



Looking into the Crystal Ball: Forecasting AIS Science and Information Needs in Ontario Using the Delphi Method

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Introduction

- While there is a considerable amount of AIS research done in Ontario, it may not provide all the information resource managers and policy professionals need
- Agency staff have not been asked to systematically and collectively prioritize their needs

Project Goals:

1. Identify key priorities for future science and information needed by AIS management staff and policy professionals
2. Identify any barriers and possible solutions to ensure effective communication amongst management staff, policy professionals, and science practitioners

So, how does one go about systematically determining the collective goals of Ontario resource management agencies?

What is the Delphi Method?

- Developed in 1950's by RAND Corporation for predicting impacts of U.S. military decisions
- Widely adapted by other fields (e.g. health, education, technology sector) as a means to identify and solve problems
- Involves an iterative, structured surveys of a group of experts
- A facilitated, but anonymous, group communication process for purpose of brainstorming a complex problem/issue
- Goal is to lead to consensus or convergence of opinion keying in on important priorities

Why Use the Delphi Method?

- Participants can respond at their convenience
- Participants can be in geographically dispersed locations
- Limits the influence of dominant individuals, individuals with seniority, etc.
- Views are shared without need to convince others of right/wrong
- Feedback process allows and encourages reassessment of initial ideas
- Helpful in predicting a future state

AIS Science and Information Needs Delphi

- We used a Classic Delphi survey to explore information needs
- Information includes science, monitoring and research
- Nominated an expert panel
 - 75 staff from MNRF, Ontario & federal government, non-governmental groups
 - Included AIS science, management, and policy professionals
- Target audience – primarily Ontario government science staff
- 3 rounds of questionnaires (online survey)
- Analysis of information after each ‘round’
- Panelists provided a minimum of 2 weeks for each survey
- Reminder emails/phone calls helped boost participation

AIS Information Needs Delphi Methodology

- **Survey #1 – brainstorming priority species and info needs**
 - Looked at a 10 – 15 year timeframe
 - 34 questions
 - Approximately 2 hours to complete
 - Over 1200 ideas
 - Response rate of 57% (43 of 75)
- **Survey #2 – ranking ideas (5-point Likert scale + Do not know)**
 - Only 14 questions about future priorities and needs carried over
 - Some synthesis of responses necessary
 - Approx. 2 hours to complete; Response rate of 74% (32 of 43)
- **Survey #3 – confirming priorities & further ranking**
 - 14 questions; under 1 hour to complete
 - Response rate of 91% (29 of 32); Overall response rate of 39% (29 of 75)

RESULTS

Priority Species (in 10 – 15 Years)

Invertebrates

Plants

Fishes

Fishhook Waterflea (<i>Cercopagis pengoi</i>)	Didymo Algae (<i>Didymosphenia geminata</i>)	Asian Swamp Eel (<i>Monopterus albus</i>)
Killer Shrimp (<i>Dikerogammarus villosus</i>)	Eurasian Water-Milfoil (<i>Myriophyllum spicatum</i>)	Baitfish
Parasitic nematode of eels (<i>Anguillicoloides crassus</i>)	European Common Reed (<i>Phragmites australis australis</i>)	Bighead Carp (<i>Hypophthalmichthys nobilis</i>)
Quagga Mussel (<i>Dreissena bugensis</i>)	European Water Chestnut (<i>Trapa natans</i>)	Black Carp (<i>Mylopharyngodon piceus</i>)
Rusty Crayfish (<i>Orconectes rusticus</i>)	Fanwort (<i>Cabomba caroliniana</i>)	Grass Carp (<i>Ctenopharyngodon idella</i>)
Spiny Waterflea (<i>Bythotrephes longimanus</i>)	Hydrilla (<i>Hydrilla verticillata</i>)	Marbled Goby (<i>Pomatoschistus marmoratus</i>)
Zebra Mussel (<i>Dreissena polymorpha</i>)	Water Soldier (<i>Stratiotes aloides</i>)	Northern Snakehead (<i>Channa argus</i>)
		Round Goby (<i>Neogobius melanostomus</i>)
		Sea Lamprey (<i>Petromyzon marinus</i>)
		Silver Carp (<i>Hypophthalmichthys molitrix</i>)

Note: Species are listed alphabetically, they were not ranked in the survey

Priority Pathways (in 10 – 15 Years)

- Angling (angler equipment, bait buckets, live wells, & use of live bait)
- Aquarium and pet trade
- Bait industry (commercial bait operations, & in-stream storage of baitfish)
- Behaviour of general public
- Canals, locks, & waterways (including Chicago Sanitary & Shipping Canal)
- Great Lakes & transoceanic commercial shipping (including ballast water)
- Live food fish trade
- Recreational activities (ATVs, boating, bilge water, trailers, personal water crafts, scuba gear, water toys)
- Unauthorized introductions of sportfish, illegal fish stocking/transfers
- Water gardens, landscaping and horticulture



Types of Information Needed in 10-15 Years

To Prevent the Introduction of AIS:

1. *Strong legislation, policy, and regulation to block pathways and prevent introductions from industries*
2. *Increased enforcement and surveillance effort and tools (including retail stores, international borders and ports of entry)*
3. *Improve sharing of knowledge and information with the public (including new technology, signage, etc.)*

To Help with Early Detection of AIS:

1. *Improved species identification skills and training for field staff*
2. *Identification of priority areas and species for surveillance*
3. *Response plans for priority AIS and appropriate protocols when a new AIS is detected*
4. *Increase the availability and sharing of data and information amongst organizations*

Types of Information Needed in 10-15 Years

To Respond to, Manage, or Control AIS:

1. *Research on physical, chemical and biological control, eradication and response measures*
2. *Improved methods for coordinating rapid response; promoting its use; and ensuring proper resourcing and set up, including better identification of the lead agencies*



Obtaining the Information

Preferred Sources of Information:

1. *MNRF*
2. *Academia*
3. *Peer-reviewed journals, & scientific reports*

Removing Barriers For Resource Managers to Obtain Needed Information:

1. *Multi-agency approaches and joint funding to coordinate science, monitoring, reporting, and communications*
2. *Adequate sustained funding for research, monitoring, and response to AIS and management of AIS*



Lessons Learned About Using Delphi

1. At the outset, it is critical to identify the final outcomes and objectives to focus the survey. Avoid questions not necessary to the objectives, or “nice to knows”.
2. With limited experience with Delphi, training on the methodology or collaboration with an expert would have been helpful.
3. A three round survey worked well. An additional round might have further focused the priorities; however, it might have masked regional and agency differences.
4. Delphi requires a large commitment of time and effort by the project team and expert panel.

Lessons Learned About Using Delphi

5. Pilot testing of the draft survey is critical.
6. Do not underestimate the time required to complete the survey...avoid participant fatigue. No survey should take longer than 1 – 1.5 hours. Testers should record the time it takes to complete.
7. Selecting the expert panel takes time and it is important to consider the expertise of each and every panelist.
8. Questions must be carefully worded to ensure you are asking what you think you are asking.
9. To ensure high participation rate, email and phone reminders are important.

Questions?

