can show evidence of learning through projects.

## Instructor Value

Our team-teaching structure is made up of a professional marine biologist who provides current field practices, and science-specific expertise and an experienced educator with a M.Ed. in Learning and Instruction who supports middle school writing, data interpretation, discussion expectations, and grade-level Claim, Evidence, and Reasoning (CER).

## All Grade 6-8 Learning

The session can be used as an environmental science enrichment or marine science elective that serves grades 6-8 in:

- Environmental and marine science enrichment grounded in field investigation, literacy, and visual communication.
- Practice with structured journaling, partner investigations, water testing, habitat comparison, and map-based analysis.
- Discussion of conservation, public policy, coastal management, and careers connected to marine science and stewardship.

## Mixed-Grade Differentiation

**Grade 6:** Students receive more support with structured data entry, map interpretation, and guided CER writing.

**Grades 7-8:** Older middle school students work with increasing independence in field analysis, comparative reasoning across sites, and evaluating methods for monitoring or reducing human impact.

## Essential Questions

1. How do geoscience processes such as erosion, sediment movement, runoff, and wave energy change coastal habitats?
2. How do organisms interact with the conditions and resources available in beaches, tidepools, bays, lagoons, and bluff systems?
3. How do human engineering, public policy, and conservation choices influence ecosystem health?
4. How can field data, models, and visual communication be used to explain and improve how humans can better care for coastal systems?

## Key Learning Targets

1. Collect and organize field observations into simple datasets in a scientific format.
2. Use evidence to explain what processes change shorelines and habitat.
3. Compare ecological interactions and habitats across different coastal systems.
4. Evaluate how human activities and management decisions affect biodiversity and environmental health.
5. Apply scientific principles to discuss monitoring or minimizing human impact.
6. Communicate findings through CER writing, verbal presentations, models, and art.

## Course Outcomes

5. Construct evidence-based explanations on what processes shape coastal environments at different scales.
6. Analyze habitat patterns and species interactions using field observations and simple datasets.
7. Apply scientific reasoning to environmental monitoring and human impact problems in local San Diego coastal settings.
8. Evaluate city and other organizations conservation and management choices using evidence from fieldwork and maps.
9. Create and present projects that communicate scientifically grounded conclusions about ecosystem health, conservation and environmental protection.

## Grades 6-8 California Standards Alignment

Area	Code	Short Description	Relevance to 12-Week Course
CA NGSS	MS-ESS2-2	Construct an explanation based on evidence for how geoscience processes have changed Earth's surface.	Central to erosion, sediment movement, shoreline change, and watershed effects.
CA NGSS	MS-LS2-2	Construct an explanation that predicts patterns of interactions among organisms across ecosystems.	Supports tidepool ecology, predator-prey examples, and habitat-zone comparison.
CA NGSS	MS-LS2-1	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations.	Fits organism counts, habitat conditions, and water or space availability discussions.
CA NGSS	MS-ESS3-3	Apply scientific principles to design a method for monitoring and minimizing human impact on the environment.	Aligns to monitoring, conservation, and problem solving for environmental issues.
CA NGSS	MS-ESS3-4	Construct an argument supported by evidence for how increases in human population and per-capita consumption impact Earth's systems.	Supports analysis of recreation, pollution, development, and coastal management tradeoffs.
EP&Cs	Principles I-V	Natural systems support communities; ecosystems and human systems affect one another; environmental decisions require multiple considerations.	Frames scaffolding and links the classes across all sessions
ELA	RST.6-8.1 / WHST.6-8.2	Cite evidence from science texts and write informative science explanations.	Used in scientific texts, journal writing, CER responses, and presentations.
ELA	SL.6.4 / SL.7.4 / SL.8.4	Present claims and findings with relevant evidence and clear organization.	Supports formal sharing of field conclusions using evidence in written work and projects.
Arts	6-8 VA:Cr2 / VA:Pr6	Develop and present art using informed material and design choices.	Expected in landscape modeling, painting, and conservation art.

## 12-Week Sequence Overview

4-Week Session Focus	Primary Sites	Main Science Lens	Culminating Product
La Jolla protected coast and tidepool systems	La Jolla Shores, Dike Rock, Ellen Browning Scripps Park, Children's Pool	MPA boundaries, topography intro, tidepool ecology, nature interaction	Field journal, recycled paper (conservation project), Claim, Evidence, and Reasoning (CER) on MPAs
Mission Beach and Mission Bay human interaction and habitat comparison	South Mission Beach, Mission Point Park, Crown Point, De Anza Cove	Human engineering, water energy, habitat zones, environmental management	Water dataset summary, nature model that reflects human influence
Torrey Pines terrain, erosion, watershed connections and differences	Torrey Pines bluff/shore sites	Erosion, runoff, bluff stability, human impact on the coast	Coastal painting, CER on coastal change, human impact, or watersheds

## Key Course Learning Goals

Focus	Key Learning Targets
Systems and processes	Explain how coastal processes and landforms interact with habitat conditions and biodiversity.
Field data and analysis	Maintain organized notebooks, compare datasets, and use evidence to support explanations and claims.
Human impact and responsibility	Evaluate how recreation, engineering, development, and conservation decisions affect coastal systems.
Communication and link to future careers	Present findings through CER, modeling, and visual communication while connecting learning to marine and coastal careers.

## Assessment and Evidence of Learning

Assessment	Description	Standards Emphasis
Field journal	Structured notes, maps, counts, data tables, sketches, and reflections across all sessions.	SEP 3, 4, 8; WHST.6-8.2
Intermediate datasets	Water observations, organism counts, and habitat comparisons collected with increasing independence.	MS-LS2-1; MS-LS2-2
Independent analysis of maps/topography	Comparing maps of MPAs, shorelines, and topographic features to explain coastal change.	MS-ESS2-2
Art/Creative projects	Environmental model, recycled-paper/algae project, and Torrey Pines art tied to evidence.	Arts + EP&Cs
Claim-Evidence-Reasoning (CER) presentations	Evidence-based discussions or written claims about human impact, erosion, or ecosystem health in varied San Diego locations	MS-ESS3-3; MS-ESS3-4