

Hybrid *Spartina* Forum: Defining eradication for a genetic invader

by Ingrid Hogle, San Francisco Estuary Invasive *Spartina* Project

Eighty-five land managers, agency personnel, representatives of environmental organizations and world-class scientists gathered for two days to discuss the “end game” of invasive cordgrass eradication at the recent Hybrid *Spartina* Forum in Oakland, California.

The forum was timely as the State Coastal Conservancy (SCC) marks the tenth year of its San Francisco Estuary Invasive *Spartina* Project (ISP). The SCC initiated the ISP in 2000 with the goal to reverse the spread of invasive *Spartina*, and to eradicate it from the estuary if possible. This invasive *Spartina* is primarily a result of hybridization between the native Pacific cordgrass (*Spartina foliosa*) and smooth cordgrass (*Spartina alterniflora*) from the East Coast, which was introduced by the Army Corps of Engineers in the 1970s. The resulting hybrid plants, discovered and documented by scientists at UC Davis in the late 1990s, are extremely invasive “ecosystem engineers” that threaten the integrity of marshes, mudflats, flood control channels, mosquito abatement efforts and habitat restoration efforts around the bay.

Successful, coordinated, regional treatment of invasive, hybrid cordgrass by the ISP since 2005 has led to a nearly 90% reduction in hybrid *Spartina* acreage throughout the estuary. However, genetic results indicating presence of hybrid *Spartina* in sites that appear to contain only pure Pacific cordgrass complicate the issue of when and what to treat, and thus complicate the definition of eradication. The devil is truly in the details of how one defines the target of eradication.

SCC Project Manager Marilyn Latta kicked off the forum with the announcement that the Conservancy expects to complete control by 2013, and expects continued monitoring for zero net acres through 2016. ISP Project

Director Peggy Olofson explained that eradication of all discernable hybrids is possible, and that the challenge is now to determine what to do about those hybrids that are not discernable. The question, she posed, is “how far do we go?”

The forum was designed to provide an opportunity for thoughtful consideration of this question in light of the management objectives of the region’s many stakeholders. Participants were asked to consider the likely impacts of continued elimination of discernable *S. alterniflora* x *foliosa* hybrids from the marshes and mudflats of the San Francisco Bay in light of their organization’s missions and the tidal ecosystem goals for the entire estuary.

To inform the consideration of this question, a multitude of invited speakers gave presentations on topics ranging from genetics to restoration, and from ecology to federal endangered species policy. The full list of speakers and talks is available at www.spartina.org/Hybrid_Forum.htm.

Geneticist Valerie Hipkins, USDA National Forest Genetics Lab, spoke about the unique challenges of conducting management-based genetic work. Malika Ainouche, University of Rennes, France, explained work done in her lab on similarly closely related hybrids of different *Spartina* species. Tom



Forum participants were challenged to identify native vs. invasive hybrid *Spartina* plants in 19 hands-on displays. “Votes” were tallied using red and green dots, after which the true identification was revealed. The verdict? “It’s not easy!” Photo by Jude Stalker, Invasive *Spartina* Project.

Witham discussed his work on hybrid cottonwoods, eucalyptus and other species which indicates that minor variation in genotypes within a species can impact the accumulation of heritable traits, and that changes to the genetic structure of a species within a site can change the community of other plants and animals supported by that species, and may ultimately affect the evolution of the entire community.

Joy Zedler, University of Wisconsin, discussed the ecology of native *Spartina foliosa*, especially as it grows in southern California, where it appears to have great phenotypic plasticity in response to wet or dry years, and where she has found a long period of low salinity a requirement for its establishment in restored marshes. Dan Simberloff, University of Tennessee, discussed examples of other invasive, hybrid species and cautioned that no

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successful eradication has ever faced an issue of hybridization. With regard to the eradication of hybrid *Spartina*, he pronounced: "If you succeed...it would be the greatest triumph of invasion biology."

Marc Holmes, San Francisco Bay Joint Venture, described the history of tidal marsh restoration in the San Francisco Bay, putting into perspective the impressive size and extent of current restoration projects underway in the Bay Area and emphasizing how each project builds on the successes of previous ones. John Bourgeois, South Bay Salt Pond Restoration, discussed the challenges in moving forward with restoration knowing that invasion by hybrid *Spartina* threatens the success of restoration, and creation of new habitat for invasion threatens to delay the success of invasive *Spartina* eradication. Diane Elam, U.S. Fish and Wildlife Service, presented an impressive number of case studies involving endangered species and hybridity.

On each day, participants were assigned to one of four break-out groups to discuss a question and then report back to the whole group. On Day 1, their

exercise was to describe the main impact of invasive, non-native *Spartina* in terms of the mission of their organization, and to describe their organization's current goal with regards to *Spartina*. On Day 2, the question was, "Do you care if any hybrid alleles are left? If so, why? If not, why not?" In other words, does it matter to you and/or your organization if any genetic variability not present in pure native *S. foliosa* prior to the introduction of *S. alterniflora*, remains in any of the *Spartina* left behind by the ISP that is not visually discernible as hybrid *Spartina*.

At the end of the forum, participants seemed to reach a consensus that the conservation community should prioritize the big picture goal of restoring tidal ecosystem functions, and needed to accept that the detection and removal of all hybrid alleles was simply not feasible. Fears that those alleles left behind might be able to recombine and allow the re-emergence of invasive traits in future generations of plants was a strong concern, however, for such a re-emergence of invasive *Spartina* would once again threaten the ultimate goal of maintaining and restoring tidal ecosystem function.

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livestock and machinery. (FSEEE Stay Informed Newsletter, Spring 2011, fseee.org)

In honor of National Invasive Species Awareness Week, National Public Radio produced a segment on "The Art of War on Invasive Species". The program profiles an artist and volunteer weed worker in Washington, D.C. who uses weeds pulled from Rock Creek Park to create handmade paper, paint brushes, and art. For instance, he derives ink from English ivy. (February 28, 2011, www.npr.org)

The Lake Tahoe Restoration Act (S. 432), introduced in Congress on March 2, would provide \$415 million over ten years to improve water clarity, reduce the threat of fire and restore the environment of the Tahoe Basin. Among other provisions, the bill would authorize

\$20.5 million for watercraft inspections and removal of aquatic invasive species. It was originally introduced last year but stalled in Congress. Information on the bill's status is at thomas.loc.gov.

The EPA and conservation groups reached a settlement to limit the introduction of invasive species into the Great Lakes. The agreement requires the EPA to issue a new permit regulating ballast water discharges from commercial vessels in settlement of lawsuits brought by a dozen conservation groups challenging the legality of the EPA's existing permit. Ballast water, water taken into tanks on commercial ships to maintain stability, is a major transport mechanism of invasive aquatic species. (Natural Resources Defense Council, March 8, 2011, www.nrdc.org)

2011 Field Course Schedule

San Francisco

The Presidio's Log Cabin

June 21 - Strategic Approaches

June 22 - Control Methods

San Diego

Tijuana River NERR

August 3 - Mapping

August 4 - Control Methods

Tahoe City

Granlibakken Conference Center

Oct. 4 - Field Techniques for

Reporting Invasive
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