

2021 Delta Invasive Species Symposium: Early Detection and Rapid Response (EDRR) to Invasion

Hosted by the Delta Interagency Invasive Species Coordination Team
December 15, 2021, 9:00 a.m. – 2:30 p.m.

Presentations and discussions will explore the importance, uses, and future applications of early detection and rapid response (EDRR) to invasive species. The symposium is co-sponsored by the [Delta Interagency Invasive Species Coordination](#) (DIISC) Team, the Sacramento-San Joaquin Delta Conservancy, and the Delta Stewardship Council's Delta Science Program.

Agenda

Opening

- 9:00 a.m. Welcome
Campbell Ingram, Executive Officer, Sacramento-San Joaquin Delta Conservancy
- 9:05 a.m. Opening Remarks
Laurel Larsen, Delta Lead Scientist, Delta Stewardship Council
- 9:15 a.m. Non-native Species in a Dynamic Delta: The Importance of Science, Anticipation, and Coordination
Dr. Stephen Brandt, Delta Independent Science Board
- 9:25 a.m. Symposium Introduction
Rachel D. Wigginton, Senior Environmental Scientist, Sacramento-San Joaquin Delta Conservancy, DIISC Team Facilitator

Session One: EDRR Lessons Learned

- 9:30 a.m. Early Detection and Rapid Response: A National Perspective
Stas Burgiel, Executive Director, National Invasive Species Council (NISC)
- 10:00 a.m. EDRR in the Colombia River Basin: Lessons Learned
Theresa Thom, Regional Aquatic Invasive Species Coordinator, U.S. Fish and Wildlife Service
- 10:30 a.m. Hydrilla, Nutria, and Noxious Weeds: The California Department of Food and Agriculture's EDRR Experience
David Kratville, California Department of Food and Agriculture

Session Two: Successes and Setbacks in EDRR

- 11:05 a.m. A Look Back: The State of Nutria Eradication in California between 2017-2021
Jared Barr, Senior Environmental Scientist (Specialist), California Department of Fish and Wildlife
- 11:20 a.m. Controlling Aquatic Invasive Plants in the Delta and Alligatorweed: Lessons Learned
Jeffrey Caudill, Senior Environmental Scientist (Supervisory), Department of Parks and Recreation
- 11:35 a.m. Successes, Failures, and Lessons Learned from an Orange County Emergent Invasive Plant Program
Ron Vanderhoff, Vice President, Orange County California Native Plant Society
- 11:50 a.m. Assessing and Reducing Risks of Aquatic Nonindigenous Species Introductions from Vessels Arriving at California Ports
Jonathan Thompson and Lina Ceballos Osuna, California State Lands Commission, Marine Invasive Species Program
- 12:05 p.m. Panel Discussion: EDRR Implementation Challenges
The panel will be facilitated by Louise Conrad, Deputy Executive Officer for Science, Delta Stewardship Council. Panelists will be joined by Valerie Cook, Program Manager, California Department of Fish and Wildlife Nutria Eradication Program

12:30 p.m. Lunch

Session Three: Emerging EDRR Tools and Challenges

- 1:00 p.m. Risk Assessment for Invasive and Range-shifting Species Using the EICAT Protocol
Cascade Sorte, Associate Professor, Department of Ecology and Evolutionary Biology, University of California, Irvine
- 1:15 p.m. Assessing the Risk of Plant Species Invasion under Different Climate Change Scenarios in California
Jorge Renteria, Postdoctoral Fellow, University of California Davis
- 1:30 p.m. Early Detection Monitoring of Invasive Mussels in California
Thomas Jabusch, Senior Environmental Scientist (Supervisory), Invasive Species Program, California Department of Fish and Wildlife
- 1:45 p.m. Using Genetic Approaches to Detect Otherwise Undetectable Invasive Species
Melinda Baerwald, Environmental Program Manager, California Department of Water Resources
- 2:00 p.m. Draft Delta EDRR Framework and EDRR Coordination Table
Rachel D. Wigginton, Senior Environmental Scientist, Sacramento-San Joaquin Delta Conservancy

Abstracts

Opening

“Non-native Species in a Dynamic Delta: The Importance of Science, Anticipation and Coordination” by Dr. Stephen Brandt, Delta Independent Science Board.

Non-native species threaten Delta ecosystem services and the ability to protect, restore, enhance, or even define the Delta ecosystem. The Delta Independent Science Board (ISB), which provides scientific oversight of programs that support adaptive management, just completed a two-year review of the science of non-native species in the Delta to help agencies improve the understanding needed to anticipate, prevent, and manage the threats of non-native species. This review found that science informs management at each stage in dealing with a potential individual invader, from threat assessment, to prevention, to early detection and rapid response, to control and, ultimately, adaptation. Seven specific recommendations were made. The review highlighted the importance of anticipation – getting ahead of invasions for prevention and mitigation. The Delta ISB stressed that science can be used to prioritize actions by better assessing potential impacts on food webs and environmental services, and they noted that stronger collaboration and planning across disciplines and among agencies are critical. The review’s overall recommendation is to encourage a more ecosystem-level, forward-looking, integrated approach to non-native species science in the Delta with specific consideration of climate change.

Session 1: EDRR Lessons Learned

“Early Detection and Rapid Response: A National Perspective” by Stas Burgiel, Executive Director, National Invasive Species Council (NISC).

Early detection and rapid response (EDRR) to new introductions of invasive species has been a major focus across federal agencies in recent years. This presentation will highlight the work of the National Invasive Species Council (NISC) and its member agencies in identifying the components for a national EDRR framework, assessing federal agency capacity, and enhancing coordination across federal agencies and with states, tribes, and other non-federal stakeholders.

“EDRR in the Columbia River Basin: Lessons Learned” by Theresa Thom, Regional Aquatic Invasive Species Coordinator, U.S. Fish and Wildlife Service.

The 100th Meridian Initiative Columbia River Basin Team, comprised of diverse partners primarily in Washington, Oregon, Montana, Idaho, Montana, Wyoming, and British Columbia, has been working proactively for more than 15 years to prevent, detect, and manage the spread of aquatic invasive species (AIS) in the Columbia River Basin (CRB). Since 2007, dreissenid rapid response exercises have been staged to prepare for an introduction of invasive mussels in the CRB. The exercises are intended to trigger implementation of the Columbia River Basin Interagency Invasive Species Response Plan as well as each state’s invasive species rapid response plan. Through time, these events have evolved into multi-day exercises involving an Incident Management structure, multiple partners, and site-specific activities. The basic principle of Early Detection Rapid Response (EDRR) is that an invasive species will be detected, contained, and eradicated before it becomes established, thus slowing the range expansion of the species and costly financial investments to contain and control the species through time. Efforts have been ongoing to build capacity for EDRR to AIS within the basin. On-going work is focused on multi-agency coordination including early detection monitoring and data sharing. Additional outcomes include improved preparedness and communication among partners.

“Hydrilla, Nutria, and Noxious Weeds: The California Department of Food and Agriculture’s EDRR Experience” by David Kratville, California Department of Food and Agriculture.

The California Department of Food and Agriculture (CDFA) has over 100 years of experience with EDRR of invasive species, including many lessons learned from Hydrilla and more recently, Nutria. Across these years of implementation, CDFA has learned leveraging partnerships, for example Weed Management Areas, is important for effective EDRR.

Session 2: Successes and Setbacks in EDRR

“A Look Back: The State of Nutria Eradication in California between 2017-2021” by Jared Barr, Senior Environmental Scientist (Specialist), California Department of Fish and Wildlife.

Owing to state and federal grants and an appropriation of State general funds, the Department of Fish and Wildlife (CDFW) has secured funding for a Nutria (*Myocastor coypus*) eradication program (Program). CDFW modeled its efforts after the Chesapeake Bay Nutria Eradication Project, which successfully eradicated Nutria from over 250,000 acres of the Delmarva peninsula. As of October 2021, CDFW has conducted surveys on approximately 230,000 acres of suitable Nutria habitat. Nutria have been detected and removed within 23,280 and 12,840 acres of habitat, respectively, for a total of 2,738 Nutria removed from the landscape. Methods critical for the early detection of Nutria include dedicated field staff to conduct surveys, a robust network of baited monitoring stations, and targeted means of detecting small and/or localized metapopulations. We have seen success in sites that have been monitored across years (1,237 and ~640 Nutria taken in 2020 and 2021, respectively), but unforeseen setbacks have delayed some components of the Program (e.g., scent-detection dogs). Upon the initial Nutria detection in 2017, CDFW had no dedicated staff, resources, or available funding to implement a rapid response; this presentation will reflect upon the partnerships utilized and approach taken to secure the resources necessary for successful eradication.

“Controlling Aquatic Invasive Plants in the Delta and Alligatorweed: Lessons Learned” by Jeffrey Caudill, Senior Environmental Scientist (Supervisory), Department of Parks and Recreation.

The Department of Parks and Recreation, Division of Boating and Waterways (DBW) is the lead agency for controlling aquatic invasive plants in the Sacramento-San Joaquin River Delta and surrounding Tributaries (Delta). Identifying and controlling new aquatic invasive plants, such as *Alternanthera philoxeroides* (Alligatorweed), where the existing process doesn't easily allow for Early Detection and Rapid Response (EDRR). DBW will discuss lessons learned through the response to Alligatorweed and interagency discussions on EDRR that will be useful to potential future aquatic invasive plants that are introduced to the Delta.

“Successes, Failures, and Lessons Learned from an Orange County Emergent Invasive Plant Program” by Ron Vanderhoff, Vice President, Orange County California Native Plant Society.

In 2016, the Orange County Chapter of County California Native Plant Society (CNPS) launched an ambitious Invasive Plant Program. It is specifically focused on the detection of new, emergent invasive plants in the county, with aspects including training and education, species assessment and prioritization, volunteer outreach, reporting, field surveys, management communications and more. The program was specifically designed to address a niche in the invasive plant battle that is sometimes under-appreciated - the very earliest detection of the newest and potentially most destructive wildland weeds. CNPS has the unique perspective of having no political or geographic boundaries, experts in plant identification and knowledge, access to a large group of both professional and amateur botanists, and an organizational infrastructure. However, being a volunteer organization provides a contrasting set of challenges. This talk will provide a brief overview of the program, highlight a few successes, and discuss some lessons that have been gleaned over the past six years.

“Assessing and Reducing Risks of Aquatic Nonindigenous Species Introductions from Vessels Arriving at California Ports” by Jonathan Thompson and Lina Ceballos Osuna, California State Lands Commission, Marine Invasive Species Program.

Nonindigenous species (NIS) are organisms that pose significant threats to human health, the economy, and the environment. NIS are intentionally or unintentionally transported through human activities to new habitats such as California’s marine, estuarine, and freshwater environments; commercial shipping is a primary pathway of introduction for aquatic NIS. In response to this threat, the California State Lands Commission’s Marine Invasive Species Program (MISP) was created to reduce the risk of aquatic NIS introduction into California’s waters. The MISP reduces this risk by implementing a robust compliance assessment program through targeted inspections. Other jurisdictions may not possess the same resources as California and can adjust to provide the best level of assessment based on available resources. To help other entities with limited resources reduce the risk of aquatic NIS introductions, a simple model was created to prioritize vessel arrivals for inspection using readily available data. The model uses proxies for both biofouling (wetted surface area) and ballast water (discharge volume) to assess the potential propagule pressure (PPP) of each vessel arrival. This model serves as a baseline for other jurisdictions to implement an adjustable data-driven prioritization scheme.

Session 3: Emerging EDRR Tools and Challenges

“Risk Assessment for Invasive and Range-shifting Species Using the EICAT Protocol” by Cascade Sorte, Associate Professor, Department of Ecology and Evolutionary Biology, University of California, Irvine.

There is a critical need to understand and predict invasion impacts to prioritize species and ecosystems for conservation and management. In this talk, I will describe the Environmental Impact Classification of Alien Taxa framework for anticipating invasive impacts. I will focus on two “types” of invasions: first, invasions of introduced, non-native species and second, the influx of native species shifting their ranges under climate change (sometimes called “climate invasions”). Frameworks and risk assessments developed by invasion biologists are tools that could help us to anticipate impacts of these “climate invasions”. Our results to date provide initial validation of these tools, which could be used to develop plans for proactively managing non-native species and climate invasions.

“Assessing the Risk of Plant Species Invasion under Different Climate Change Scenarios in California” by Jorge Renteria Bustamante, Postdoctoral Fellow, University of California Davis.

Using species distribution models (SDMs), we predicted the distribution of 170 plant species under different climatic scenarios (current and future climatic conditions) and used this information to create invasion risk maps to identify potential invasion hot spots in California. The risk of invasion by individual species was also assessed using species’ predicted area in combination with some biological traits associated with invasiveness (growth form, reproduction mechanisms, and age of maturity). A higher number of species would find suitable climatic conditions along the coast; the Central Western (CW) and South Western (SW) were ecoregions where a higher number of species were predicted. Overall, hot spots of species distribution were similar under current and future climatic conditions; however, individual species’ predicted area (increase or decrease) was variable depending on the climate change scenario and the greenhouse gas emission. Out of the 170 species assessed, 22% ranked as high-risk species, with herbs, grasses, and vines accounting for 78% within this risk class, and a high proportion (67%) of Asteraceae species ranked as high risk.

“Early Detection Monitoring of Invasive Mussels in California” by Thomas Jabusch, Senior Environmental Scientist (Supervisory), Invasive Species Program, California Department of Fish and Wildlife.

California Department of Fish and Wildlife (CDFW) has developed monitoring recommendations for invasive dreissenid (quagga and zebra) mussels to inform CDFW's statewide monitoring and monitoring conducted by others. The recommendations are based on the potential for dreissenid mussels to establish in a waterbody, considering mussel biology and habitat suitability. Calcium, pH, and salinity were the basis for determining the suitability of a waterbody. Recommendations include multiple methods, specific to sample both larval and adult life stages, and frequency of sampling. For example, plankton tows to detect mussel larvae are only recommended at waterbodies with sufficient calcium for dreissenid mussels to reproduce. The recommended plankton tow frequency depends on the water temperature. More frequent plankton tows are recommended when water temperatures are optimal for spawning and no plankton tows are advised when water temperatures are not suitable for spawning. Prioritization of early detection monitoring amongst waterbodies is informed by their potential for dreissenid mussels to establish, their vulnerability for dreissenid mussels to be introduced, and their ecological and economical significance.

“Using Genetic Approaches to Detect Otherwise Undetectable Invasive Species” by Melinda Baerwald, Environmental Program Manager, California Department of Water Resources.

Detecting a low-density species during the early stages of invasion and/or after an eradication effort is a critical component of effective ecosystem management and invasive species control. Innovative molecular tools such as those that detect environmental DNA (eDNA) can provide highly sensitive and accurate information regarding species presence and distribution, either by focusing on a species of interest or by conducting biosurveillance of a broader community. Despite the many advantages of eDNA monitoring (e.g., cost and time savings, high sensitivity and accuracy), increased manager confidence in eDNA results is essential for the tool to gain widespread acceptance. In this presentation, I will provide examples of recently emerging molecular approaches with the potential to further improve detection capabilities. Several "best practices" have become apparent within the eDNA scientific community, not only in terms of field and lab protocols and reporting requirements but also in the importance of effective communication with ecosystem managers.

“Draft Delta EDRR Framework and EDRR Coordination Table” by Rachel D. Wigginton, Senior Environmental Scientist, Sacramento-San Joaquin Delta Conservancy.

The Delta Interagency Invasive Species Coordination (DIISC) Team aims to foster communication and collaboration among California state agencies, federal agencies, research and conservation groups, and other stakeholders that detect, prevent, and manage invasive species and restore invaded habitats in the Sacramento-San Joaquin Delta. Given this role, a working group of the DIISC Team came together in December 2020 to develop a draft EDRR framework for the Delta. It became clear centralized information was a key need for more effective EDRR in the Delta, and the working group created the draft Delta EDRR coordination table to begin compiling existing EDRR resources for the region. The aim of presenting these draft documents is to get feedback from the Delta community on the effectiveness and potential usefulness of the framework and to complete the coordination table by adding any missing data provided by the Delta community.