

Seagrass Restoration

A Diverse-Based Solutions Roadmap Fact Sheet



Seagrasses are flowering plants that grow entirely underwater and form dense meadows in shallow areas.¹ Seagrass restoration refers to any activities that help return seagrass ecosystems as close as possible to their state before anthropogenic disturbances.² Seagrass beds are widespread throughout the coastal waters of the United States.³ Seagrass populations are declining due to coastal development, degraded water quality and the impacts of climate change like ocean acidification and rising ocean temperature.^{4,5}

TECHNICAL APPROACH

Early seagrass restoration focused on reducing environmental stressors to encourage new plant growth,⁶ however recently more active forms of restoration have included:

- Transplanting seagrass by moving plants from a donor site to the restoration site
- Seeding seagrass by germinating seagrass seedlings in a nursery and later planting them at the restoration site
- Modifying sediment to encourage seagrass growth. Light is a key factor limiting seagrass growth and suspended sediment in the water attenuates light. To enhance seagrass growth, restoration projects have reduced the amount of suspended sediment to allow more light to penetrate deeper into the water.

BENEFITS

Climate Threat Reduction

- Storm protection
- Reduced flooding
- Sea level rise adaptation and resilience
- Carbon storage and sequestration

Social and Economic

- Reduced erosion
- Mental health and wellbeing
- Resilient fisheries
- Cultural values
- Jobs
- Recreational opportunities
- Public health and safety

Ecological

- Enhanced biodiversity
- Improved water quality
- Increased primary productivity

SITE SUITABILITY FACTORS

- ✓ Light availability
- ✓ Little to no salinity fluctuations
- ✓ Depth between 0.8-1.5 meters
- ✓ History of previous seagrass growth
- ✓ High bivalve biomass
- ✗ High wave energy
- ✗ High populations of lugworms (*Nereididae*) and lugworms (*Arenicola marina*)
- ✗ Close to sources of nutrient pollution
- ✗ High boat traffic
- ✗ Areas likely to be dredged

EXAMPLE PROJECT

The Drakes Estero Eelgrass Restoration Project at the Point Reyes National Seashore was a joint project between NOAA and the Point Reyes National Seashore Association. The site had previously been used for mariculture, which resulted in a significant amount of debris in the water. After removing debris, which had blocked light from reaching the sea bed, historic eelgrass beds naturally grew back.



An excavator on a barge mechanically removing debris from the water.
Photo credit: [National Park Service](#)

REFERENCES

- 1 Smithsonian. 2018. "Seagrass and Seagrass Beds." *Smithsonian Institution: Ocean Find Your Blue*. <https://ocean.si.edu/ocean-life/plants-algae/seagrass-and-seagrass-beds>
- 2 Paling, Mark Fonseca, Marieke Katwijk, and Mike van Keulen. 2009. "Seagrass Restoration." In *Coastal Wetlands: An Integrated Ecosystems Approach*, 687–713. <https://books.google.com/books?hl=en&lr=&id=xpgnDQAAQBAJ&oi=fnd&pg=PP1&dq=Coastal+wetlands:+an+integrated+ecosystems+approach.&ots=PCGDZHVzmx&sig=B5wnmqT1Tpgb3GCVwVlarOpmTho#v=onepage&q=Coastal%20wetlands%3A%20an%20integrated%20ecosystems%20approach.&f=false>
- 3 Gumusay, Mustafa, Tolga Bakirman, Inci Tüney Kızılkaya, and Nedim Aykut. 2019. "A Review of Seagrass Detection, Mapping and Monitoring Applications Using Acoustic Systems." *European Journal of Remote Sensing* 52 (January): 1–29. <https://doi.org/10.1080/22797254.2018.1544838>.
- 4 Waycott, Michelle, Carlos M. Duarte, Tim J. B. Carruthers, Robert J. Orth, William C. Dennison, Suzanne Olyarnik, Ainsley Calladine, et al. 2009. "Accelerating Loss of Seagrasses across the Globe Threatens Coastal Ecosystems." *Proceedings of the National Academy of Sciences* 106 (30): 12377–81. <https://doi.org/10.1073/pnas.0905620106>.
- 5 UNEP. 2023, March 1. "Five Ways Often-unheralded Seagrasses Boost Biodiversity." *United Nations Environment Programme*. <https://www.unep.org/news-and-stories/story/five-ways-often-unheralded-seagrasses-boost-biodiversity>
- 6 Valdez, Stephanie R., Y. Stacy Zhang, Tjisse van der Heide, Mathew A. Vanderklift, Flavia Tarquinio, Robert J. Orth, and Brian R. Silliman. 2020. "Positive Ecological Interactions and the Success of Seagrass Restoration." *Frontiers in Marine Science* 7. <https://www.frontiersin.org/articles/10.3389/fmars.2020.00091>.

CITATION

Warnell, K., Mason, S., Siegle, A., Merritt, M., & Olander, L. 2023. "Fact Sheet: Seagrass Restoration." *NBS Roadmap Project*. Durham, NC: Nicholas Institute for Energy, Environment & Sustainability, Duke University. www.nicholasinstitute.duke.edu/roadmap.

KEY RESOURCES

Title and Link	Site Suitability	Design and Construction	Monitoring Guidance	Example Projects
Guidelines for the Restoration and Conservation of Seagrasses in the United States and Adjacent Waters	✓	✓	✓	✗
Eelgrass Restoration on the U.S. West Coast (US ACF)	✓	✓	✗	✓

LEARN MORE

Visit the DOI Nature-Based Solutions Roadmap for more information on seagrass restoration, other nature-based solutions, and principles and considerations broadly relevant for nature-based solutions projects. The seagrass restoration summary includes additional details on each section included in this fact sheet, plus information on operations and maintenance, common barriers, and more resources and example projects.

Explore the Roadmap



Full Roadmap Document



Seagrass Restoration Section

www.nicholasinstitute.duke.edu/roadmap