Time travel and parallel universes: The power of simulation

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CLEAN WATER LAND & LEGACY AMENDMENT

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

Computer modelling-What?

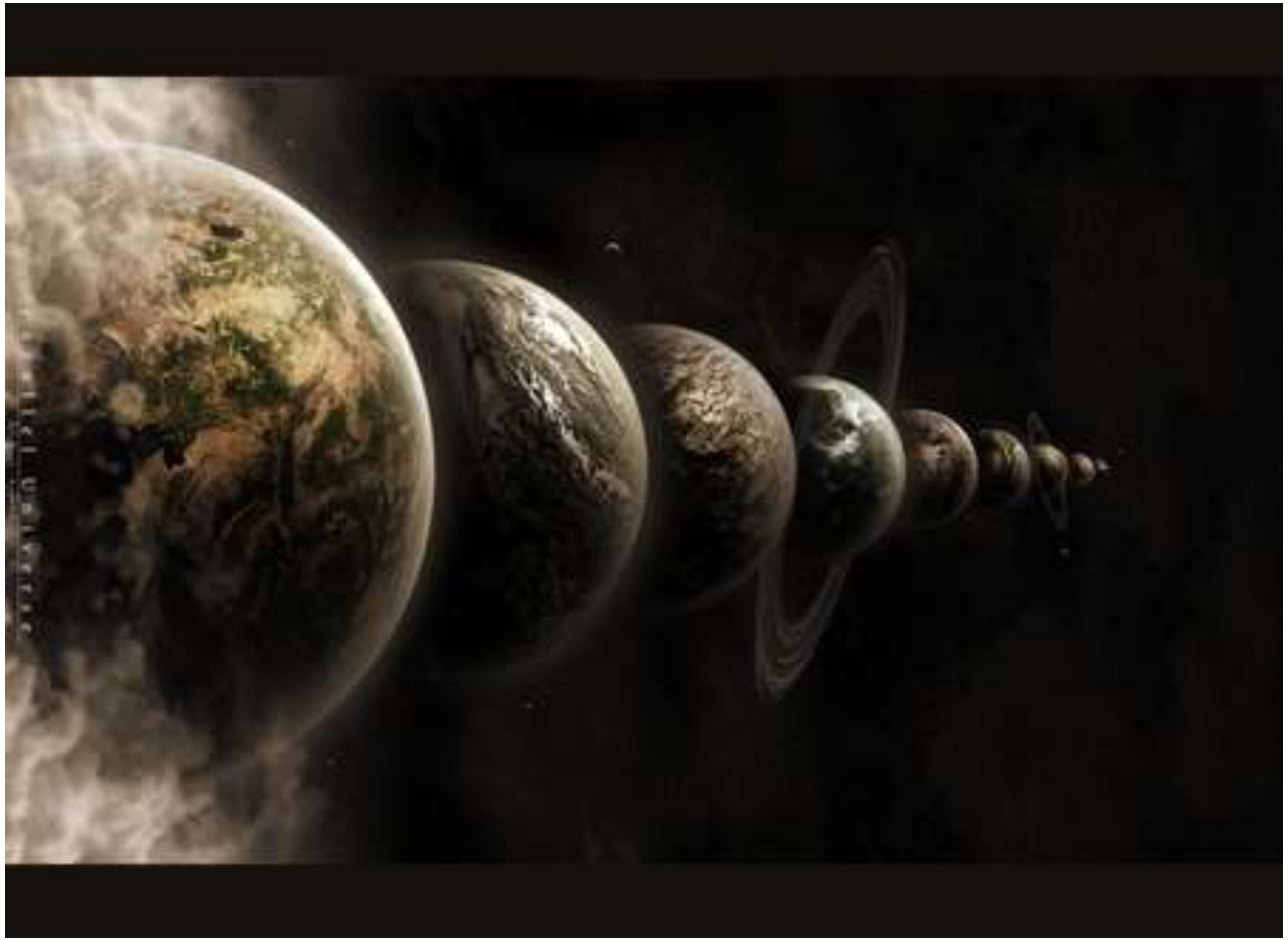
A computer model synthesizes known information and uncertainties to simulate a situation.

Computer modelling-Why?

We can make projections for the future

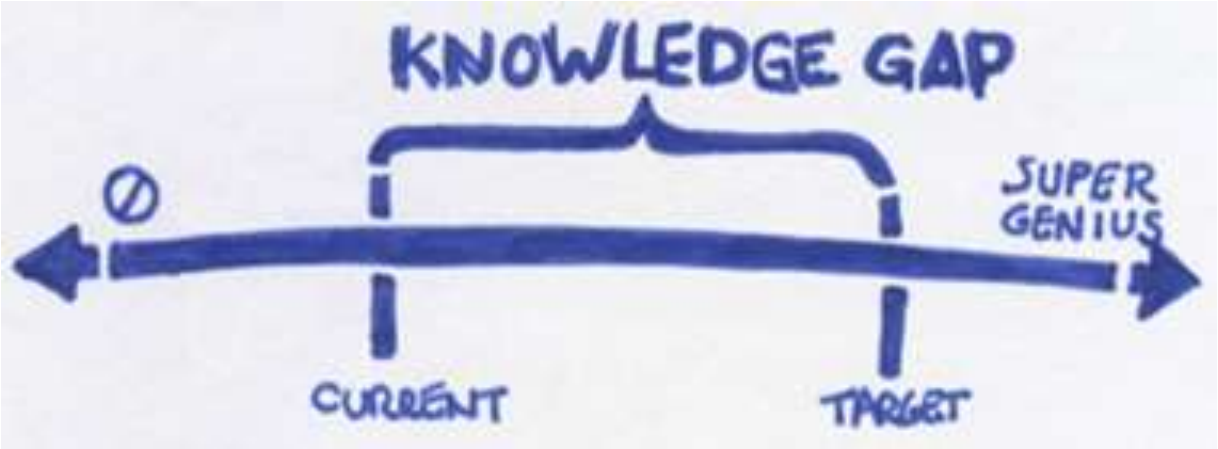
Computer modelling-Why?

We can try out different scenarios



Computer modelling-Why?

- We can identify what is important to research next in order to improve our understanding of the organism/ecosystem/control method

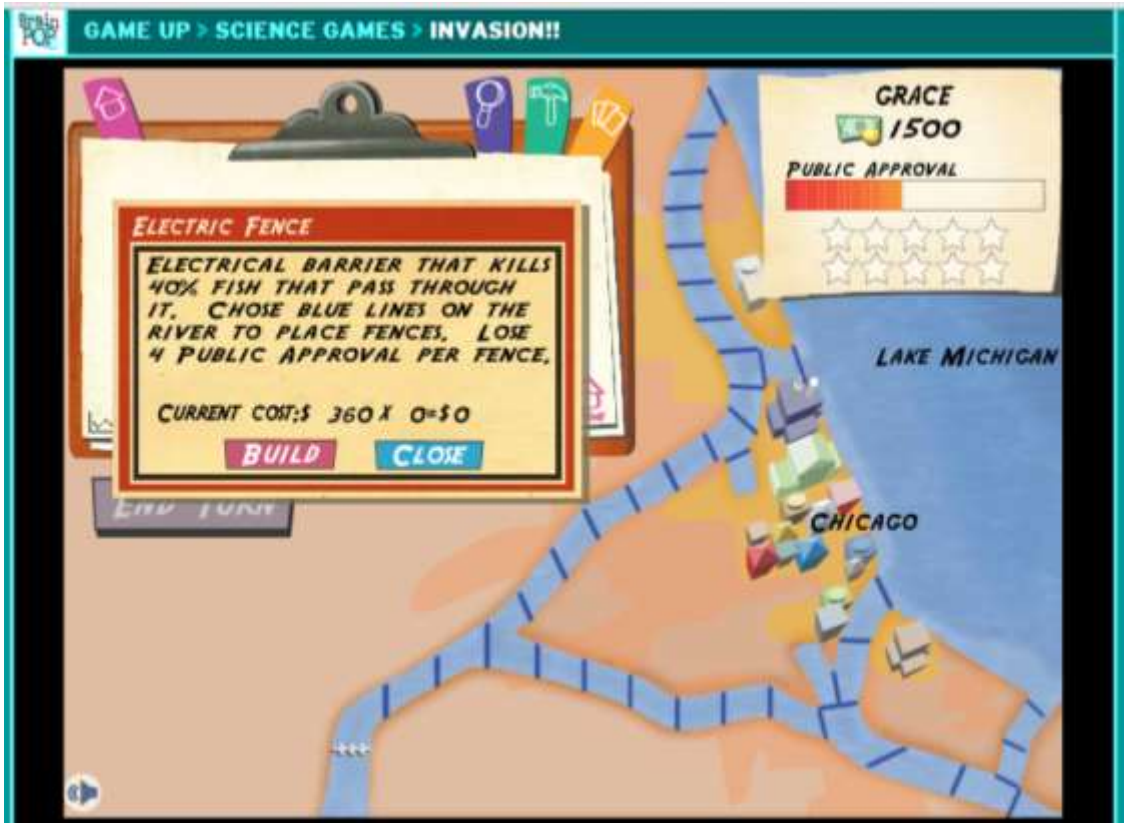


Computer modelling-Why?

- Can be used to advise management actions

Computer modelling-Why?

- Can be used to make teaching tools and extension materials

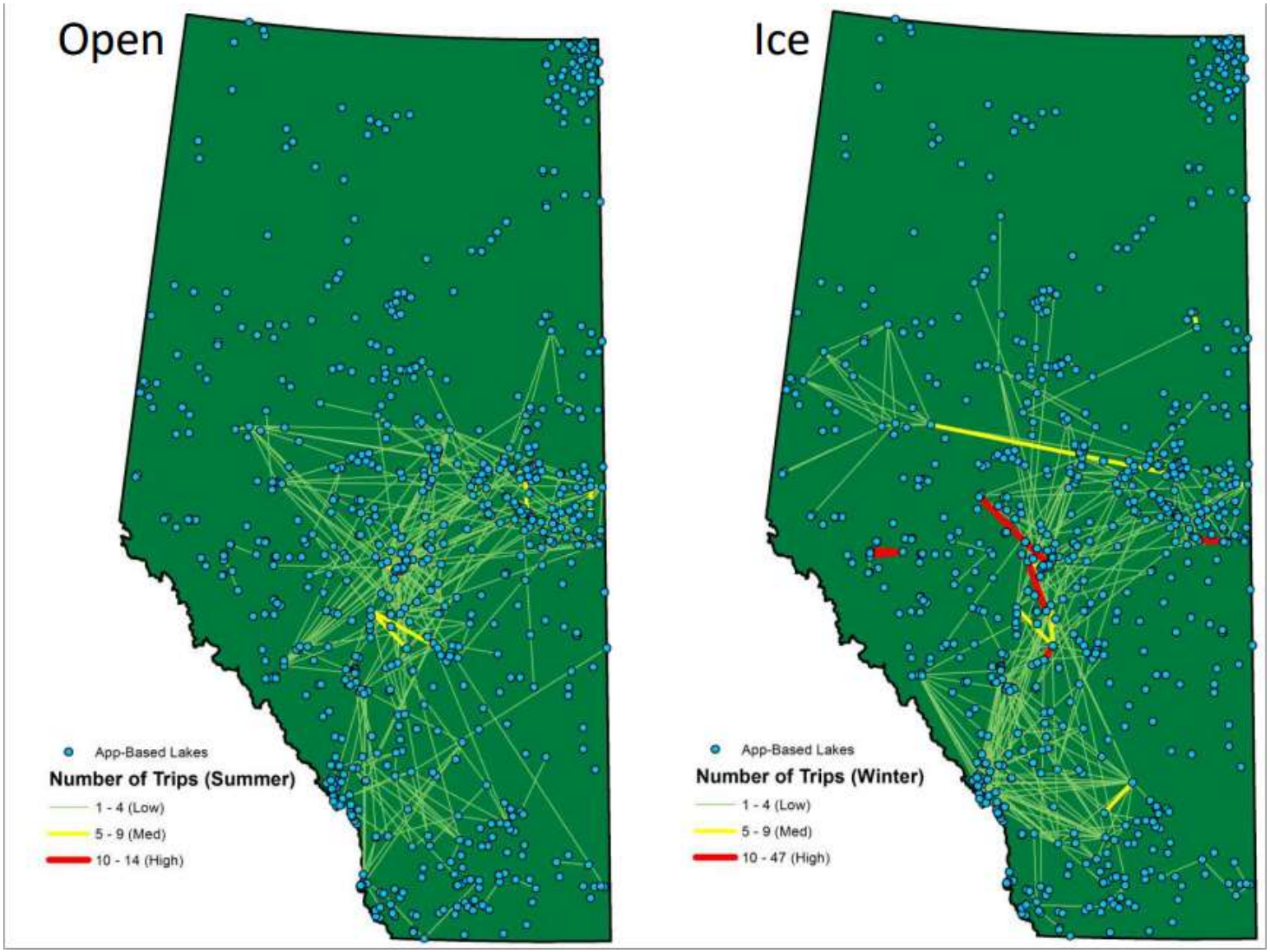


http://www.brainpop.com/games/invasion!!/

Disease spread in salmon farms

Green= healthy farm, red= diseased farm

Angler movement patterns



What is MAISRC modelling?

- Common carp control and the importance of marsh habitat to their survival
  - Future application for shallow lakes
  - Duck habitat and angling implications
- *Heterosporis* population model
  - Fish disease that “liquefies” muscle
  - Simulates effects on a perch population
  - Identify most important research needs

What is (possibly) next?

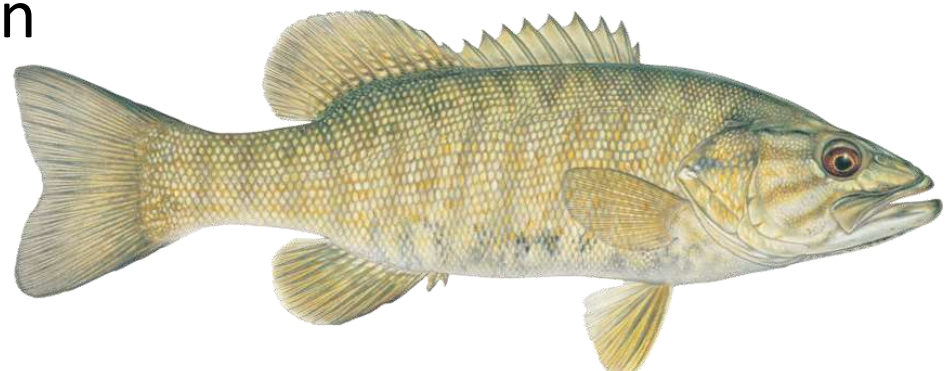
- Model pathways of spread for fish diseases
  - Bait shop/supplier networks
  - Angler networks (using apps?)
  - Predict best ways to limit spread

Demo #1: Common carp management

- Part of a larger MAISRC model
- Led by Joey Lechelt and Przemek Bajer
- Common carp one of the most common, destructive invasive species
- Model simulates the effects of various management options over time
- Decide which methods to use to control carp in a lake and a wetland (spawning grounds)

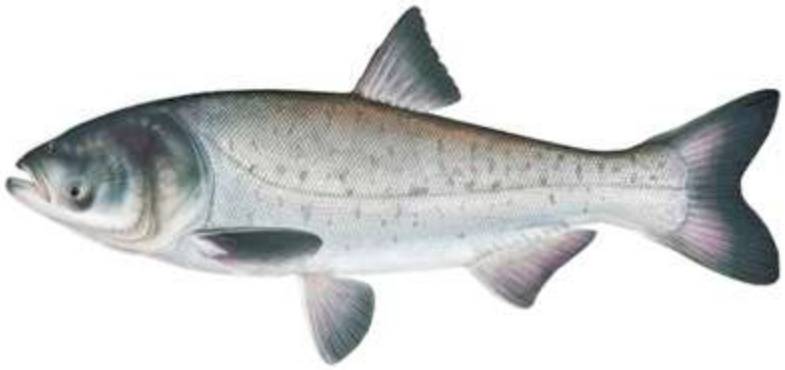
Demo #2: Smallmouth bass management

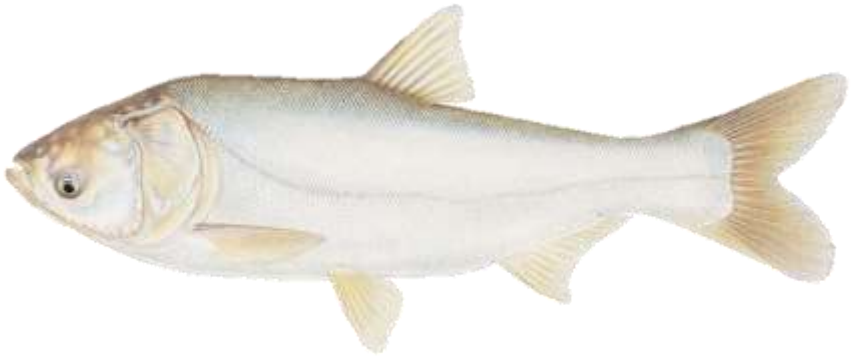
- Non-MAISRC model
- Part of my own thesis research to develop a control method for invasive smallmouth bass
- Invasive in parts of Canada, northern MN, Colorado River, Japan
- Used sensitivity analysis on several models—showed that young are best to target
- Nest failure—eradicate bass nests for control
- Use combinations of nest failure and electrofishing to control the population



Demo #3: Asian carp decision support

- Non-MAISRC model
- Developed for the U.S. Fish and Wildlife Service to help managers throughout the country make decisions about how to manage Asian carp
- In early stages—needs further validation
- Make recommendations for management in several different locations





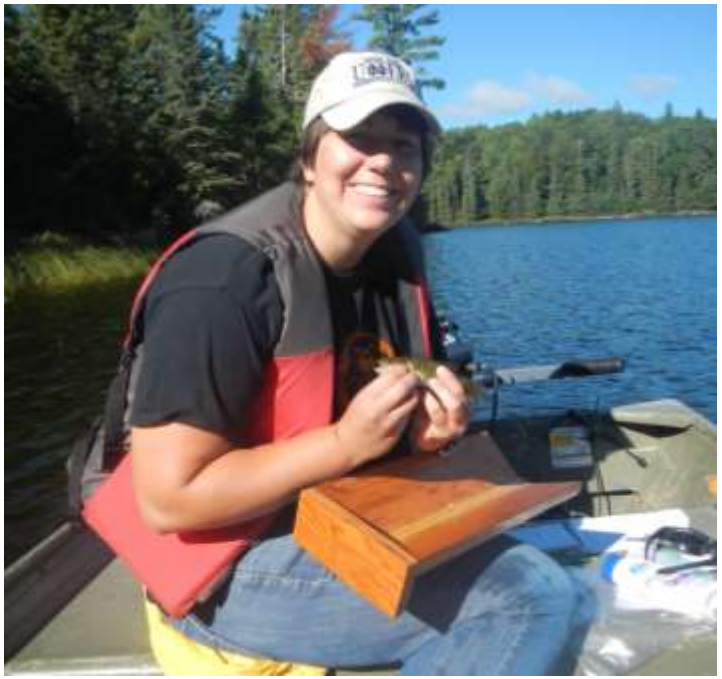
Demos

- 3 models on each of 3 laptops
- Work in groups
- 5 minutes per station
- Read directions before using!
- Paul, Joey, and I will be available to help

Discussion

- What's one thing you learned by using the models?
- Were the models harder or easier to use than you thought they would be?
- Was controlling carp/bass harder or easier than you thought it would be?
- What invasive species questions would you like MAISRC to answer using models?
  (I encourage you to include these in the Research Needs Assessment survey)

Thanks for visiting us today!



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