Preventing the Spread of Quagga and Zebra Mussels

A Time for Action

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Presentation Overview

I. Invasive Species Background
II. Quagga and Zebra Mussels
III. Prevention Program Elements
IV. Next Steps Discussion
Invasive Species
An Overview

- **Invasive Species** – “a species that is non-native to the ecosystem under consideration, and whose introduction causes, or is likely to cause economic or environmental harm, or harm to human health.” (National Invasive Species Council)

- **Non-Native or Nonindigenous** – only refers to the origin of the species and not their rate of reproduction, dispersal, or potential to cause harm.

- **Vector/Pathway** – the means or agents that transport species from one place to the next.
Invasive Species Federal Authority

• Lacey Act
  – Injurious Wildlife List

• Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990
  – AIS Management Plans

• National Invasive Species Act
  – Aquatic Species Nuisance Task Force
  – Regional Panels

• Executive Order on Invasive Species
  – National Invasive Species Council
  – Invasive Species Advisory Council

Burmese python (Python molurus bivittatus) Susan Jewell, USFWS
Invasive Species
State Authority

- Department of Fish and Wildlife
  - Live wild animals and plants
  - Aquaculture operations
- Department of Food and Agriculture
  - Injurious animal pests, plant diseases, and noxious weeds
- State Water Resources Control Board
  - Biological pollutants
- Department of Boating and Waterways
  - Aquatic weeds
- State Lands Commission
  - Ballast water
Quagga and Zebra Mussels
An Overview

• Freshwater bivalve native to Ukraine and Russia
• Small, banded or solid color pattern
• Prolific: 1 million eggs/spawning season
• Free-floating larval stage (veligers)
• Transportable
• Arrived in the U.S. in late 1980’s via ballast water
Quagga and Zebra Mussels Impacts

Ecological Impacts

- Disrupts the food web
- Changes water quality
- Out-competes with other species

Water Supply Impacts

- Pipe fouling
- Trash racks
- Infrastructure
Quagga and Zebra Mussels Impacts

Fishing Impacts
• Waterbody closures
• Reduction in game fish
• Fishery collapse

Boating Impacts
• Block cooling system
• Increase drag on bottom of boat
• Affect steering equipment
Quagga and Zebra Mussels
U.S. Infestation
Quagga and Zebra Mussels
CA Infestation

Quagga Mussel
Jan 07 Colorado River
Mar 07 San Bernardino Co.
Jul 07 Riverside Co.
Aug 07 San Diego Co.
Feb 08 Imperial Co.
Apr 08 Orange Co.

Zebra Mussel
Jan 08 San Benito Co.
Quagga and Zebra Mussel Authority

- **Fish and Game Code Section 2301**
  - Inspection authority
  - Quarantine authority
  - Control Plans

- **Fish and Game Code Section 2302**
  - Prevention Programs

- **California Code of Regulations**
  - Restricted Species List – Title 14, Section 671
Quagga and Zebra Mussel Prevention

- Program Elements
  - Vulnerability Assessment
  - Monitoring
  - Public Education
  - Management of Recreation

DON’T MOVE A MUSSEL!
Quagga/zebra mussels
ruin boats and destroy waters
DON’T LET THEM RIDE WITH YOU!
Risk Factors

• Recreational use
  – Boating
  – Fishing/tournaments

• Water access
  – Marinas
  – Number of boat ramps

• Nearby infestations
## Prevention Programs
### Vulnerability Assessment

## Risk Factors
- **Water Quality**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>No Adult Survival</th>
<th>Uncertain Adult Survival</th>
<th>Moderate Infestation</th>
<th>High Infestation</th>
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</thead>
<tbody>
<tr>
<td>Calcium (mg/L)</td>
<td>&lt;8 to &lt;10</td>
<td>&lt;15</td>
<td>16-24</td>
<td>≥ 24</td>
</tr>
<tr>
<td>pH</td>
<td>&lt;7.0 or &gt;9.5</td>
<td>7.1-7.5 or 9.0-9.5</td>
<td>7.5-8.0 or 8.8-9.0</td>
<td>8.2-8.8</td>
</tr>
<tr>
<td>Mean Summer Temp (°F)</td>
<td>&lt;64</td>
<td>64-68 or &gt;83</td>
<td>68-72 or 77-83</td>
<td>72-75</td>
</tr>
<tr>
<td>Dissolve Oxygen (mg/L)</td>
<td>&lt;3</td>
<td>5-7</td>
<td>7-8</td>
<td>≥8</td>
</tr>
<tr>
<td>Salinity (mg/L)</td>
<td>&gt;10</td>
<td>8-10</td>
<td>5-10</td>
<td>&lt;5</td>
</tr>
</tbody>
</table>

Table 1. Criteria used in determining the levels of infestation (Mackie and Claudi 2010).
Prevention Programs
Monitoring

• Early Detection Monitoring
  – Visual Surveys
  – Substrates
  – Plankton Tows

• Sample Analysis and Identification
  – UC Davis Bodega Marine Laboratory

• Decontamination
  – Protocols
Strategy Objectives: Public Education

Posters and Rack Cards

*THE MUSSELS ARE HERE!*
What you can’t see will ruin your boat.

*DON’T MOVE A MUSSEL!*
Mussels will ruin your boat, fisheries and California waters!

When leaving the water:
- **Inspect** all exposed surfaces - small mussels feel like sandpaper to the touch.
- **Wash** the hull of each watercraft thoroughly.
- **Remove** all plants and animal material.
- **Drain** all water and dry all areas.
- **Drain and dry** the lower outboard unit.
- **Clean and dry** all live-wells.
- **Empty and dry** any buckets.
- Dispose of all bait in the trash.
- Wait 5 days in hot weather and up to 30 days when cool and moist. Keep watercraft dry between launches into different fresh waters.

*REPORT MUSSEL FINDS TO 866-440-9530 VISIT WWW.DFG.CA.GOV/INVASIVES/QUAGGAMUSSEL*

*CHECK YOUR BOAT, TRAILER AND VEHICLE*

*DON’T SPREAD INVASIVE SPECIES*
You can prevent the spread of quagga and zebra mussels using this checklist every time you exit a waterbody:
- **Inspect** all watercraft and equipment.
- **Clean** any visible mud, plants, fish or animals from watercraft and equipment.
- **Drain** all water, including from lower outboard unit, ballast, live-well, buckets, etc.
- **Dry** all areas.
- **Dispose of debris and live bait** in the trash.
Prevention Programs
Recreational Activities

• Uniform Minimum Protocols
  – Levels I, II, III

• Trainings
  – Watercraft Inspection
  Trainings Level I and II
Prevention Programs

Funding

• Local Ordinances/MOU
  – Set up fee structure

• Grants
  – Wildlife Conservation Board
  – USDA

• AB 2443 – New Legislation
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Next Steps Discussion

- CDFW Resources
- Tribal Needs
- Cultural Impacts
- Co-Managed Lands