

Terminology

- **Native** – species found within its natural range
- **Non-native (introduced, alien, exotic, non-indigenous)** – a species living outside its native distribution range which has arrived there by human activity either deliberate or accidental.
- **Invasive species** - species that spread subsequent to establishment usually at some cost. **US legal definition** - an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.

INVASIVE SPECIES PROBLEMS



- **World-wide problem**
- **Increase in travel and trade open routes**
- **In U.S. costs \$137 billion dollars per year**
- **Approximately 42% of Threatened or Endangered species are at risk due to non-native, invasive species.**
- **Raise havoc in ecosystems and threaten species diversity**

Causes of Invasion

- **Introduced as a result of human activity** – estimated **50,000 exotic organisms** released in **US** every year. **Non-native species** are introduced as a result and some species become **invasive species**.
- **Accidental or on purpose.**
- **10% Rule** – **Only 10%** of introduced exotics will live at all due to wrong climate, food availability and other factors; of the **10%** that live, only **10%** will actually breed and become invasive.

Effects of Invasive Species on Ecosystems

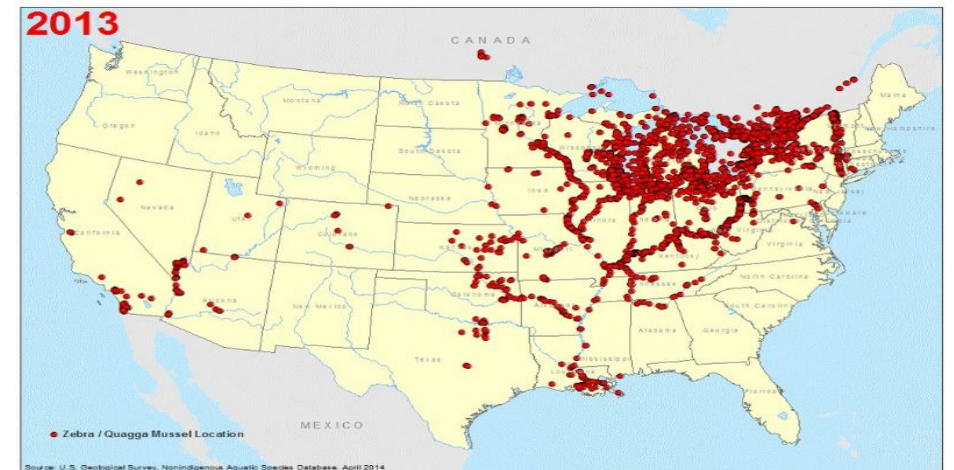
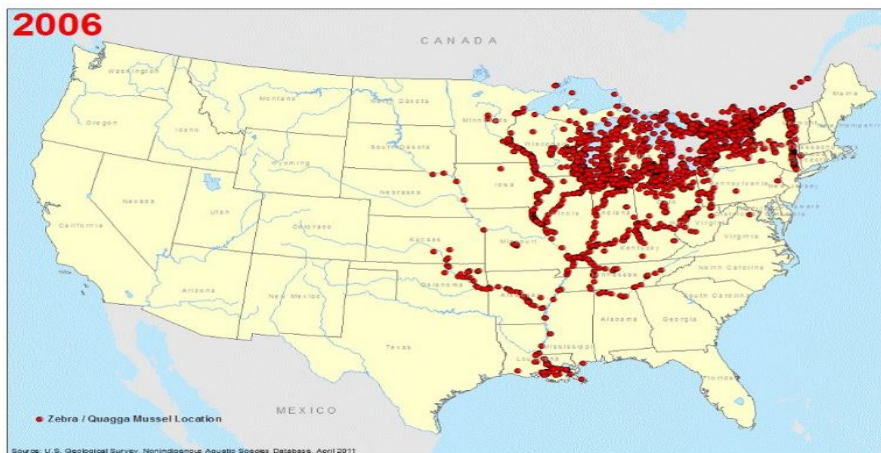
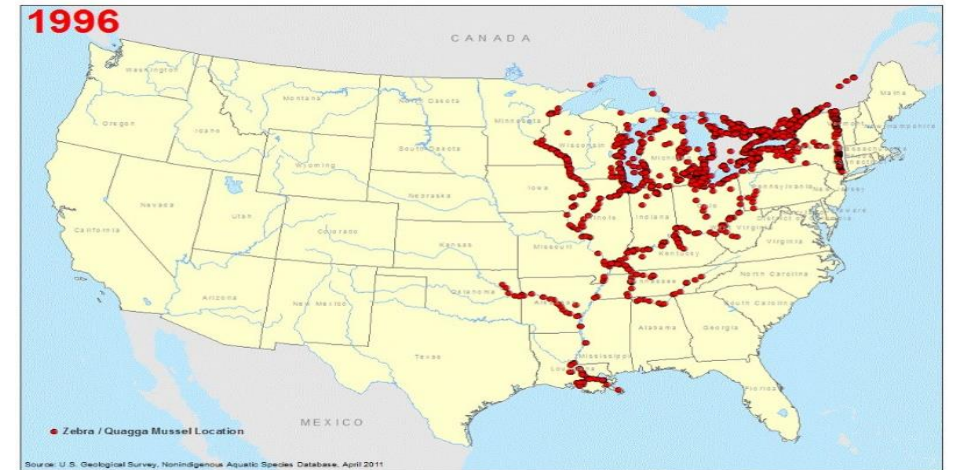
- **Direct competition with native species**
- **Lose of species diversity – may cause native species to become endangered**
- **Short-circuit interactions in natural communities & disrupt natural food web**
- **Affect entire ecosystem functions as water availability and nutrient cycle**

Invasive Species by State

Data from: USGS Report on Nonindigenous Species by James D. Williams and Gary K. Meffe



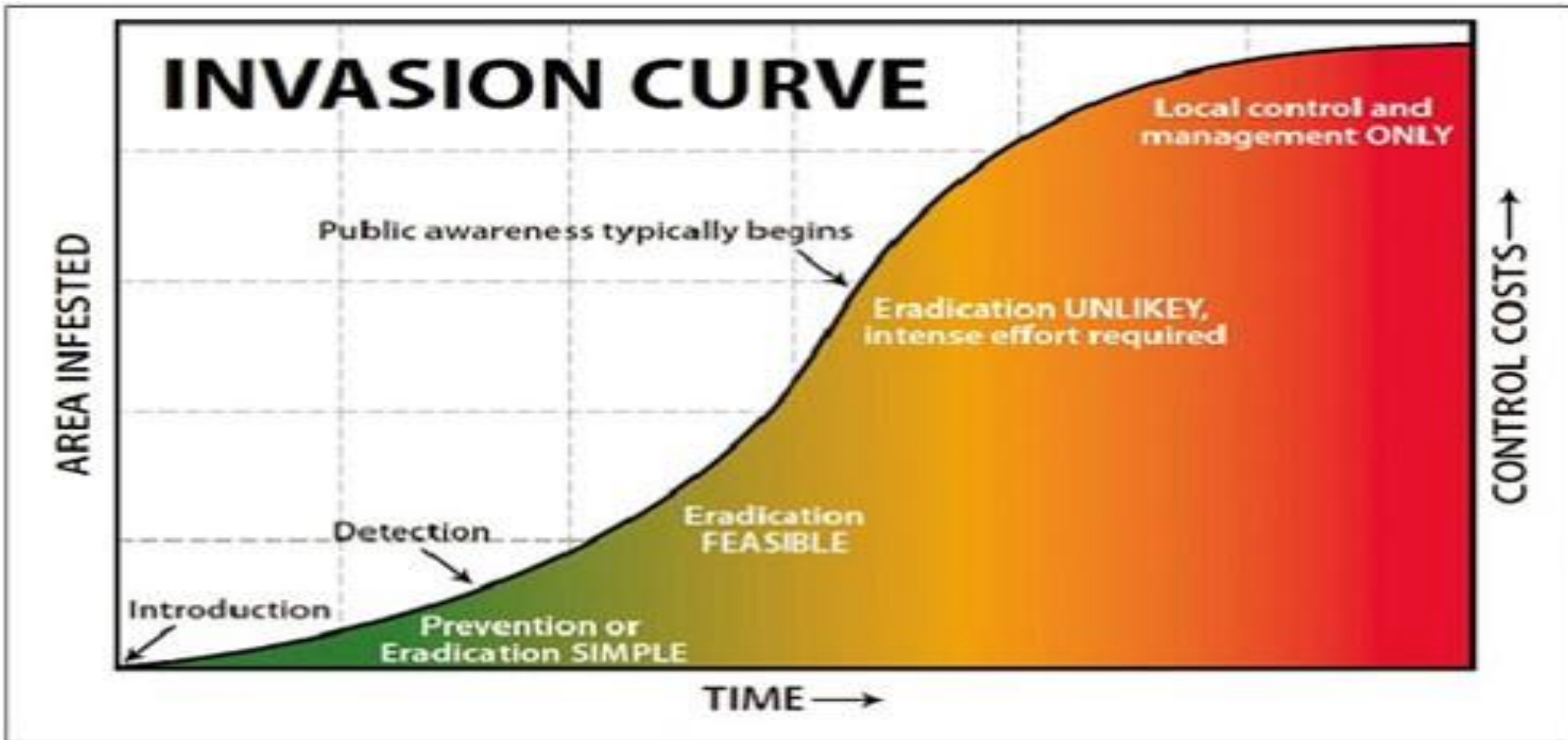
Zebra Mussel Spread



Characteristics of Invasive Species



Invasion Curve



Control Methods

- **Prevention**
- **Eradicating** potential invaders soon after invasion
- **Physical** (manual & mechanical)
- **Cultural – Ecosystem Management**
- **Biological – natural enemies**
- **Chemical – pesticides**
- **Integrated Pest Management – Uses a combination of methods –
OFTEN MOST EFFECTIVE**