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Marine biologists at Cal State Long Beach help Huntington Beach Wetlands Conservancy restore coastal marshes

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When Jane Lubchenco, administrator of the National Oceanic and Atmospheric Administration (NOAA), came to a Huntington Beach salt marsh in June to announce $167 million in coastal restoration projects across the United States, three **Cal State Long Beach (CSULB) marine biology faculty members** took a keen interest in her presentation.

Assistant Professors Christine Whitcraft and Bengt Allen and Professor Chris Lowe are helping the **Huntington Beach Wetlands Conservancy** restore and maintain three coastal marshes—*Talbert*, *Brookhurst* and *Magnolia* —located along Pacific Coast Highway between Newland Avenue and the Santa Ana River.

Talbert Marsh was restored about 20 years ago, then last fall the conservancy began restoring the *Brookhurst Marsh* as well as dredging Talbert to improve its tidal flow. Lubchenco's NOAA press conference announced $3.3 million to restore the *Magnolia Marsh*.

Whitcraft, an expert in coastal wetland ecosystems, and Allen, a marine community ecologist, learned about the Huntington restoration last fall from a NOAA colleague who encouraged them to get involved. However, the project was to begin in three weeks, so they had to rush into planning and obtaining funding. They were able to quickly get $9,999 from the rapid response grant program of California Sea Grant. The CSULB group later received a grant of approximately $108,000 from the Montrose Settlements Restoration Program (MSRP) to pay for staff and student time and research expenses. MSRP comprises six federal and state natural resource trustee agencies—NOAA, National Park Service, California Department of Fish and Game, California State Lands Commission, U.S. Fish and Wildlife Service, and California State Parks. These agencies are working together to restore natural resources damaged by long-term releases of DDT and PCBs into the marine environment of Southern California.

"What's amazing about a large project like this is that restoration costs a lot of money, but not a lot of attention is devoted to evaluating the consequences of the restoration," said Whitcraft. "To meet regulations, evaluation of more simple metrics is conducted; i.e., are there plants, how much water comes in, are birds present?

"The whole reason generally that we do a restoration is not so much aesthetics," Allen said, "although that's obviously part of it, but it's actually to restore some of the ecological functionality that these marshes provide. Historically, salt marshes provide a lot of services to humans that are important.

"Salt marshes are very highly productive systems. They filter land runoff, limiting sedimentation into coastal areas and there's a lot of bacterial activity that breaks down

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organic material and pollutants before they get into nearshore waters. Coastal wetlands also provide habitat for a lot of ecologically and economically important fisheries species. We call them nursery habitats—juveniles of many species grow and survive better in a salt marsh habitat. Once individuals are big enough, they move offshore where we interact with them. But without the salt marshes, the populations overall don't do so well."

Whitcraft and Allen invited Lowe, an expert in marine fisheries, sharks and rays, to join their research. Lowe and his students are studying how fish are adapting to the opening of Huntington Beach's Bolsa Chica wetlands to the ocean, so they'll apply their expertise to see how fish use and repopulate the more southerly wetlands, focusing on halibut.

For the Sea Grant proposal, "Bengt and I wrote a grant whose purpose was to take the pre-restoration evaluation of this marsh from just structural attributes to functional attributes," Whitcraft said. "We could collect enough background data on the monitoring parameters on plants and animals, but then put it in the larger context. We could look at how decomposition occurred, what the food web structure was, what the algal community looked like—parameters that normal restoration monitoring doesn't cover. They gave us money to do pre-sampling, which was very exciting. We were able to sample Talbert, Brookhurst and Magnolia. We had 10 different students helping us sample in the fall."

The data will provide a baseline for both the Brookhurst and Magnolia restorations as the team tracks the wetlands' progress. "Our first take is that Talbert Marsh, which has been restored for 20 years, certainly looks—and we assume functions—much more like what we perceive to be a natural marsh," Allen said. "That's always a big problem—what do you actually call natural in Southern California? Everything has been modified to some degree. We're hoping to see whether the ecological trajectory of Brookhurst Marsh after the restoration at least moves in the same general direction of Talbert Marsh. We'll be assessing a lot of different parameters to try to follow that."

One of the study parameters will be how fish use the habitat. "Do juvenile fish come in, where do they go, how long do they stay, what are they eating? How are they using this marsh?" Allen said.

"MSRP's hope is that while certain fish populations are doing more poorly off the Palos Verdes Peninsula because of the DDT dumped decades ago, if we can provide some new nursery habitat in the region for enhanced juvenile growth and survival, we will eventually end up with larger, healthier fish populations offshore," Allen explained.

"When they dredged out Bolsa Chica, we didn't get in there until they'd been open for a year," Lowe said. "The great thing about this is that we get to see this place in its infancy. We get to see who comes in first and colonizes it, then how are they using it. That might help determine how well future restoration projects work and how quickly things can recover. From a fisheries standpoint, that could be very important. MPAs (marine protected areas) are going to be put in and these areas may be linked to some of those MPA networks because you have to have connectivity between these salt marshes and the areas that you're going to protect. I think having a better understanding of how these habitats will participate in the restoration of fish species will be really important."

Their research may benefit future projects such as Long Beach's Colorado Lagoon or Newport Beach Back Bay. "The whole idea is that you can do these restoration projects faster and more efficiently and save money and hopefully do them better," Lowe said. "That's always been the challenge because here in California, unfortunately, most of our wetlands were lost before people had an opportunity to really understand how they work. Our west coast wetlands work differently than the ones on the East Coast because they don't get the same constant fresh water influx that estuaries on the East Coast get. Unfortunately, we still don't have a good idea of how they function and how quickly they restore themselves after you've opened up tidal flow. Looking at how quickly organisms get there and how they use it is still a challenge."

"The restoration aspect is critically important," Allen concurred. "Loss of coastal wetlands and their associated services during the past century has been extensive; in California, less than 10 percent of historical distributions remain intact. Really, it's not an issue as much at this point of conservation, it's trying to bring back highly degraded areas to some semblance of a functioning ecosystem. That can lead to also sorts of interesting basic science questions, too—if we want to try to restore something, we first need to know how it works."

Lowe noted CSULB's role as perhaps Southern California's premier university marine biology program. Not only are the three professors benefiting from each other's expertise, but "our students are going to be best prepared for dealing with this and they're going to get jobs in agencies that will be mandated to do this. It's a great win-win for us, because not only are we contributing to the science, but we're also training the future scientists to do this." Moreover, a large contingent of student volunteers are participating in tasks ranging from planting native vegetation to helping with fish counts and tracking fish movements.

The professors also praised community groups such as the Huntington Beach Wetlands Conservancy who are driving the restoration efforts. "They're very invested in what's going on, which is one of the reasons that they're so excited about having us involved, because they want to know this information," Allen said. "And of course, it's great for us to have the chance to partner with the community to improve our local environmental resources."

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