Invasive Species: Can We Eat Our Way Out of a Crisis?

Invasive Catfish Symposium
November 7, 2017

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www.eattheweeds.com


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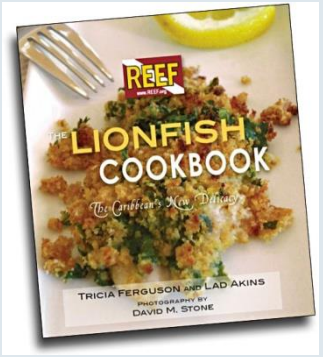


Photo: Bimini Big Game Club

Photo: Shafer Fisheries

Photos: Marshdog.com

Photo: gofishn.com

Examples of Incentive Programs

- Bounty programs
  - Nutria, rapa whelk
- Contract Operation
  - Fee for service
- Commercial Market
  - Asian carp fishery, iguanas
- Recreational Harvest
  - Fishing derbies, USAID

Opportunities

Incentivized Harvest may

- Support other control, management, and containment options
- Lower overall cost of invasive species control
- Generate significant public awareness and engagement

Costs

But it may also…

- Be a perverse incentive
- Create opportunities for additional spread
- Create long-term markets and demand

Biological Considerations

Understanding population dynamics is the foundation for successful invasive species management

- Calculate removal rates
- Predict overcompensation responses
- Prevent immigration

Photo: Larry Daugherty

Determining Removal Rates: Lionfish vs. Garlic Mustard

- Require high annual removal rates (27-65%)
- Derbies may be used to protect areas of high significance

Photo: Florida Keys National Marine Sanctuary

- Require high annual removal rates (85-95%)
- Harvest may leave parts behind

Photo: U.S. Forest Service

Understand Range of Invasion: Great Britain vs. United States

- Successful 10 year eradication program
- Preceded by long term population study
- Isolation decreased change of re-invasion

- Population much larger and widespread
- Requires more financial and staff resources
- Local success is possible, but higher chance of re-invasion

Photo: eattheweeds.com

Photo: USGS


Photo: National Park Service

Biological Challenges

- Can the species be detected easily?
- Will incentives be effective when densities are low?
- “Tyranny of small numbers”
- Eradication is a high risk undertaking

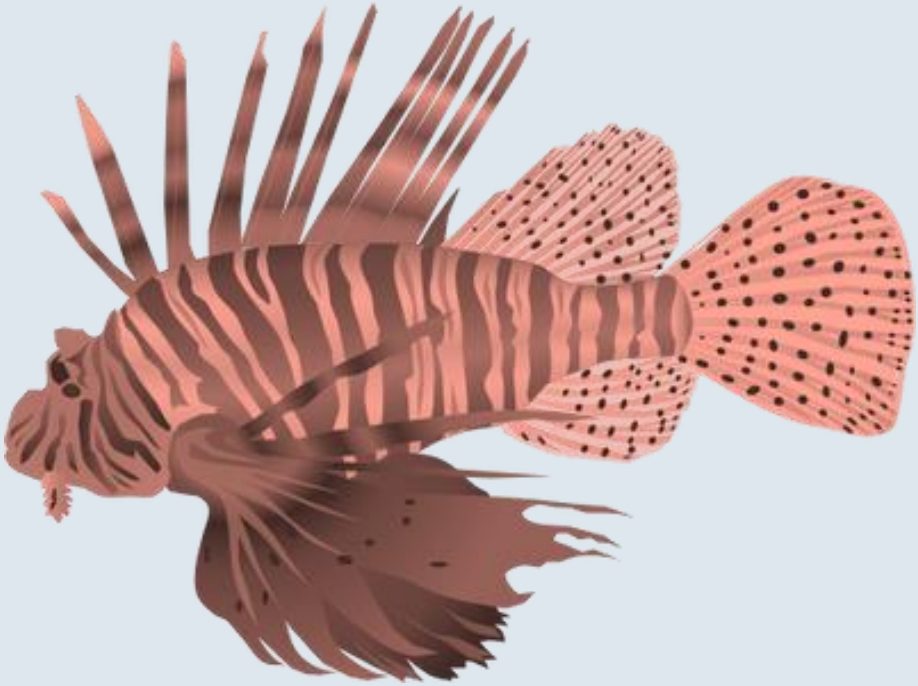


Image Credit: Kim Kraeer, Lucy Van Essen-Fishman, IAN Image Library

RECOMMENDATIONS

- **Understand the population dynamics of the target species**
- **Prevent re-introduction**

Ecological Considerations

- Unintended consequences on native ecosystems:
  - Alteration of ecosystem properties
  - Trophic Cascades
  - Predatory / Competitive release
  - Positive association with native species

Understand Ecological Consequences: Lionfish vs. Red Deer

- Require high annual removal rates (27-65%)
- Once removed native fish populations increase by 50-70%

- Commercial harvest does not reverse ecological impacts
- Browse induced impacts alter litter quality and soil properties

Photo: NOAA

Photo: U.S. Forest Service

RECOMMENDATIONS

- **Understand potential ecological outcomes**
- **Restore native ecosystems**

Human Health and Safety

Photo (clockwise from top: Florida Fish and Wildlife Conservation Commission, NOAA, BBC News, teara.govt.nz

RECOMMENDATIONS

- **Determine potential risk to human health and safety**
- **Ensure people are properly trained in capture methods**

Socioeconomic Considerations

- Legal issues
  - Private property
  - Movement of harvested species
  - Bag limits and other restrictions
- Incentive to establish populations
  - “Bucket biologists” and “midnight managers”
  - Fraud
- Tyranny of small numbers (redux)
  - Adaptive management needed as CPUE decreases
  - Incentives may be needed even when CPUE is high

Duane Raver/USFWS

RECOMMENDATIONS

- Monitor for unintended consequences
- Employ adaptive management (again!) as needed
- Determine appropriate points for government intervention

Asian Carps

- Applications:
  - Government: 2012 Asian Carp Control Strategy Framework
  - Private: Silverfin Marketing Group
  - Cooperative: Humanitarian aid
- Larger fish more desirable
  - Greater incentives needed for smaller size classes
- Government responsibility?
  - Start-up funds needed for businesses seeking to exterminate their income source?
  - Responsibility to ensure start-ups can recoup their investment?
  - Can regulation inhibit or help markets?

Image Credit: Jane Hawkey, IAN Image Library (ian.umces.edu/imagelibrary)

Identifying the Program Goal: Sea Lamprey vs. Pikeminnow

- Location: Great Lakes
- Goal: Control entire population.
- Control: Lampricides and sterilization of males.
- Results: Populations have decreased 90%.

Image: fish.dnr.cornell.edu

- Location: Pacific Northwest
- Goal: Control older and larger fish.
- Control: Prizes of $4-8 / fish, with special tags worth $500.
- Results: Predation on juvenile salmonids reduced 40%.

Image: www.pikeminnow.org

RECOMMENDATIONS

- Define the management objectives
- Understand the costs
- Incorporate adaptive management
- Determine appropriate points for government intervention

Outreach

Image: www.pythonchallenge.org

Images: www.floridastateparks.org, www.change.org

RECOMMENDATIONS

- **Incorporate outreach**

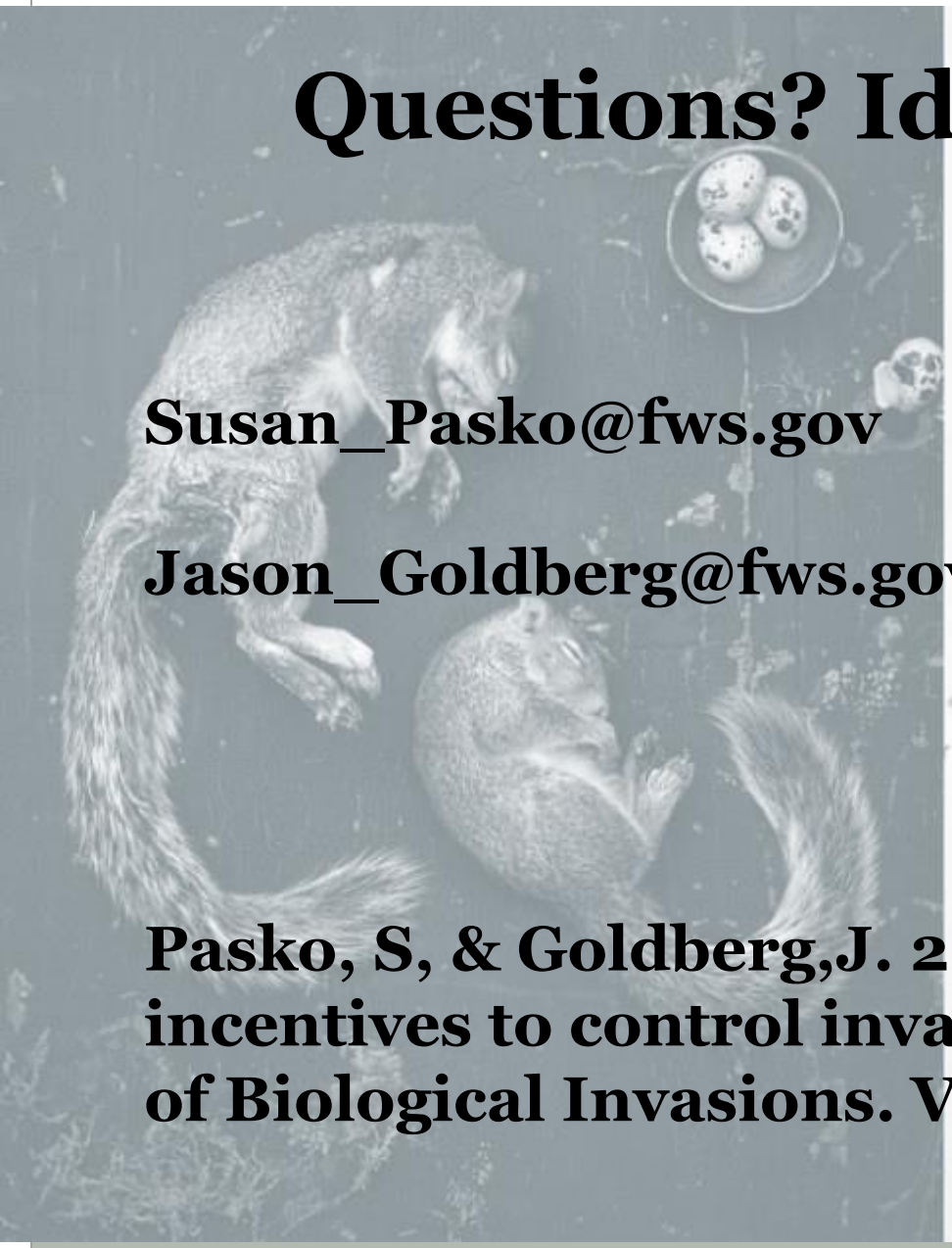
Monterey Bay Aquarium Seafood Watch

- Criterion 1: Stronger support for harvesting species with higher inherent vulnerability
- Criteria 2, 3, and 4: Similar analysis
- Identified Concerns:
  - Intentional movement
  - Health risks of larger fish
  - Establishment of sustainable fishery?

Take Away

- **Successful application of harvest incentives is species- and region-dependent.**
- **Good planning and monitoring are as essential as for any other option.**
- **Incorporate adaptive management.**
- **It may taste good and look fashionable, but it is not free.**

Questions? Ideas? Recipes?



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Pasko, S, & Goldberg,J. 2014. Review of harvest incentives to control invasive species. Management of Biological Invasions. Volume 5, Issue 3