

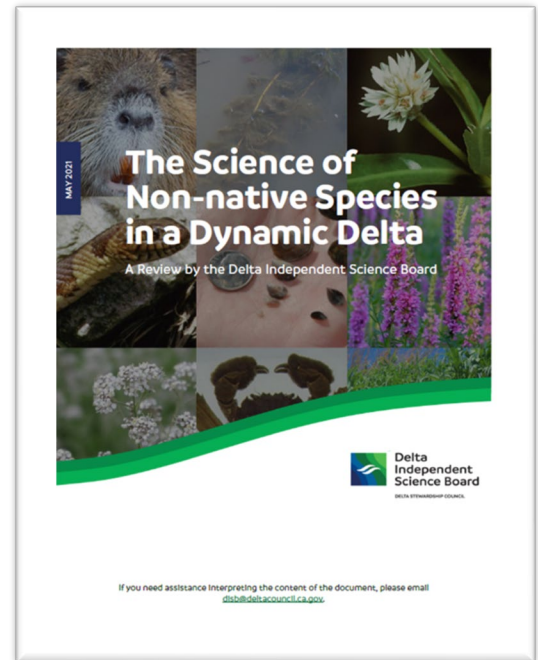
The Science of Non-native Species in a Dynamic Delta

A Review by the Delta Independent Science Board

Background and Motivation

The invasion of non-native species is one of the greatest global threats to the integrity of ecosystems, and non-native species are a large part of what is now the Sacramento-San Joaquin Delta (Delta) ecosystem. The invasion of new non-native species threatens the achievement of the coequal goals of a reliable California water supply and resilient Delta ecosystem.

In May 2021, the Delta Independent Science Board (Delta ISB) completed a review report on the science of non-native species. This review aims to improve the scientific understanding needed to help agencies prevent and manage the threats and consequences of non-native, invasive species in Delta lands and waters.



Approach

The information-gathering process for the review included an extensive literature review, two panel discussions with a total of ten experts who explored the state of science, and comments from other scientists and the public. Delta ISB members also participated in several workshops, scientific sessions, presentations, and discussions with managers.

Key Findings

General

- The science related to invasions and non-native species is extensive and spans six decades
- Non-native species impact almost every ecosystem service and ecosystem sustainability
- Basic needs and technologies to better prevent, eradicate, control, and ultimately manage **individual** non-native species are similar across ecosystems
- Science is needed at each point in the management decision process

Delta Specific

- The Delta is a highly modified ecosystem susceptible to invasion
- The global and local forces driving environmental changes in the Delta are ongoing, some at an accelerated pace
- These changes affect the vulnerability of the Delta to new invaders
- The species pool (composition and abundances) of an ecosystem is dynamic, leading to a continual reshuffling of native and non-native species and ecosystem services

Recommendations

Non-native species threaten Delta ecosystem services and the ability to protect, restore, enhance, or even define the Delta ecosystem. The review highlights the importance of anticipation – getting ahead of invasions for prevention and mitigation. The Delta ISB's report stresses that prioritization of science and stronger collaboration across disciplines and among agencies is critical.

The Delta ISB'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. To achieve this, the Delta ISB offers seven specific recommendations.

1. Develop and test a comprehensive, spatially explicit, food-web model that is Delta-wide in scope and tied to environmental driving forces and conditions.
2. Define and prioritize detailed short-term and long-term science project needs to improve understanding and management of established invaders by conducting a series of focused workshops or syntheses.
3. Identify and prioritize species that pose the greatest immediate and long-term threats to the Delta and re-evaluate this list regularly.
4. Go beyond individual species management and address how to set ecosystem-level goals that recognize an ever-changing species pool and high uncertainty.
5. Evaluate threat assessments for invasive species in the context of a changing environment and multiple drivers, especially climate.
6. Develop a comprehensive multi-agency invasive-species coordination and implementation plan that identifies the authority that assigns responsibilities to include monitoring, rapid response, control, and science expertise.
7. Develop a single 'go to' science source of expertise and information with proper authorization and funding. This could involve organizing a Non-native Species Task Force or Non-native Species Science Center to complement or expand the functions of the Delta Interagency Invasive Species Coordination Team.

Conclusion and Next Steps

The fundamental role of science is to provide management with information to set priorities and manage expectations. Developing more forward-looking predictive science will improve our ability to understand and adapt to changing environmental drivers and species pools. On May 21, 2021, the Delta ISB presented this report to the Delta Stewardship Council who will consider how to proceed with supporting the recommendations.

The full report can be found at deltacouncil.ca.gov/pdf/isb/products/2021-05-21-isb-non-native-species-review.pdf. If you have any questions, please email disb@deltacouncil.ca.gov.