



Tide pool in Acadia National Park. Ed Sharron photo.

Rocky Intertidal Monitoring



Rocky intertidal habitat lies between the high and low tide marks, and is regularly covered and exposed by the advance and retreat of the tides. Because they are repeatedly subjected to the air and sun as well as tossed to-and-fro by the incessant action of waves when underwater, the plants and animals that call this zone home must be hardy and adaptable. Despite the formidable challenges that rocky intertidal habitats present, they are nonetheless teeming with a high biodiversity of organisms (many of them at the edge of their physical and ecological tolerances) that have adapted to the unique niche zones contained within it.

Northeast Temperate Network Program Brief

Right: Sea stars are important predators of invertebrates, especially mussels. They are most commonly found in the subtidal zone and in tidal pools low in the intertidal. NETN monitors these echinoderms to track changes in their abundance and size. NPS photo.



Why is the rocky intertidal zone important?

Rocky intertidal communities provide important economic, scientific, educational, and recreational value, and are also highly susceptible to climate change, invasive species, pollution, and trampling.

Monitoring intertidal ecosystems in Acadia National Park and the Boston Harbor Islands National Park Area will help to determine the level of negative impacts to rocky shorelines that are popular with park visitors. Monitoring these two park sites will also show whether changes are occurring across broad scales (hundreds of kilometers). The parks also contain several stretches of relatively untouched intertidal habitat that are monitored as a baseline and to track more indirect human impacts like climate change. Intertidal ecosystems are ideal for sampling with regards to climate change because of two phenomena that are rapidly (geologically speaking) changing due to the warming climate – sea level and air/water temperature – which are critical to determining the elevational range of intertidal species.

How is the monitoring done?

Chasing and being chased by the tides.

Monitoring focuses on target species (also called key or indicator species) that dominate particular zones in rocky intertidal habitats. Rocky shores are monitored across multiple scales (biological, ecological, and landscape) and across relevant disciplines (marine ecology, physical oceanography, and the study of climate change). This long-term, regional, interdisciplinary approach to monitoring helps to improve the NPS's ability to manage these resources.

The monitoring crew has a short window of time to get all the monitoring that needs to be done completed at a site. When the tide is at its lowest point, all data must be gathered in the lowest zones before the tide inexorably rises once more and covers it again. Several techniques are used for monitoring in the rocky intertidal zone. One technique is using "photoquadrats" to track



Upper intertidal

- barnacles

- mussels

Mid-intertidal

- rockweeds

Tidepools

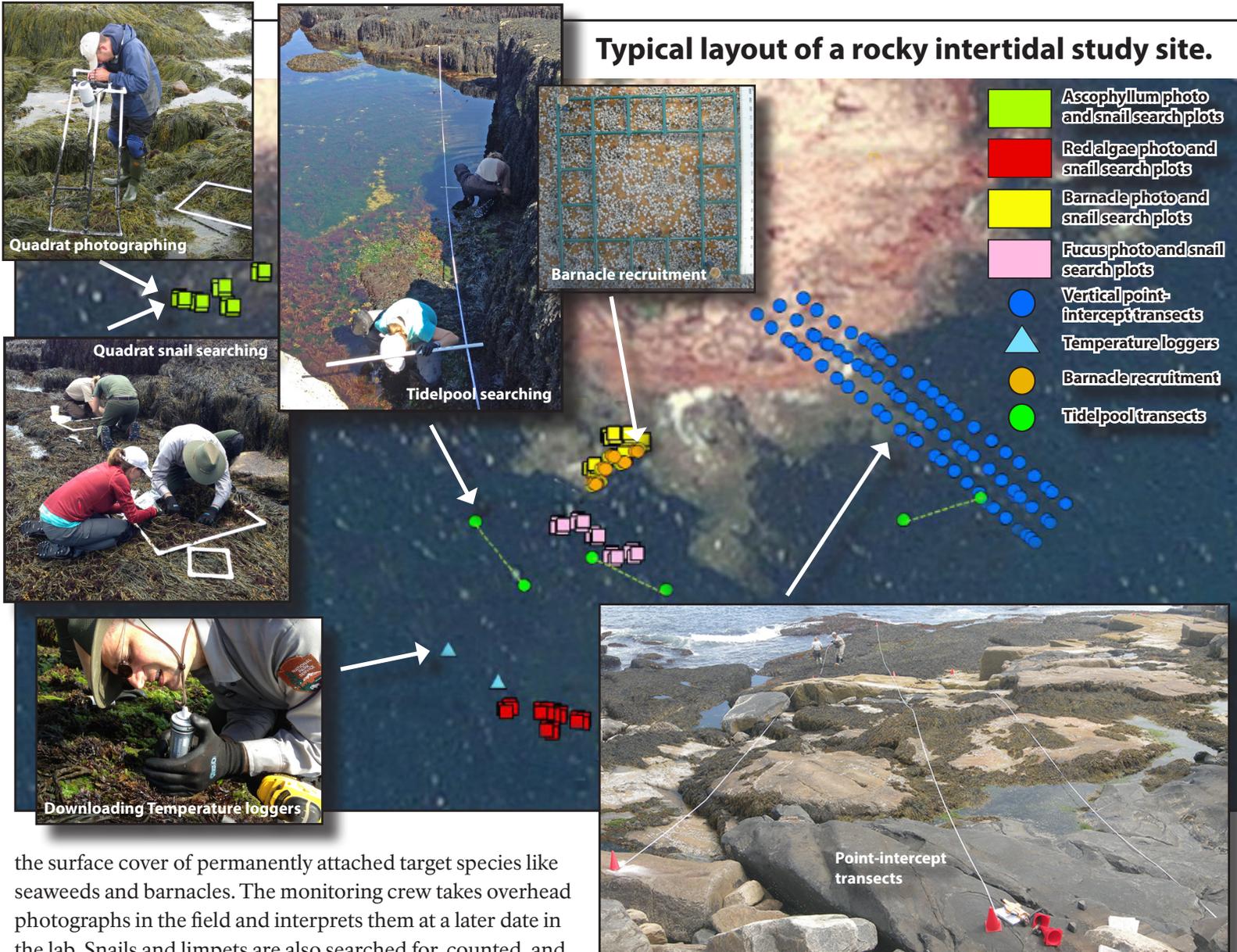
- sea stars

- urchins

Lower intertidal

- red algae

Typical layout of a rocky intertidal study site.



- Ascophyllum photo and snail search plots
- Red algae photo and snail search plots
- Barnacle photo and snail search plots
- Fucus photo and snail search plots
- Vertical point-intercept transects
- Temperature loggers
- Barnacle recruitment
- Tide pool transects

the surface cover of permanently attached target species like seaweeds and barnacles. The monitoring crew takes overhead photographs in the field and interprets them at a later date in the lab. Snails and limpets are also searched for, counted, and measured (only first 10 of each species) in every photoquadrat.

Each site contains three vertical point-intercept transects that extend from the high to the low intertidal. The species or substrates along these transects are recorded by the crew at 30-cm intervals, with the point being to track changes in the range of species with respect to intertidal height.

Tide pool band transects are used to monitor the number and size of sea stars and sea urchins in this important niche habitat. Monitoring is done by counting every sea star and sea urchin (again measuring only the first 10) that fall below a 1-m long pipe held perpendicular to a transect tape across the width of the pool.

Barnacle recruitment (how fast barnacles settle on a bare surface) is a major force that determines succession after disturbance such as trampling or winter storms. It is measured by counting the number of individual barnacles settling on scraped rocks in the

barnacle zone. Barnacle recruitment also encompasses changes that happen beyond intertidal habitats because larvae disperse away from this zone, and may help to give NETN a glimpse of consequences of long-term changes in plankton production, ocean temperature, and oceanic circulation.

Water temperature is measured automatically once every hour using temperature sensors that are deployed in the low intertidal (red algae) zone at each site, and then downloaded during site visits.

More information:

For access to the full monitoring protocol, resource briefs, and more - visit NETN's website and click on the Monitoring / Rocky Intertidal links. You can also "like" NETN on Facebook where you can view pictures and time lapse videos of monitoring crews in the intertidal.



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