A Summary of Gaps in Control and Restoration Measures

(From information acquired as part of the ANSTF Research Committee's 2020 survey)

Ad-hoc Control Subcommittee

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I. Background

In 2018, the Aquatic Nuisance Species Task Force (ANSTF) began the development of its 2020-2025 Strategic Plan. The six broad goals of the draft plan included: Coordination, Prevention, Early Detection and Rapid Response, Control and Restoration, Research, and Outreach and Education. At the December 2018 ANSTF meeting, Goal Teams were formed for each of the six goals and were tasked with refining the objectives and strategies identified for each goal.

At the Spring, 2019 ANSTF Meeting, the work of each of the Goal Teams was reviewed and options were discussed for its committee structure under the new Strategic Plan and the process for development of work plans. It was determined that five standing subcommittees should be formed (Prevention, EDRR, Control and Restoration, Research, and Outreach and Education). The remaining goal, Coordination, focuses on internal operations and procedures and is currently managed by the Executive Secretary. Self-nominations for the five subcommittees were then organized, and once formed, each subcommittee was tasked with developing a 2020 work plan for their goal by October 1, 2019.

The Control Subcommittee is charged with conducting work targeted towards Goal 4 of the ANSTF Strategic Plan: "Facilitate capabilities to contain and control established ANS and restore native species and ecosystems." The three Objectives of Goal 4 include:

- Objective 4.1: Coordinate the development and implementation of ANS Management and Control Plans
- Objective 4.2: Identify and communicate effective control and restoration techniques
- Objective 4.3: Identify gaps in available control and restoration measures and encourage innovation

Collectively, these objectives bring the ANSTF closer to its outcome to facilitate cooperative efforts between ANS Task Force members, regional panels, and their partners that suppress or eradicate ANS populations and restore native ecosystems.

II. Output 4.3.a(i) and Process

As part of Objective 4.3, the Control Goal Team developed the following output:

Output 4.3.a(i): *"Survey ANS Task Force members and regional panels, every five years, for gaps in control and restoration measures; use this information to produce a summary document that explains the gap and measures that are needed to address the deficiency; inform the ANS Task Force of the gaps for consideration as a future research priority."*

To complete the survey, the Control Subcommittee collaborated with the ANSTF Research Subcommittee, adding a question to an ongoing query they were conducting to accomplish work elements from their own Strategic Plan Goal. The question asked:

> "In some circumstances, controlling an AIS or restoring a habitat back to a pre-AIS condition may be difficult because the current tools or technology is either not available or impractical. If you recently encountered this type of situation, please describe the circumstances and provide detail on the gap and measures that are needed to address the deficiency."

This document summarizes the responses that were submitted to answer this query.

III. Summary of Survey Results

A. Numbers

Comments on gaps in control measures that were received by the Subcommittee include:

- 10 comments regarding needing more options for control and management (i.e. Integrated Pest Management)
- 11 comments regarding specific types of control
    - 7 comments on needing new and better chemical controls
    - 2 comments on genetic controls
    - 1 comment on biocontrol
    - 1 comment on harvesting
- 6 comments regarding needing more funding or staff/resources
- 1 comment regarding recovery and restoration after invasive plant treatment
- 1 comment regarding basic research needed on species ecology and biology so that species can be more effectively managed.

B. Summary of Comments by Category

More Options for Control (i.e., Integrated Pest Management)
Respondents identified several commonly encountered challenges associated with eradicating well-established species over large areas. Examples included being limited to ineffective or very expensive physical or mechanical methods and lacking species-specific chemical or biological control methods for plant and animal species to reduce risk of collateral damage to native species. The variety of species identified, from invertebrates to plants to fish, emphasized the difficulty of achieving control in a timely, cost-effective manner. Comments by respondents indicated each species requires very specific, tested and prescriptive approaches.

Specific Control Methods

Chemical Control
Respondents reported the availability of a limited variety of herbicides to control terrestrial and aquatic plants but a more severe limitation of not being able to limit the effects to target plant populations. The very limited arsenal of piscicides is similarly challenged by an inability to limit effects to targeted animals. The development and field application of endocides is emerging as a plant control method, however, a variety of questions remain as to agency approval, public acceptance and direct or indirect collateral damage.

Genetic Control
The specificity of genetic control is very attractive. One type of genetic control is achieved through interrupting reproductive success within wild populations by the production of all male prodigy. Challenges with this type of control include:

- Negative impact to native species and ecosystems continues but at a declining rate;
- Eradication may require a long period of time;

- Species must possess an x-y sex determination system;
- There is significant public opposition to genetic modification; and
- Achieving regulatory approval to create and release genetically modified animals is difficult, expensive, and time-consuming.

Biological Control

Considerable success has been achieved to identify fungal, bacterial, viral, insect and vertebrate predators, parasites and pathogens that exert significant but not total control over plants and animals. Identifying and testing these biological control agents is species-specific, expensive, time-consuming, and not without risk of inadvertently impacting native species.

Harvest Controls

The scale and scope of noncommercial harvest is generally beyond the financial capability of publicly funded agencies. Commercial harvest typically focuses on adult, marketable animal products which is self-limiting unless public-funded once population numbers fall below the point of commercial profitability. Additional challenges include marginal or unprofitable market value and the lack of effective, efficient harvest methods throughout a species' range.

Funding/Resources

Respondents reported an obvious constraint to control, the lack of adequate and sustained funding, and a not so obvious constraint: resource and environmental regulations. Permitting to initiate any type of control requires approvals such as conditions to avoid risk to human health, economic activities, native species, and ecosystems.

Recovery and Restoration

Respondents noted that control can result in some level of damage to native species and ecosystems. Attention must be given to native species and ecosystem recovery, including research to study and improve restoration techniques, and improve post-project monitoring to determine success.

Basic Research on Species Biology and Ecology

Successful control is predicated upon an adequate understanding of target species biology and ecology in a novel, invaded environment and coordinating agreed upon control methods across political boundaries. Time and effort are required to gather and analyze data and to develop working relationships across political boundaries. This investment may not be made given a perceived expediency to control an invading species.

C. Species Referenced in Survey Results

The following species were specifically mentioned in the survey results:

- Blue Catfish (*Ictalurus furcatus*)
- Carpet Sea Squirt (*Didemnum vexillum*)
- Common Reed (*Phragmites australus*)
- Cuban Treefrog (*Osteopilus septentrionalis*)
- Dreissenid Mussels:
  - Quagga Mussel (*Dreissena bugensis*)
  - Zebra Mussel (*Dreissena polymorpha*)
- Eurasian milfoil (*Myriophyllum spicatum*)

- European Frogbit (*Hydrocharis morsus-ranae*)
- European Green Crab (*Carcinus maenas*)
- Giant Salvinia (*Salvinia molesta*)
- Green Sunfish (*Lepomis cyanellus*)
- Invasive Carp (and in one case, specifically Bighead Carp, *Hypophthalmichthys nobilis*)
- Island Apple Snails (*Pomacea maculata*)
- Northern Snakehead (*Channa argus*)
- Waterweeds (*Elodea spp.*)

IV. Recommendations to Address Control Gaps

Based on the summary of the survey results in the previous section, the Control Subcommittee offers the following recommendations to address the gaps identified by the survey respondents:

- Support development of new control options among all the control techniques (chemical, mechanical, biocontrol, genetic, etc.) recognizing that a wider array of control tools contributes to better integrated pest management and can lead to improved chances of successful control efforts.

- Support the development of additional chemical control options and new methods of application to reduce effects of non-target species, while recognizing that chemical control is not, and should not be considered the only control option.

- Continue to support research on the emerging science of genetic control technologies.

- Improve on the successes in the field of biocontrol while seeking options to reduce the time and costs associated with biocontrol studies.

- Continue to support requests for additional funding, within each member's organizational sideboards, where appropriate and when the control will lead to the achievement of other conservation or societal goals.

- Expand capacity and support for native species and ecosystem recovery during and after successful control efforts.

- Facilitate greater understanding that basic research on species biology and ecology is often needed to develop successful control options because species can exhibit different characteristics in invaded environments.

V. Next Steps

Significant financial and staffing resources will be needed to address these recommendations. However, additional resources are not easily acquired within the confines of the Federal budget process. The ANSTF should consider the following ideas to create some of the organizational infrastructure needed to facilitate accomplishment of the above recommendations:

- Add the recommendations to the list of Research priorities.
- Add the recommendations into the next version of the ANSTF Strategic Plan.

- Work to integrate recommendations where appropriate, into the priorities of ANSTF Federal and ex-officio members, Regional Panels, States, State Plans, NISC, etc.
- Seek budget initiatives that may be able to address these recommendations.
- Seek funding opportunities within existing annual grant programs such as the USGS cyclical funding.
- Work with existing species collaboratives to address these recommendations, where appropriate. Examples of existing species collaborative include (but are not limited to the following):
    - The Invasive Mussel Collaborative (https://invasivemusselcollaborative.net/);
    - The Great Lakes Phragmites Collaborative (https://www.greatlakesphragmites.net/);
    - The Great Lakes Hydrilla Collaborative (https://hydrillacollaborative.com/);
    - The Starry Stonewort Collaborative (https://starrystonewort.org/); and
    - The Invasive Crayfish Collaborative (https://iiseagrant.org/work/aquatic-invasive-species/programs-initiatives/invasive-crayfish-collaborative/).

Another aspect necessary to lay the groundwork to address the control and restoration gaps is to identify entities and organizations that may be able to help develop and test new technologies. This was one of the next steps planned by the Control Subcommittee in its 2021 work plan:

> *Output 4.3.b(i): Identify Federal and non-federal entities that have the ability to develop and test new control and restoration measures.*

Upon approval of the recommendations in this document, the Control Subcommittee plans to collaborate with the Research Subcommittee to identify potential entities that have the ability to fund the identified research and control needs. Both Subcommittees will work with the Outreach Subcommittee to determine the best way to communicate this information.