Marine Bio Invasive (MBI) Species Monitoring Approaches For Volunteer Programs

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Prevention and early detection are the most effective approaches for controlling invasive species. Training volunteers to monitor for marine invasive species can significantly enhance both prevention and early detection. Clearly, having more eyes in more places watching for potential invasive species will greatly improve the possibility of identifying a new invasion quickly, perhaps making eradication feasible. Volunteer monitoring efforts can also help assess the consequences of bioinvasions. The often comprehensive, long-term monitoring data gathered by volunteers can be used to identify changes in ecological conditions. With proper training and good timing volunteers can provide baseline data on relevant species, as well as assess impacts once a bioinvasion has occurred. Perhaps more important is the role volunteer monitoring plays in preventing the spread of invasive species through education, and the development of an informed community and local stewardship. Monitoring for invasive species or baseline community assessments can occur as either stand-alone programs, or as part of a larger volunteer water quality monitoring effort.

The Continuum of MBI Monitoring

Awareness/ Early Detection → Occurrence (presence / absence) → Abundance → Expansion → Biology → Impact

Increasing Time - Training - Expertise - Expense $$

Five Basic Types of Monitoring Activities to Document MBI

1. **Occurrence** - determining the presence (or absence) of exotics in a specific area and the recording of new exotic arrivals with time...
2. **Abundance** - recording changes in numbers, density or area covered...
3. **Expansion** - measuring the rate of expansion of a clump or population within a site and to other sites...
4. **Biology** - recording seasonal flowering events; identifying feeding preferences or habitat selection; presence of herbivores/pollinators/predators...
5. **Impact** – identifying replacement of native species; change in use of areas by animals as exotics becomes dominant; potential food web interactions...

http://eqb-dqe.cciw.ca/eman/ecotools/protocols/terrestrial/exotics/exotic6.htm

1st Step - Awareness Building

Early Detection - Awareness Programs

Require:
Identification information through widely distributed materials (pamphlets, signage, etc.)
No formal training program
Confirmation system to respond to suspect sites

Provide:
Awareness building - very high
Number of "volunteers" - very high
Possibility of identifying new invasions early - very high
Possibility of false identifications - high

Awareness Brochure Approach
Impact and Requirements

Volunteers:
- Little effort – no training, and looking for MBI during their usual activities
- May have lower rate of discovery per person (MBI not focus)
- Quantity of watchers makes up for intensity of monitoring activity

Staff:
- Develop / evaluate and distribute materials
- Respond to potential infestation calls
- Provide on-going educational outreach (optional?)

2. Abundance Monitoring

MBI identified accurately (confirmed)
Quantified (i.e. % density or coverage, population estimate)
Mapped
  Approximately: Location drawn on map
  Precisely: Global Positioning System (GPS)
  Photographs, geo referenced

Abundance Monitoring Approach
Requirements and Impacts

Volunteer – Earlier requirements plus:
Increased training
Increased time and effort to quantify and map
Reduced numbers of volunteers

Staff - Earlier requirements plus:
Develop & provide quantification and survey technique training and support
Increased data management

4 & 5. Biology & Impact Monitoring Approach
Requirements and Impacts

Generally utilizes undergraduate and graduate student "volunteers"
Citizen volunteer data may supplement specific research efforts
Provides baseline or targeting information

Occurence Monitoring → Abundance Monitoring → Expansion Monitoring → Biology → Impact

1. Occurrence Monitoring

Volunteers are trained to:
- Identify MBI
- Collect and preserve samples
- Submit preserved samples for identification
- Survey sheets completed and returned (+ or -)

Authorities confirm ID, and may follow up with management activities
Effective for monitoring the movement and distribution of MBI, and eradication efforts through early detection

Occurrence Monitoring Approach
Requirements and Impacts

Volunteers:
Increased effort
Training required
Monitoring IS the activity
Increased discovery per person
Reduced numbers participating

Staff:
Develop / evaluate and distribute materials
Respond to potential infestation calls
Provide on-going educational outreach
Provide training
Provide on-going data management & program support

3. Expansion Monitoring Approach
Requirements and Impacts

Builds on earlier efforts (more time and effort volunteers and staff):
Regular reassessment of populations (monthly, annually, etc.)
Requires previously quantified and mapped populations
Additional data management resources required (database and GIS)
Provides valuable data on the rate and geographic direction of spread of MBI

Occurrence Monitoring Example:

Zebra Mussel Plankton Tow Sampling
http://www.wa.gov/wdfw/volunter/zebramitten.htm

30' to 100' drift tows from a boat
Monthly sampling schedule
Program supplies sampling equipment:
  Plankton net
  Sample bottles
  Labels
Netted material is condensed into a 12 ounce bottle and mailed for analysis