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focuses on r's impact on al Bridges' tide

If you visited Natural Bridges State Beach in Santa Cruz at low tide between September 2006 and March of this year, you might have seen a lone park volunteer, clad from head to toe in yellow Gore-tex, purposefully stamping up and down on the rocky flats at the edge of the beach.

Nicole Rucker, an environmental studies graduate student at San Jose State University and volunteer docent at Natural Bridges, tramples the area because she cares. The 65 acre park attracts nearly 1 million visitors yearly, many dedicated tide pool explorers.



Dan Coyro/Sentinel
SJS grad student Nicole Rucker is writing a paper on how visitors affect animals living in the tidepools at Natural Bridges, where she's a volunteer docent.

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Rucker wanted to know how all those feet are affecting the tide pool plants and animals.

The rocky area at Natural Bridges between low and high tides, otherwise know as the intertidal zone, is home to a host of strange creatures -- such as ochre sea stars, the dusky orange, purple, or pink stars that flip their stomachs out of their bodies and ooze thin digestive membranes into the crevices of mussel shells, or owl limpets, innocuous looking brown lumps that each night fastidiously scrape their territory on the rocks clear of invading species to "farm" their favorite food, a certain type of brown algae.

All the intertidal residents have to contend with environmental pressures such as crashing waves, repeated drying when the tide recedes and changes in salt levels from evaporation at low tide. The intertidal

zone is naturally patchy -- areas of bare rock abut giant swatches of mussels and seaweed -- but some of the bare patches are temporary, wiped out by large waves during winter storms.

While giving tide pool tours, Rucker noticed that visitors to the park tend to walk on the bare regions and avoid stepping on visible plants and animals. She wondered if this instinct was actually the path of least harm, or whether walking on the bare patches would ensure they would stay bare for good.

To test her theory, Rucker, along with Rachel O'Malley, chair of environmental studies at San Jose State University, made her own bare patches in the intertidal rock and dutifully trampled them. She found that plants and animals were slower to grow back in the trampled spots than in the control patches.

In September, Natural Bridges was classified as part of a state marine reserve, California's most protected classification under the new Marine Life Protection Act. It is now illegal to fish or take anything from the park. Still, over-visitation is a problem in many coastal parks in California, said Chris Reeves, consultant for Monterey Bay environmental group Save Our Shores, but humans' effects on parks vary depending on the region and the specific creatures present.

Martha Nitzberg, interpretive ranger at Natural Bridges, said it would be logistically difficult to restrict casual use of the park.

"It would take a lot to say, 'you can't go out there,' and put up a fence," she said.

Answers to the question of where people should or shouldn't put their feet are unclear. Previous studies have examined how trampling affects established communities, but the results have been somewhat mixed. A study at Fitzgerald Marine Reserve in Moss Beach found little difference between organisms in

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intertidal regions with large numbers of visitors and those in closed-off areas, said park ranger Steven Durkin. Other studies in Central California also have shown minimal effects, but researchers are not sure if that is because the studies' durations were too short.

Rucker took a slightly different approach, by examining how trampling would affect communities of creatures trying to establish themselves after being swept away by winter storms. To mimic these catastrophic events, Rucker and a team of graduate students attacked the rocks with crow bars, scraping off the organisms in 48 8-by-8 inch squares.

For the rest of her experiment, Rucker was on her own. Every other week at low tide, she put on her hipwaders and bright yellow Gore-Tex overalls and headed out to the rocks to mimic the footsteps of thousands of tourists.

"People look at you kind of funny when you go clomping out looking like a wharf fisherman," she said.

Each cleared spot got either zero, 100, 200, or 300 steps per treatment, meaning Rucker stamped up and down on the rocks 7,200 times whenever she went out for a total of 86,400 steps over the six-month course of her experiment.

Every month, she counted which organisms were coming back in her cleared squares. In general, the squares she didn't trample recovered faster -- after six months, more than 70 percent of their surface was covered with new organisms, while the trampled squares reached less than 50 percent coverage.

There were some exceptions, however. In the lowtide areas, trampling actually seemed to help mussels grow in the bare spots. Rucker thinks that is because in this region, mussels grow in multiple layers, and so the trampling may have helped spread the top layers of mussels around the bare spot down onto the rock.

She also saw more tar spot algae, a flat black algae

that looks like drops of tar, growing in some of her trampled spots. The algae is very hardy and doesn't have many natural predators at Natural Bridges, so Rucker thinks it could be taking advantage of the bare spots to insinuate itself.

"When humans get in the way of natural processes," O'Malley said, "you see weedy species coming in."

The overall findings of Rucker's work suggest a need for balance between education and conservation. Some changes are needed to protect the creatures, Rucker and O'Malley said, but closing off the tide pools to human visits is not an option because education about these fragile areas is important to ensure that future generations will still want to protect them.

"Kids are naturally compassionate, " O'Malley said. "They can turn a snail around from something revolting to a creature they love and want to take care of."

Rucker recommends temporarily closing off certain areas of the tidepools after natural disasters, such as winter storms, so organisms have a chance to recover before they are trampled again. But this too will have to be a balancing act, because closing off some areas will increase traffic to others.

"It's a fine line we walk to maximize education and minimize impact," Fitzgerald Marine Reserve ranger Durkin said.

For now, Nitzberg is thinking of limiting the number of school tours to the tide pools and having more docents present at lowtide to answer visitors' questions and make sure people aren't doing excess damage to the creatures.

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