Risk Assessment

Cornerstone of Aquatic Invasive Species Programs

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Outline

- Risk Assessment – very brief 101
- Risk Assessment Steps *(arrival-survival-establishment-spread-impact)*:
  - Examples of information gathered
  - How risk assessments inform an AIS Program?
- Conclusions

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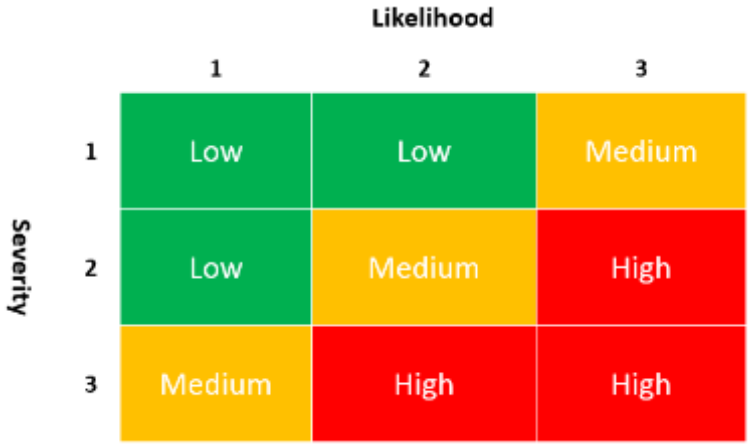
What is Risk Assessment?

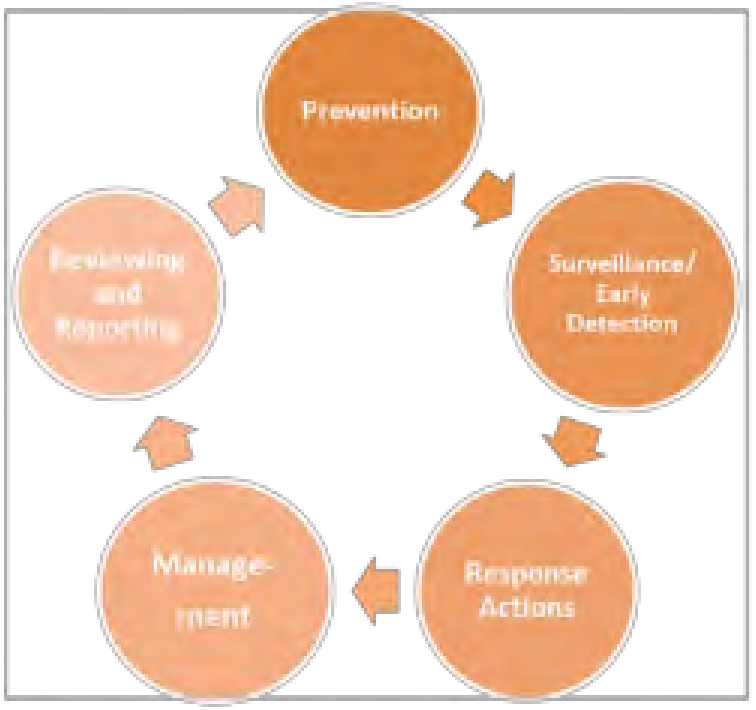
A procedure to identify likelihood of threats & vulnerabilities, and analyze them to ascertain the magnitude of exposures.



Risk Assessment in an AIS Program

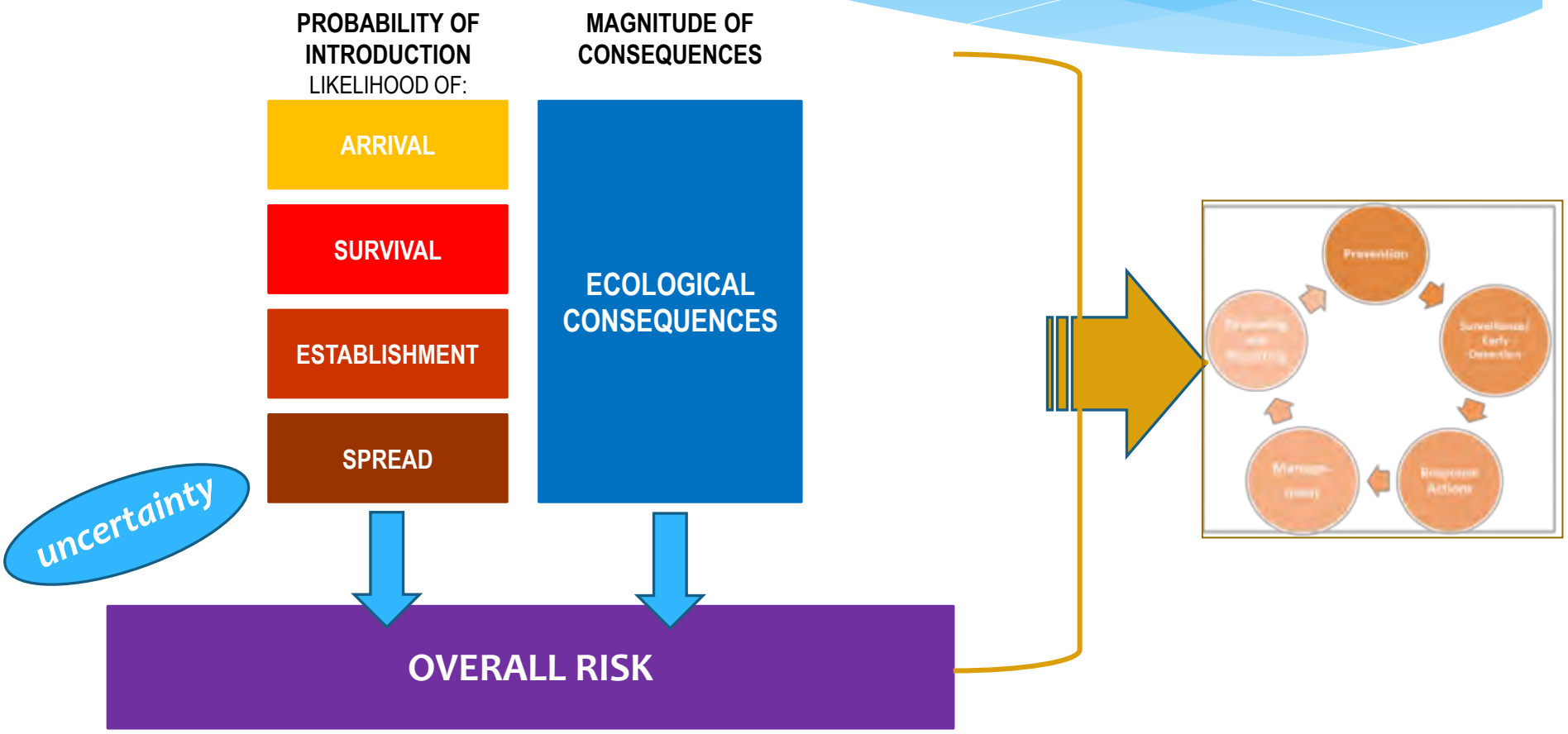
- Goal of an aquatic invasive species (AIS) program should be prevention, but other actions may be required = well-rounded AIS Management Program

- Risk assessment NOT JUST RISK!
- Scientifically defensible information for decision-makers within all levels of an AIS Management Program cycle.

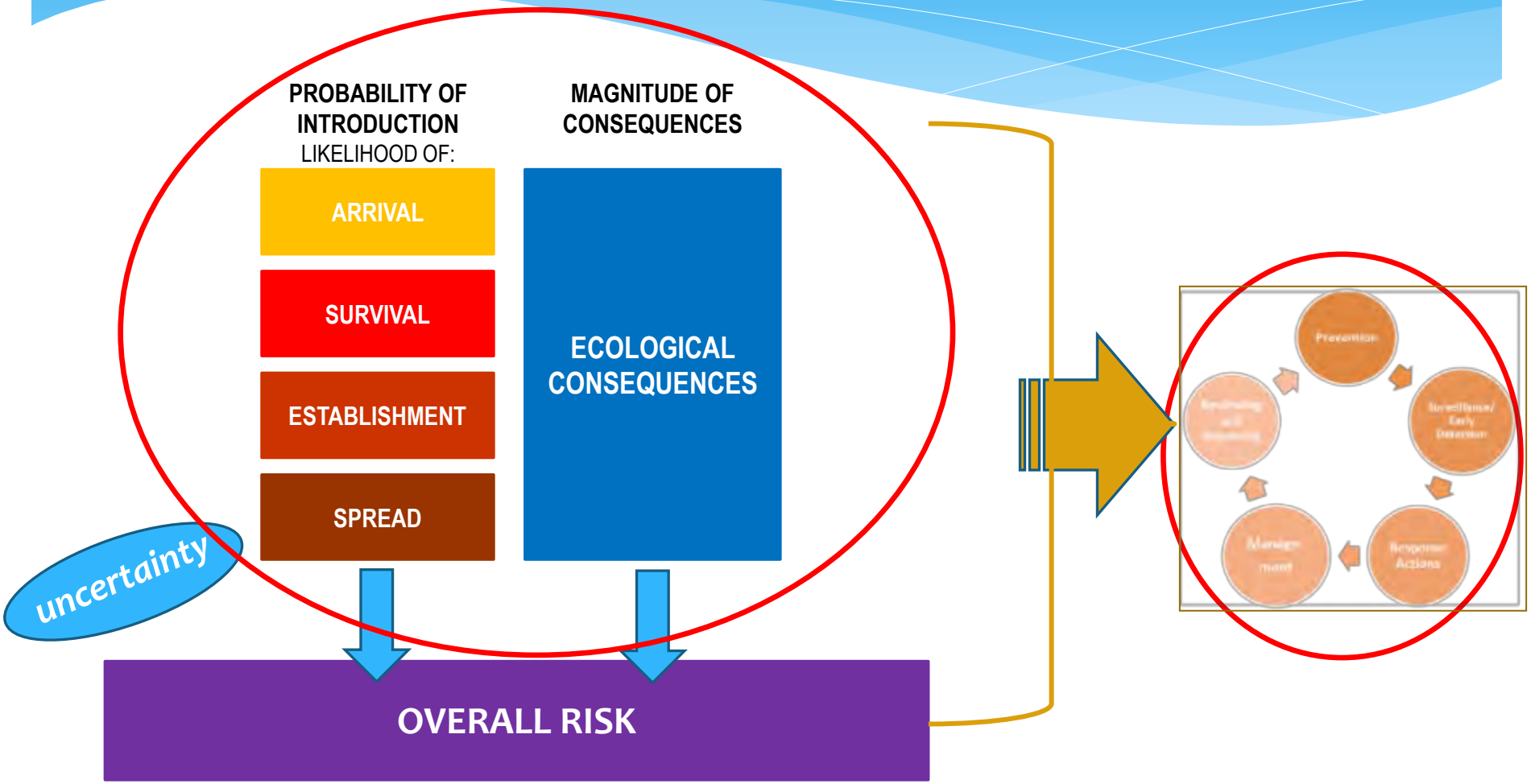


AIS Management Program Cycle

Risk Assessment Process



Risk Assessment Process



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Arrival-Survival-Establishment-Spread-Impact

Data:

- Presence in pathway
- Volume of individuals (propagule pressure)
- Distribution
- Physical connections
- Human-mediated releases

Chan et. al.

Arrival-Survival-Establishment-Spread-Impact

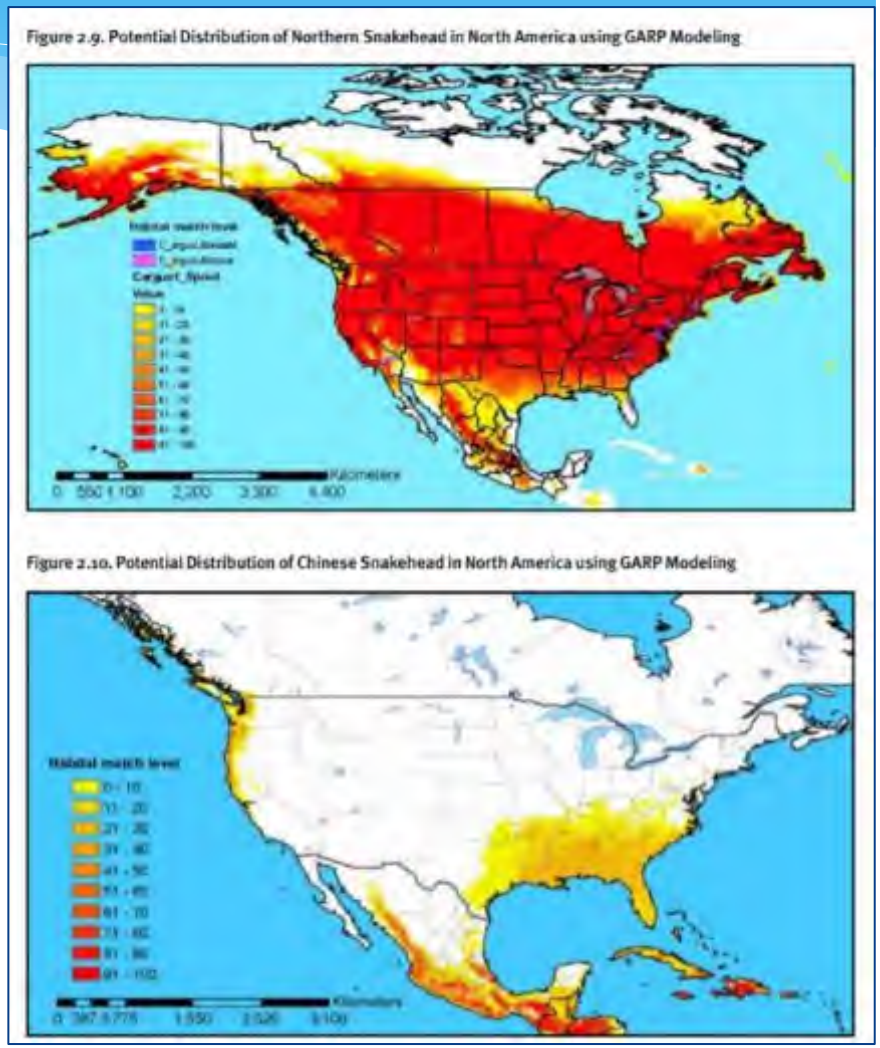
Informs:

- Alignment of resources for early detection in:
  - Geographic areas of highest risk
  - Pathways of highest risk
- Implementation of management actions (e.g. regulations)

Arrival-Survival-Establishment-Spread-Impact

Data:

- Environmental suitability of potential range including environmental tolerances (e.g. salinity, temperature, calcium)
- Habitat and food availability (all life stages, especially vulnerable life stages)
- Predation and disease



CEC 2009

Arrival-Survival-Establishment-Spread-Impact

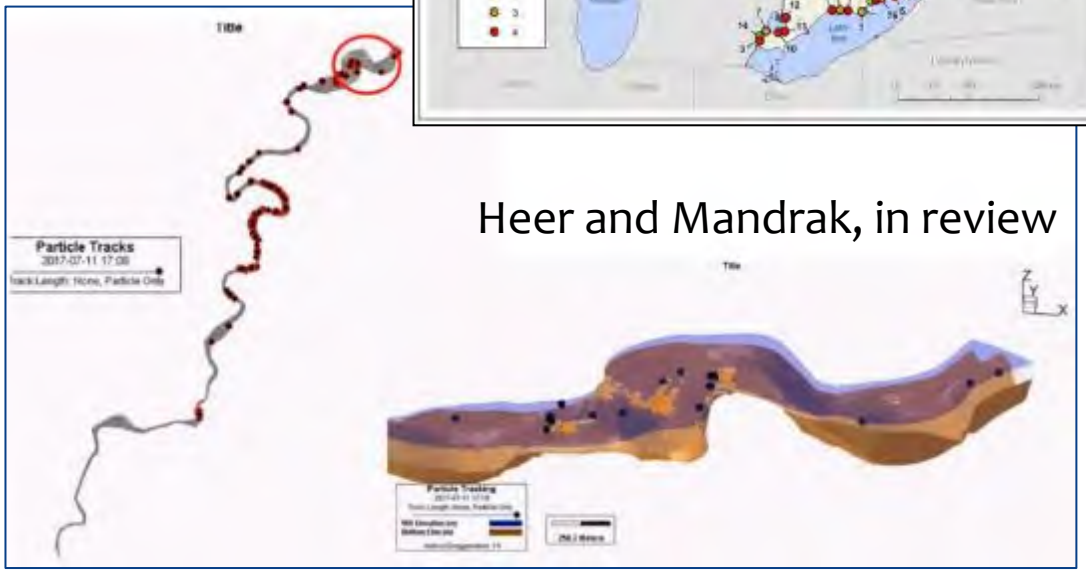
Informs:

- Response actions
- Control mechanisms
  - *"Achilles heel"* that can be exploited for eradication or population level control (impact mitigation)

Arrival-Survival-Establishment-Spread-Impact

Data:

- Environmental suitability of potential range
- Environmental tolerances of the species
- Number of individuals
- Survival of early life stages



Heer and Mandrak, in review

Arrival-Survival-Establishment-Spread-Impact

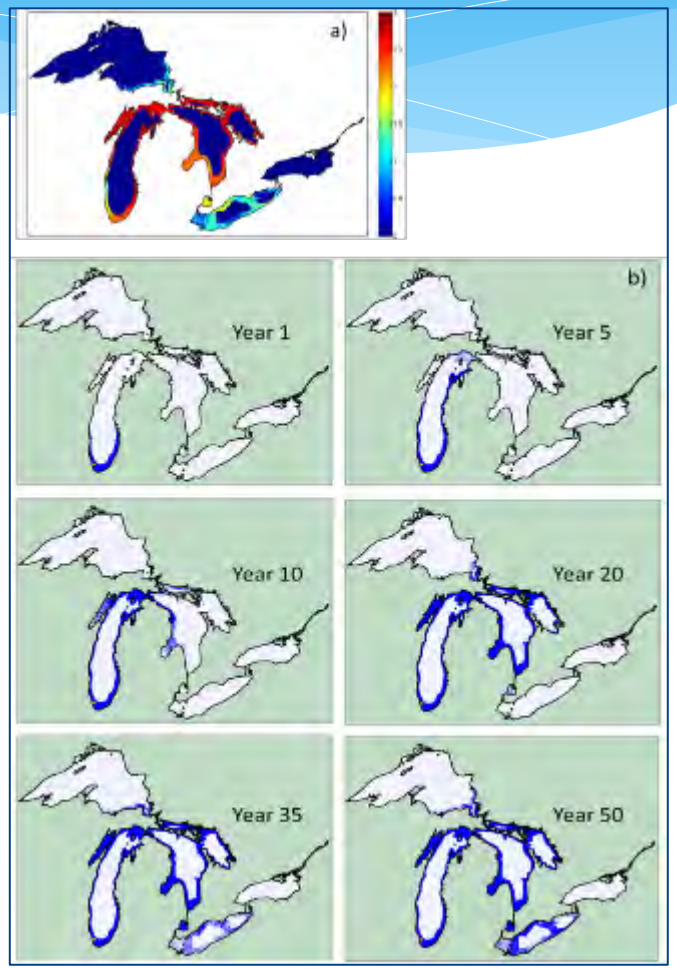
Informs:

- Where to conduct early detection surveillance
- When to conduct ED
- Most effective gears

Arrival-Survival-Establishment-Spread-Impact

Data:

- Environmental suitability and tolerances
- Natural dispersal ability, patterns and speed
- Other movement mechanisms – human-mediated

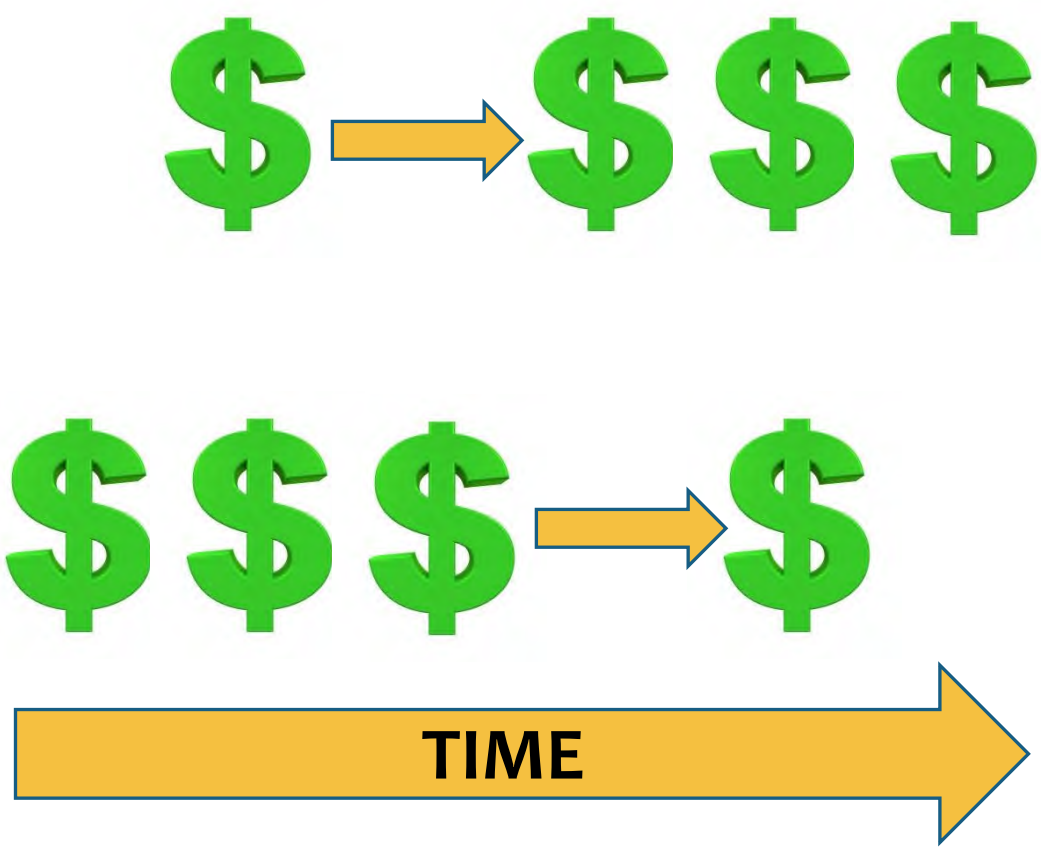


Cudmore et al. 2017

Arrival-Survival-Establishment-Spread-Impact

Informs:

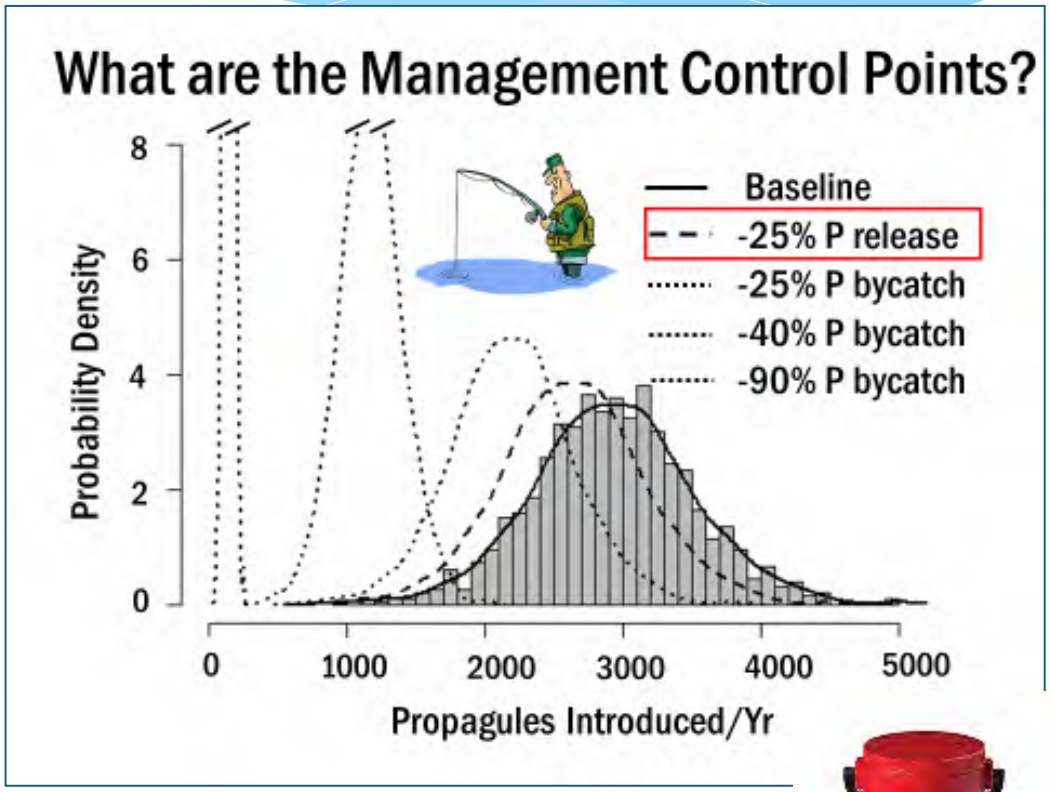
- Temporal risk over time for managers in larger geographic areas
- Mitigation of movement in secondary pathways



Arrival-Survival-Establishment-Spread-Impact

Data:

- Magnitude of impact on ecological endpoints (e.g. biodiversity, habitat, water quality)
- Disease and hybridization
- Ranges from expert opinion to predicted modelling to published research



Drake and Mandrak 2014

Arrival-Survival-Establishment-Spread-Impact

Informs:

- Critical points for risk control
- Most effective groups for stakeholder/public education and management
- Best geographic locations for signage (most vulnerable areas)
- Prioritization

Arrival-Survival-Establishment-Spread-Impact
Broader Aspects

- Required uncertainty elements in a risk assessment can provide direction for further scientific research needs
- Prioritization for program focus
- Support tool for screening large # species and for listing decisions
- Risk mitigation and analysis
- Reporting back on the program

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Conclusions

Research Priorities

Outreach/Education

Regulations/Policies

Early Detection

Threat Mitigation

Program Reporting

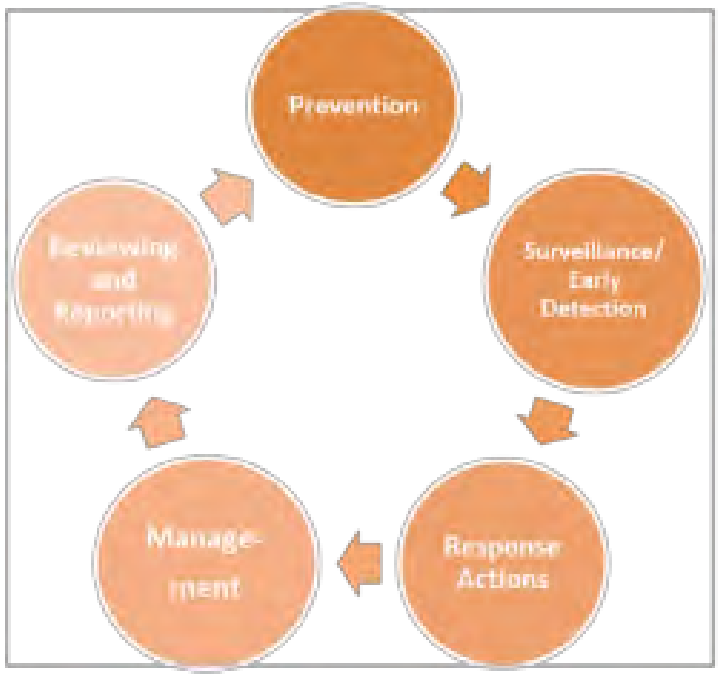
Response

Population Control

Prioritization

Conclusions

- ✓ Risk assessment plays a key role in an AIS Management Program
- ✓ Information and results from each element in the RA process provides scientifically defensible advice for management decisions and actions
- ✓ Requires ongoing interaction between science and management



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