EARLY DETECTION AND RAPID RESPONSE BEST PRACTICES

WASHINGTON STATE
RECREATION AND CONSERVATION OFFICE
Washington Invasive
Species Council

Table of Contents

Early Detection and Rapid Response Best Practices

Preface

Among the plethora of economic and ecological threats that plague countries worldwide, invasive species are one that can be fully prevented as well as be mitigated though policies and management actions when prevention fails. Invasive species are animals, plants, viruses, and other species that are introduced to new environments where they harm the local ecosystem.[1] The increase in international trade and travel during the past few decades has made it easier than ever before to move species, intentionally and unintentionally, from one location to another. From a global perspective, the negative impacts to business, social well-being, recreational opportunities and value, human health, and ecosystem services cannot be understated.

A wide variety of human-aided pathways have allowed invasive species to infiltrate new ecosystems. For example, the black rat (Rattus rattus), an invasive species that disrupts plant pollination and causes cascading food web changes, was believed to be an unintentional stowaway on ships.[2] Other species, like the Burmese python (Python bivittatus) and the nutria (Myocastor coypus) escaped domestic captivity have found their niches in ecosystems where no natural predators exist to limit their populations, causing extensive economic damage to their new homes. Species introduced purposely for recreation, such as the European or common rabbit (Oryctolagus

Invasive Black Rat (*Rattus rattus*)

---

[1] https://portals.iucn.org/library/sites/library/files/documents/2018-030-En.pdf
[2] https://www-sciencedirect-com.ezproxy.library.wwu.edu/science/article/pii/S2351989415000244

cuniculus) and the Nile perch (Lates niloticus), also have brought devastating effects to local ecosystems.

Prevention is the most effective way to stop the impacts of invasive species. Prevention may involve adopting policies limiting the movement of goods, screening boats for stowaway species, tracking the movement of invasive species from nearby regions, and much more. When prevention is not possible, management actions to reduce harm from these species may be put into place. This report discusses the best practices for these actions.

Figure 1: Invasive Species growth curve and strategic action

GENERALIZED INVASION CURVE SHOWING ACTIONS APPROPRIATE TO EACH STAGE
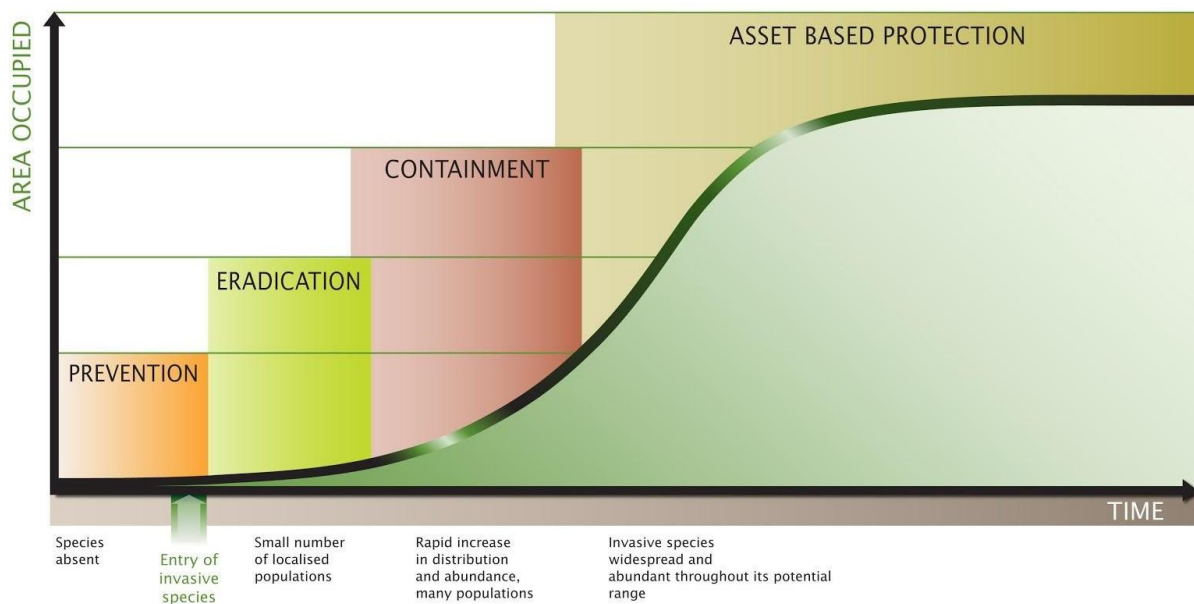
As shown in Figure 1, an invasive species population may grow exponentially when there are limited or no controls in place. Optimally, prevention would remove the threat of a specific species being moved and introduced to a new area altogether. When that's not possible and an invasive species already has established in a new area, eradication and containment are the next best options to halt the population's growth. These actions must begin rapidly after the detection to stop widespread, exponential population growth.

Plans that control invasive species in a timely manner are known as Early Detection Rapid Response (EDRR) plans. This report was created after an analysis of a handful of these plans to do the following:

- Discuss EDRR plans

- Explain best practices for plan integration

- Suggest worst practices to avoid

- Recommend features for effective EDRR plans

Early Detection and Rapid Response

EDRR plans fall under the "Eradication" and "Containment" sections of the invasion curve. The aim of these plans is to take immediate action on a species that has been discovered in the region. Alternatively, sometimes these plans are developed around high-risk species that haven't been discovered yet but are nearby or would cause so much damage that they warrant a plan.

Some of the general steps applicable to any EDRR plan include the following:

- Detection

- Identification and verification

- Risk assessment

- Response action

- Communication

- Evaluation and reassessment

Many forms of these steps, under different titles or with different responsibilities, are common among both broad- and small-scale EDRR plans. Typically plans will follow this order to integrate these processes.

Detection begins with surveillance of the area, either passively (a chance encounter with the species) or actively (with surveys and equipment) until the invading species is found. Analysis may sometimes be done on the extent of the organism's invasion.[3]

Identification and Verification involve close analysis of the detected species. This step is essential to determine the classification of the species, the extent of its infestation, and general accuracy of all reports. This is clearly recognized in the Wisconsin Department of Natural Resources' Response Framework for Invasive Species, where the identification process involves experts analyzing photographs of a species, its distribution patterns, or even the species itself.[4] Another key piece of this step involves proper verification of the extent of the infestation, which will be touched upon later.

Risk Assessment comes after the identification and verification of the species has been complete. This phase, as best detailed in the report by Wallace et al., is a collaborative process by which a species is evaluated to determine how impactful it may be. In their report, they stressed that communication between agencies and standardization of methodology is essential to calculating which species pose harm to the surrounding environment.[5] Risk assessment may be determined at local, state, or national levels on a case-by-case basis.

Response, often the most time-consuming component of the EDRR process, may have components that vary widely depending on the invasive organism in question. The goal is to eradicate or control the infestation. In Oregon's emerald ash borer readiness and response plan, an example of possible responses to control the beetles included removal of their host (ash trees) and biocontrol through release of organisms that keep the borer in check.[6,7] Many other methods of control are suggested for various organism

Invasive Emerald Ash Borer

---

[3]Canada, Inter-Ministry Invasive Species Working Group. (2014)
[4]United States, Wisconsin Department of Natural Resources. (2017)
[5]"Information Management Relevant to Invasive Species Early Detection and Rapid Response Programs." *Information Management Relevant to Invasive Species Early Detection and Rapid Response Programs*. (2018)
[6]Parasitoid: an organism that lives in close proximity to its host through development, eventually killing it.
[7]Bliss-Ketchum, L., Draheim, R., Hepner, M., & Guethling, O. (n.d.).

outbreaks, such as trapping, hunting, or isolating the infested area. These methods rely heavily on the funding.

Communication at many levels is essential for EDRR functions. In most cases, the public plays a large role in preventing the spread of invasive species. This is notable in the case study by Sharp, Cleckner, and DePillo on public outreach and perception of aquatic species. In this study, communication between the lead agency and the public recreators in the Finger Lakes region of New York state was integral to containing aquatic invasive species in the area.[8] Furthermore, communication between agencies on the workings of invasive species data, response plans, and resources is essential for a plan's efficiency. This is explained later in more detail.

Evaluation and Reassessment, this final cumulative phase of many EDRR plans, is crucial to determine if the species' population growth has been stopped or the species has been eradicated. Monitoring programs, such as the one suggested in the Mississippi River Basin Panel on Aquatic Nuisance Species, are common ways to verify the state of the infestation. The Mississippi plan suggest extensive sampling efforts, a species-specific monitoring plan, and precautionary control efforts, all of which will provide insight to the progression of the species.[9] This phase tends to exist alongside communication with the public on the status of the infestation.

Emergency Response Plans

A widely discussed component of EDRR plans is the Incident Command System. The Incident Command System provides foundational protocols for agencies to use in emergencies. The commonly practiced command system in the United States, the National Incident Management System, is quite flexible and may be applied to a wide range of emergency invasive species events. It is important to note that although rather helpful, the Incident Command System is not always used in response plans. Rather, some other emergency response is called upon.

---

[8]Ryan L. Sharp, Lisa B. Cleckner & Sarah DePillo (2017)
[9]United States, U.S. Department of Commerce, Mississippi River Basin Panel on Aquatic Nuisance Species. (2010)

Some of the common practices within the Incident Command System will be discussed further in this report; however, the foundational principles of the practice are as follows:[10]

- Common Terminology

- Modular Organization

- Management by Objectives

- Reliance on an Incident Action Plan

- Manageable Span of Control

- Pre-designated Incident Mobilization Centers/Facilities

- Comprehensive Resource Management

- Integrated Agency Communication

- Establishment and Transfer of Command

- Chain and Unity of Command

- Unified Command

- Resource and Personnel Deployment

- Information and Intelligence Management

Nationally, Incident Command System practitioners have developed a mechanism for grouping response organizations, resources, services, and functions that are most likely needed during specific types of emergencies. Most relevant to invasive species is the Emergency Support Function 11 (ESF 11), coordinated by the U.S. Department of Agriculture in partnership with the U.S. Department of Interior to protect agriculture and natural resources in emergencies. This mechanism builds upon the framework of the Incident Command System in close interagency communication, resource management, technological intelligence management, and resource and personnel deployment.[11] The grouping of common resources and functions could be applied in an invasive species emergency where responders and supplies must be activated and deployed. Another

---

[10]https://www.fema.gov/txt/nims/nims_ics_position_paper.txt
[11]United States, Department of Agriculture. (2016, June). *Emergency Support Function #11*.

response plan, put into place by the State of Maryland, features a modified Incident Command System that focuses on education, eradication, and public outreach.[12] There are many options for response systems and the correct choice ensures efficient and effective response.

Best Practices in EDRR

Six key elements are essential to a cohesive, operative EDRR plan:

- Clear Interagency and Public Communication

- Access to Necessary Resources

- Strong Focus on Detection and Identification

- Pre-founded Protocols

- Secure Methods for Funding

- Balance of Protocol Detail

Each piece plays an essential role in ensuring the timeliness and efficiency needs of EDRR will be met. It is important to note that these are recommendations, and some plans will meet their goals without adherence to every single component.

Aside from these measures, use of the National Incident Command System also should be considered a best practice. The National Incident Command System is proven to enable effective and efficient incident management by integrating a combination of facilities, equipment, personnel, procedures, and communications operating within a common, flexible, and scalable organizational structure. However, in the context of invasive species response, it only may be considered a best practice in specific plans that address newly detected invasive species that are considered an emergency. In an emergency response scenario, the Incident Command System is considered the best practice.

Clear Interagency and Public Communication

One of the main components of an Incident Command System is a strong communication base. A strong communication foundation allows information to flow

---

[12]United States, Maryland Department of Agriculture. (2005)

quickly between impacted agencies and increases the timeliness of the plan. Clear communication also makes the accumulation of resources easier for agencies in need.

The British Columbia Invasive Species Early Detection and Rapid Response Plan provides a good example of strong communication and features both public and agency communication tactics. Elements of the British Columbia plan include an annual progress report for groups participating in the plan and integration of many modes of public outreach, such as professional poster presentations, field trips, local displays, brochures, pamphlets, and media outreach.[13] Each of these aspects focus specifically on informing the public and agencies on the workings of the rapid response plan.

Communication is not limited to reports on the infestation at hand. Clear communication is essential for mobilizing and controlling resources to eradicate or control invasive species. In a document by the U.S. Geological Survey on invasive plant species, communication between agencies establishes points of contact for personnel and locations for resource transportation.[14] This pre-identification of authoritative points of contact reduces confusion in initial response.

Access to Necessary Resources

Many projects require mobile equipment, traps, ropes, or bait, as well as enough staff to work the project and funding to push the project along. These are resources that absolutely are necessary for EDRR to progress and be successful. It is best practice to create a list of anticipated resources, from pencils to boats, before the project begins.

One plan that lays this out well is the Incursion Response by the Pacific Invasive Ant Toolkit. This plan recommends that a list be created for required funding, staff, and resources before the rapid response activities begins. A communications list, list of staff roles, and a plan for funding are all recommended components for an effective rapid response framework.[15]

Developing the ability to quickly deploy resources before an emergency is a strong best practice. The British Columbia Invasive Species Early Detection and Rapid Response Plan provides a good way to identify response capabilities and maintain readiness. The plan uses an advisory committee to review the program, resource allocations, and the budget needed for associated costs.[16] Planning of resource use is a best practice to prevent a

---

[13]Canada, Inter-Ministry Invasive Species Working Group. (2014)
[14]United States, Congress, Welch, Bradley A, et al., editors. "Early Detection of Invasive Plants—Principles and Practices."
[15]Boudjelas, S. (2016, November)
[16]Canada, Inter-Ministry Invasive Species Working Group. (2014)

---

scramble for money, staff, and necessary objects once a newly introduced invasive species is detected and verified.

Strong Focus on Detection and Identification

Ensuring that the species is indeed invasive can be a challenging but necessary step in the EDRR process. That is why it is best practice to focus resources and time into proper identification techniques. Species may closely resemble each other and one may be invasive and the other not. One example of this is the mock strawberry (Duchesnea indica), which resembles the

Invasive Mock Strawberry (c) 2012 Dietmut

common wild strawberry (Fragaria virginiana) save for its yellow rather than white leaves.[17] The mock strawberry is easily may be mistaken for the non-invasive wild strawberry. Another example of common misidentification is discussed in Incursion Response by the Pacific Invasive Ant Toolkit on ant identification. Correct identification will produce an EDRR plan that manages the specific needs of the species and can determine the best routes to its containment and/or eradication.[18]

The Early Detection of Invasive Plants—Principles and Practices document by the U.S. Geological Survey suggests good practices for monitoring and identification. The document recommends monitoring and data collection of non-invasive species to establish a baseline and understanding of the non-impacted landscape. Long-term monitoring and sampling of invaded areas also are suggested as good practices to get updated information on the extent of the infestations. The authors suggest that projects with lesser funding adhere to less extensive surveying techniques; however, they stress that accurate projections for the scope of the infestation are crucial.[19] Although there are many different methods expressed in this document, it is best practice to choose the one that will adequately ensure the program will be able to detect new problem species if they are introduced onto the landscape.

---

[17]https://nature.mdc.mo.gov/discover-nature/field-guide/indian-strawberry-mock-strawberry
[18]Boudjelas, S. (2016, November)
[19]United States, Congress, Welch, Bradley A, et al., editors. "Early Detection of Invasive Plants—Principles and Practices."

After a questionable organism has been found, it is essential to properly identify it as well as determine the extent of the invasion. In the study conducted by Yackel Adams et al., brown tree snakes were cautiously identified, and the population count estimated by the Poisson Distribution Method. In this method, the probability of a surveyor finding a snake over a fixed amount of space and time is determined. This information is helpful for estimating the total extent when time and resources prevent a full survey. This, or more comprehensive survey and delineation practices, are best practice for determining the extent to which a new invasive species has spread.[20]

Pre-Founded Protocols

Many of the aforementioned principles would not be able to occur unless predetermined protocols for action were in place. An outlining component of Incident Command System structure is the flexibility of a predetermined planning process to inform staff on the task at hand. Many plans choose to use the Incident Command System for their guidelines on how to handle an emergency scenario, such as an invasive species response.

The *Guidelines for Invasive Species Planning and Management on Islands* by Tye stressed that having process and protocols in place were integral to invasive species management on island ecosystems. Alongside these protocols, Tye suggests that staff should understand and comply with regulatory bodies' policies, and procedures before needing a rapid response. When the process and protocols are not developed before a response, bureaucracy and indecision may prevent successful eradication.[21]

When the Incident Command System is not used to build standardized protocols, other methods may be used. For example, the European Environmental Agency has developed an overarching European EDRR plan to maximize operational efficiency between agencies and staff by standardizing protocols.

Secure Methods for Funding

Invasive species control would not exist without funding. The costs for hiring staff, procuring resources, and acquiring data can be grand. Many EDRR programs secure funding from government agencies, whether from the federal, state, or local level. As illustrated in a paper by Reaser et al., that response to invasive species from a national perspective is often piecemeal and a more coordinated approach to budget and finance is needed. For example, invasive species removal on federal lands may be adequately funded by the federal government; however, the same invasive species on adjacent

---

[20]Yackel Adams, A. A., Lardner, B., Knox, A. J., & Reed, R. N. (2018)
[21]Tye, A. (2018)

private lands may not be controlled due to a prohibitive cost to the private landowner. A funding structure allowing for adequate invasive species management across jurisdictions will be more effective.[22]

One interesting method of proposed funding comes from The State of Montana's Invasive Species Rapid Response Guidelines, which calls for separate funds to be set aside for different sectors of invasive species control such as noxious weeds and aquatic invasive species to pay for eradication projects. Alongside this general funding (which the State of Montana accumulates throughout the year), fees would be imposed on various modes of recreation to generate nearly $3.5 million for invasive species funding (as of 2019).[23] This proposed model diverges from the current model of acquiring money from the governor's emergency fund when necessary. The authors explain that this was an unreliable form of funding, which may have led to failure in control and eradication.[24]

A similar idea for funding has been proposed by the U.S. Department of the Interior, which cites the concept for a Comprehensive Environmental Response, Compensation, and Liability Act, also known as Superfund. The idea proposed is to generate a super fund for invasive species response projects across the nation and distribute money as species are placed on a ranked list. The higher a species is on a list, the more likely the eradication project would receive funding. Alongside this plan, the authors suggest crowd-sourcing funds; however this can prove unreliable and is not the best practice of predisposed secure funding.[25]

Balance of Detail

Authors of EDRR plans should keep their audiences in mind. Plans reviewed for this report ranged from 15 pages to nearly 200, with fine detailed points and broad statements open for interpretation. Some EDRR plans are created as operational documents, with checklists and instructions on what to do during a project, and others are more informational in nature, with explanations of how to handle an invasive species and who should be involved. As both are useful in their own ways, it is important for project planners to determine which method would be more effective for their staff. It is best practice to create an EDRR plan with a balance in mind.

---

[22]Reaser, J.K., Burgiel, S.W., Kirkey, J. et al. Biol Invasions (2020)
[23]United States, State of Montana. (n.d.). The State of Montana's Invasive Species Rapid Response Guidelines.
[24]ibid
[25]The U.S. Department of the Interior. 2016. Safeguarding America's lands and waters from invasive species: A national framework for early detection and rapid response, Washington D.C.

Such a balance can be seen in the EDRR island invasive species guidelines plan, where steps are outlined and then detailed to an applicable extent.[26] The document is readable and provides a foundation for efficiently framing protocols and processes for response to begin. This initial level of detail provides a starting point for more detailed, site-specific plans to branch off from the EDRR plan. It is absolutely essential to note that these plans thrive off documentation that practices a mixture of detailed protocol and general guidelines.

EDRR Practices to Avoid

Disregard for Lesser Priority Species

Many times, species are identified and put on a priority list of species that may cause immediate or future harm. Others may be put on a watch list or simply noted because they do not present imminent harm to the ecosystem, economy, or community. Some response plans take no action if the species is not a high priority for risk.

One such example comes from the Model Rapid Response Plan for Pennsylvania, which features a flow chart that determines rapid response action. In the flow chart, any species that is not identified a high priority is either disregarded or noted with no further action.[27] This response is perhaps not a best practice because it devalues species that still have the opportunity to grow along the invasion curve into a problematic infestation.[28]

A fix to this problem of neglecting low-priority species involves clearly explaining what long-term containment and management actions are available for species that do not have high negative consequences or are too widely distributed for eradication. Roybal et al., authors of a rapid response plan for the Everglades, seem to have accomplished this with a flow chart that illustrates the roles of multiple organizations to determine response to questioned species, with an inconclusive outcoming allowing the agency having jurisdiction itself to make the final deamination about response.[29] Following this process, a species deemed low-priority from a national or statewide perspective may still receive action if determined to be actionable from a regional, local, or site-specific perspective of the landowner or manager.

---

[26]Tye, A. (2018)
[27]United States, Pennsylvania Invasive Species Council. (2014).
[28]Figure 1
[29]Roybal, A., Humphrey, J. S., Ketterlin, J., Giardina, D., & Rogers, L. (2011). Early Detection And Rapid Response Plan For Invasive Species In The Everglades Cooperative Invasive Species Management Area

Neglecting lesser priority species as a way to focus funding on higher priority species is key to stopping new invasive species; however, it is essential to consider long-term management and containment for lower priority species to prevent them from becoming an even larger problem. In this instance, ensuring that an EDRR plan includes long-term management and assistance programs if a specific species has low impact or distribution beyond the scope of eradication is considered a best practice.

Too Broad or Too Detailed of a Plan

Invasive species response typically has a broad range of tactics, resources, timelines, and budgets. The objectives and tactics for response also often vary widely between specific species and the geographic scale being considered. As a result, planners often create detailed plans for one specific species at one scale, whether nationally, statewide, or local. It should be noted that a less detailed plan with EDRR standardized protocols applicable to a wider range of species could save planners critical time when drafting response plans.

What is the perfect level of detail? Somewhere in the middle lies a happy medium. Efficiency may be found through a broad plan that serves as an outline or template in which to apply species-specific information.

Conclusion and Recommendations

EDRR Programs Can Thrive Based on their Build

Global interconnectedness, species migration, and human intervention have contributed to the constant threat of invasive species. The EDRR plans that have been put in place, although varied in application, reiterate universal themes that have proven effective in invasive species eradication. The best practices are the following:

- Clear Interagency and Public Communication

- Access to Necessary Resources

- Strong Focus on Detection and Identification

- Pre-founded Protocols

- Secure Methods for Funding

- Balance of Protocol Detail

Recommendations

How does one build the most effective and efficient response plan? To meet the constant threat of invasive species, this report recommends a few of the following practices:

- Create strong, pre-determined plans *before* invasion

- Secure a method for quick, reliable funding

- Keep reliable access to resources

- Delegate leadership roles and interagency communication

- Focus on detailed information as needed

The Incident Command System, as a response strategy, should be used upon the discretion of the response planner or lead agency. Many of the recommended principles are featured in Incident Command System structure and may be worth exploring for individual EDRR plans. Training of staff, certification, and adoption of Incident Command System roles are recommended if incident command is to be used. These processes could require precious time and funding, and therefore are left to the planning agency's discretion.

A stunning example of an EDRR plan that may provide a starting point for further EDRR plans is *Guidelines for Invasive Species Planning and Management on Islands* by Tye. This plan features most of the recommended features and goes further as an operational document for the creation of more specific EDRR plans.

References

Black rat, an invasive species in Hawaii. [Photograph]. (2018). Maui, Hawaii In L. Clark (Author).

Bliss-Ketchum, L., Draheim, R., Hepner, M., & Guethling, O. (n.d.). Emerald Ash Borer Readiness and Response Plan for Oregon (United States, Oregon Department of Forestry). Retrieved from https://static1.squarespace.com/static/58740d57579fb3b4fa5ce66f/t/5b1ad1896d2a73a4cffcdad1/1528484258046/EAB+Plan+2018.pdf.

Boudjelas, S. (2016, November). Incursion response. Retrieved January 19, 2020, from http://www.piat.org.nz/preventing-ant-problems/post-border-rapid-response/incursion-response.

Canada, Inter-Ministry Invasive Species Working Group. (2014). Invasive Species Early Detection and Rapid Response Plan for BC. Retrieved from https://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/invasive-species/guidance-resources/final_imiswg_bc_is_edrr_plan_nov_2014.pdf.

Congress, Office of the Secretary. "Information Management Relevant to Invasive Species Early Detection and Rapid Response Programs." Information Management Relevant to Invasive Species Early Detection and Rapid Response Programs, 2018. www.doi.gov/sites/doi.gov/files/uploads/information_systems_edrr_5june2018.pdf.

Congress, Welch, Bradley A, et al., editors. "Early Detection of Invasive Plants—Principles and Practices." Early Detection of Invasive Plants—Principles and Practices, 2014. pubs.usgs.gov/sir/2012/5162/pdf/sir2012-5162.pdf.

Department of Agriculture. (2016, June). Emergency Support Function #11. Retrieved January 18, 2020, from https://www.fema.gov/media-library-data/1473679204149-c780047585cbcd6989708920f6b89f15/ESF_11_Ag_and_Natural_Resources_FINAL.pdf.

Dorsal view of emerald ash borer adult with elytra and wings spread. [Photograph]. (2012). USDA-APHIS.

Harper, G. A., & Bunbury, N. (2015). Invasive rats on tropical islands: Their population biology and impacts on native species. Global Ecology and Conservation, 3, 607-627. https://doi.org/10.1016/j.gecco.2015.02.010.

Maryland Department of Agriculture. (2005). Maryland's Emergency Response Plan for Invasive Forest Pests. Retrieved from https://mda.maryland.gov/plants-pests/Documents/plan.pdf.

NIMS and the Incident command system. (2004). Retrieved February 02, 2020, from https://www.fema.gov/txt/nims/nims_ics_position_paper.txt.

Pennsylvania Invasive Species Council. (2014). Rapid Response Plan and Procedures for Responding to Aquatic Invasive Species in Pennsylvania. Retrieved from https://pawalter.psu.edu/sites/default/files/resources/PA%20AIS%20Rapid%20Response%20Plan%20%282014%29.pdf.

Reaser, J.K., Burgiel, S.W., Kirkey, J. et al. Biol Invasions (2020) 22: 1.
https://link.springer.com/article/10.1007/s10530-019-02156-w

Roybal, A., Humphrey, J. S., Ketterlin, J., Giardina, D., & Rogers, L. (2011). Early Detection and Rapid Response Plan for Invasive Species in The Everglades Cooperative Invasive Species Management Area (United States, Federal Interagency Committee for the Management of Noxious and Exotic Weeds). Retrieved from https://evergladesrestoration.gov/content/ies/meetings/091713/ECISMA_EDRR_Plan_2009-2011.pdf

Ryan L. Sharp, Lisa B. Cleckner & Sarah DePillo (2017) The impact of on-site educational outreach on recreational users' perceptions of aquatic invasive species and their management, Environmental Education Research, 23:8, 1200-1210, DOI: https://doi.org/10.1080/13504622.2016.1174983

State of Montana. (n.d.). The State of Montana's Invasive Species Rapid Response Guidelines. Retrieved from http://dnrc.mt.gov/divisions/cardd/docs/misac-docs/draft-montana-rapid-response-guidelines-for-review.pdf

Teijgeman-Hansen, D. (2012). Schijnaardbei / mock strawberry. Retrieved from https://www.flickr.com/photos/reisgekki/7911948218/

The U.S. Department of the Interior. 2016. Safeguarding America's lands and waters from invasive species: A national framework for early detection and rapid response, Washington D.C., 55p.

Tye, A. (2018). Guidelines for Invasive Species Planning and Management on Islands (United Kingdom and Switzerland, International Union for Conservation of Nature). Retrieved from https://portals.iucn.org/library/sites/library/files/documents/2018-030-En.pdf.

U.S. Department of Commerce, Mississippi River Basin Panel on Aquatic Nuisance Species. (2010). A Model Rapid Response Plan for Aquatic Invasive Species. Retrieved from http://www.mrbp.org/wp-content/uploads/2018/05/mrbp-model-rapid-response-plan-with-appendices.pdf.

Wisconsin Department of Natural Resources. (2017). Wisconsin Department of Natural Resources' Response Framework for Invasive Species. Retrieved from https://dnr.wi.gov/news/input/documents/guidance/ISResponseFrameworkFinal.pdf.

Yackel Adams, A. A., Lardner, B., Knox, A. J., & Reed, R. N. (2018). Inferring the absence of an incipient population during a rapid response for an invasive species. PLoS ONE, 13(9), 1–13. https://doi.org/10.1371/journal.pone.0204302

Acknowledgements

Approved by the Washington Invasive Species Council on June 17, 2020