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CHALLENGES IN MANAGEMENT OF RIPARIAN ECOSYSTEMS: Who are the real bad guys?

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CHALLENGES IN MANAGEMENT OF RIPARIAN ECOSYSTEMS

Who are the real bad guys?

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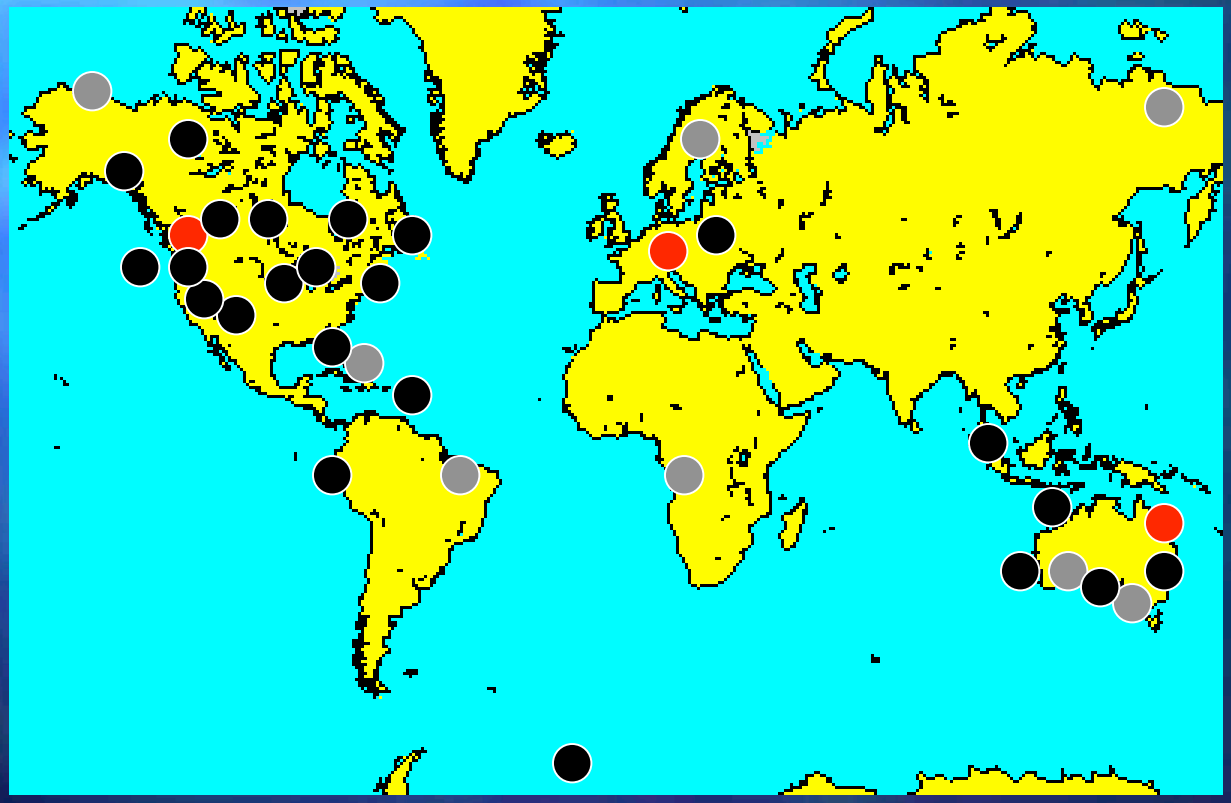
A pathetic track record for implementation of adaptive management:

● Successful ● Modeling failure ● Implementation failure



There is growing demand for riparian "restoration"

- Much modeling has been aimed at quantifying the tradeoffs (gains and losses) associated with restoration
- Surprisingly, that modeling has revealed many "win-win" options, especially where current policy is the result of cumulative historical changes (growing like topsy) without careful planning

Hydrologic engineering aims to control seasonality

- Conveyance of flood waters
- Storage for power and irrigation
- Predictable navigation opportunity
- Enhanced recreational uses

But the natural biota is generally adapted to profit from that seasonality

- Why were there once so many birds in the Florida Everglades?
- Why did Columbia River sturgeon spawn during spring floods?
- Why do young salmon migrate downstream during spring floods?
- What carries away the mud?

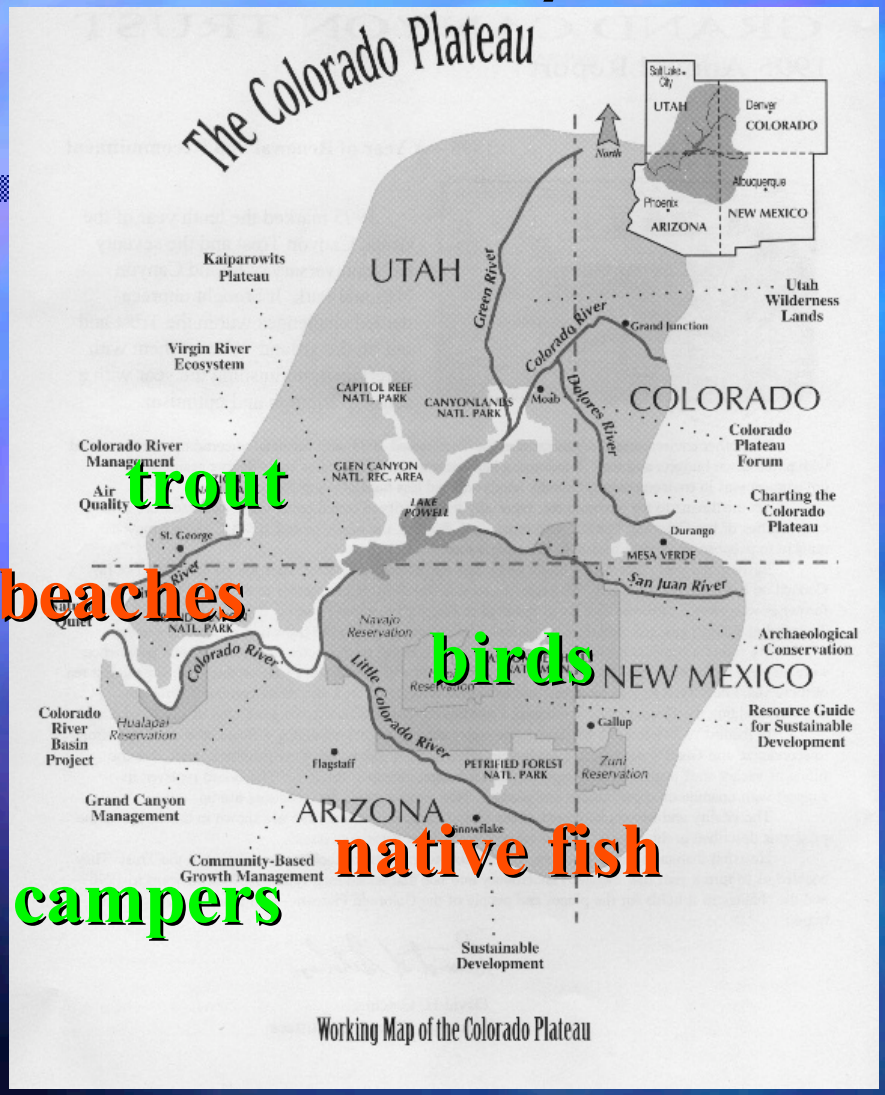
Nature abhors a vacuum

- If you build it, they will come
- If they become abundant and valuable, they will be treated with contempt ("pests") by environmental purists
- If they remain rare or decline, they will be listed under the ESA and become limits to policy change

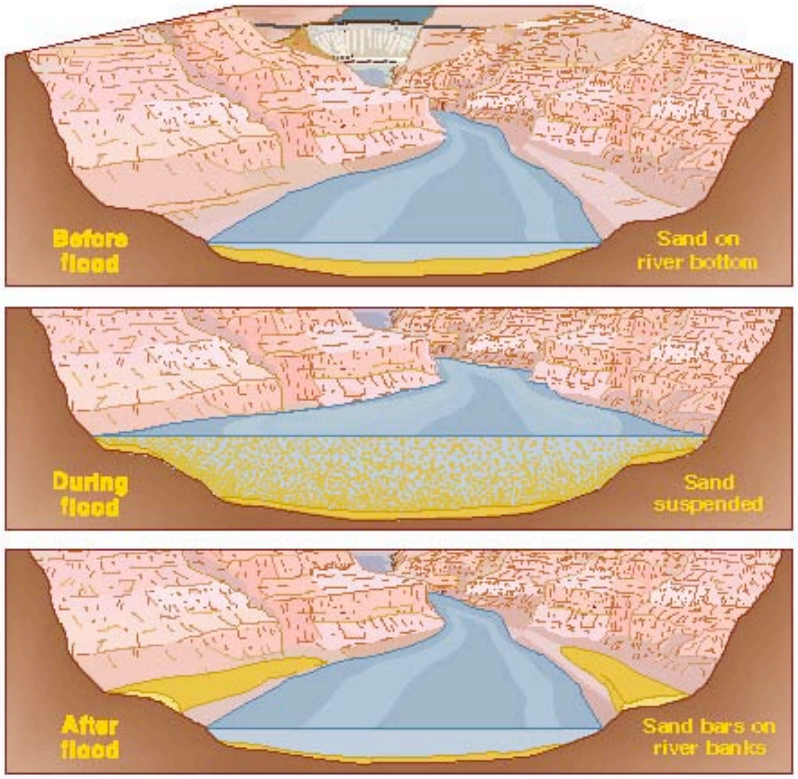
Examples of win-win restoration

- Deplumbing the Florida Everglades--better flood control and urban water supply
- Seasonal drawdown of Mississippii River navigation pools--vegetation development and sediment transport
- Removal of "unprofitable" dams in the Northwest
- Planned floods in Grand Canyon--flood control and recreation (sand beaches)

Grand Canyon winners and losers

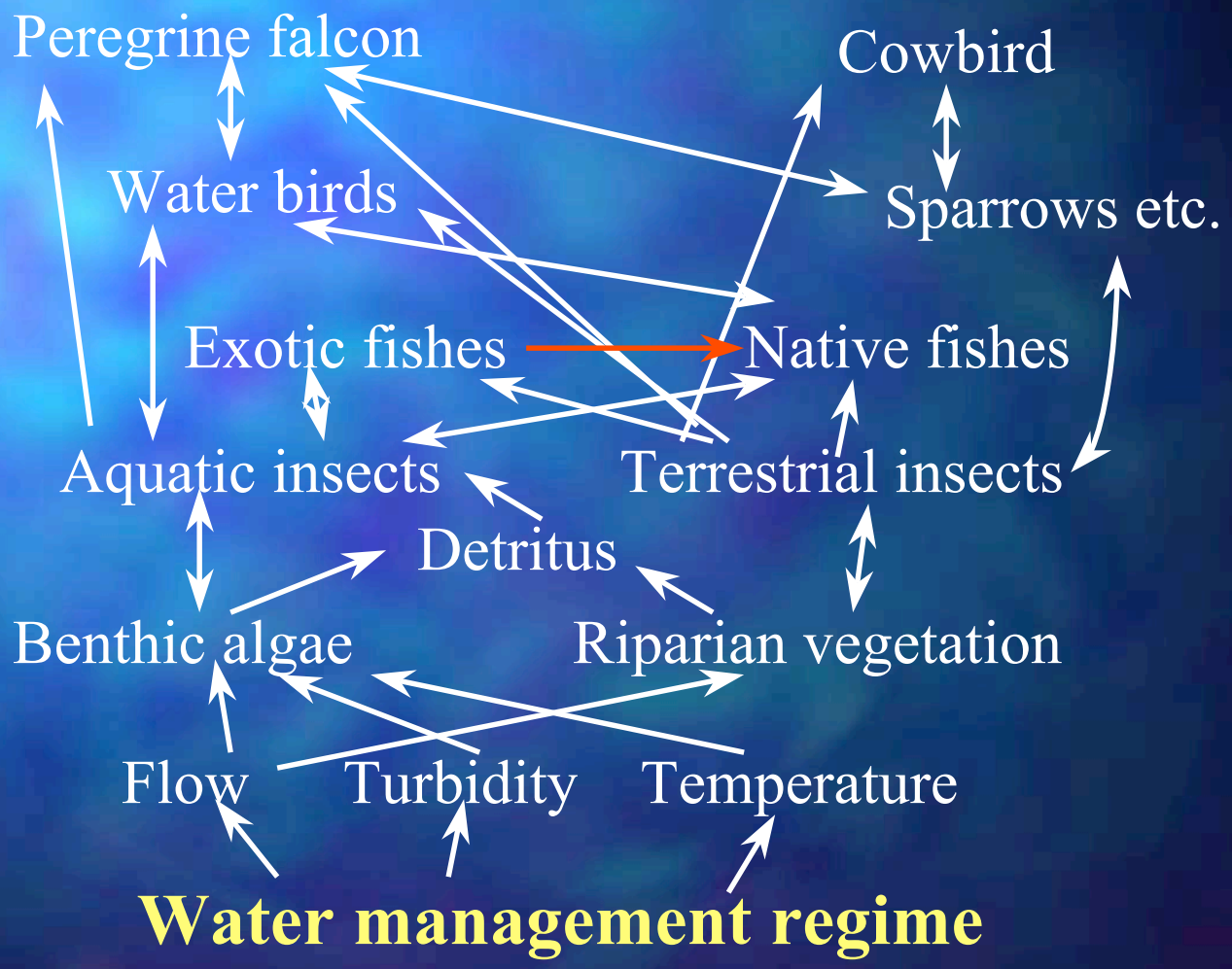


A much applauded experiment:

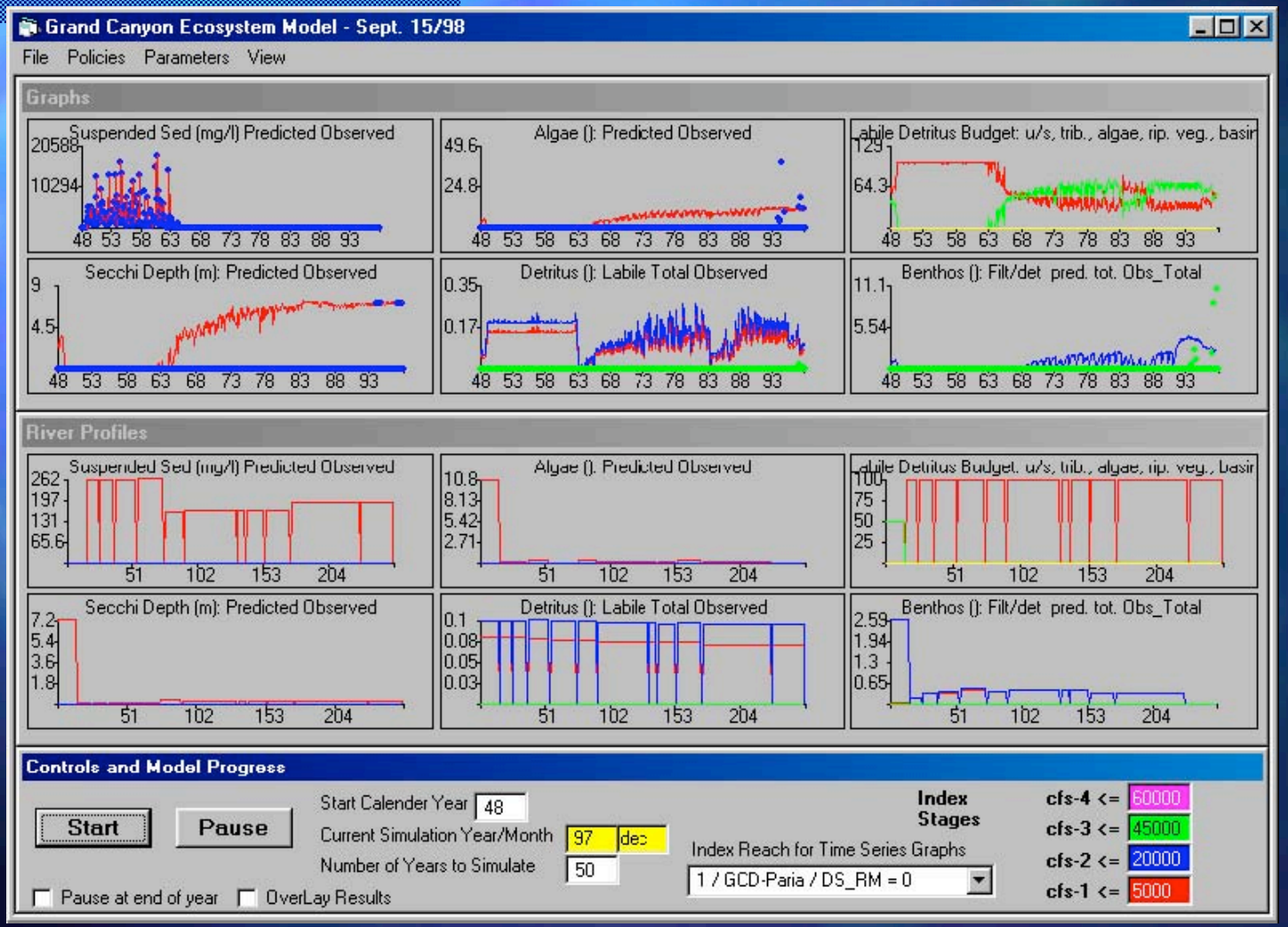


Sand on the river bed will be suspended by the controlled flood and deposited in sand bars along the banks.

We can now build some really impressive looking models, as for the Grand Canyon:



These models look right when compared to available data



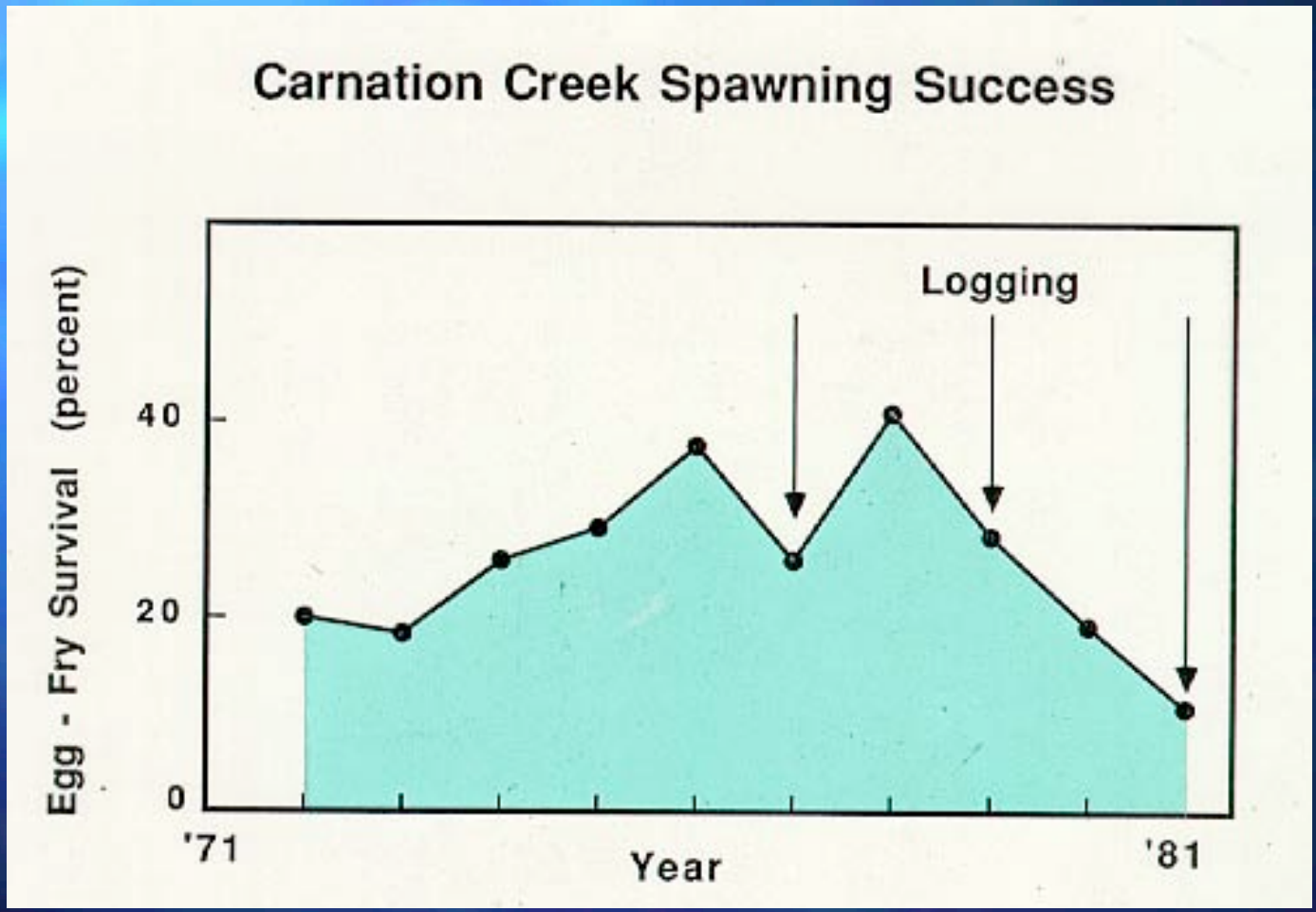
Should anyone believe the models that predict win-win options?

- We are talking about really complicated systems that nobody designed in the first place.
- Our track record at predicting how they will behave is not exactly stellar.
- Hard to test models since many factors are changing at once.
- Mistakes could be very costly.

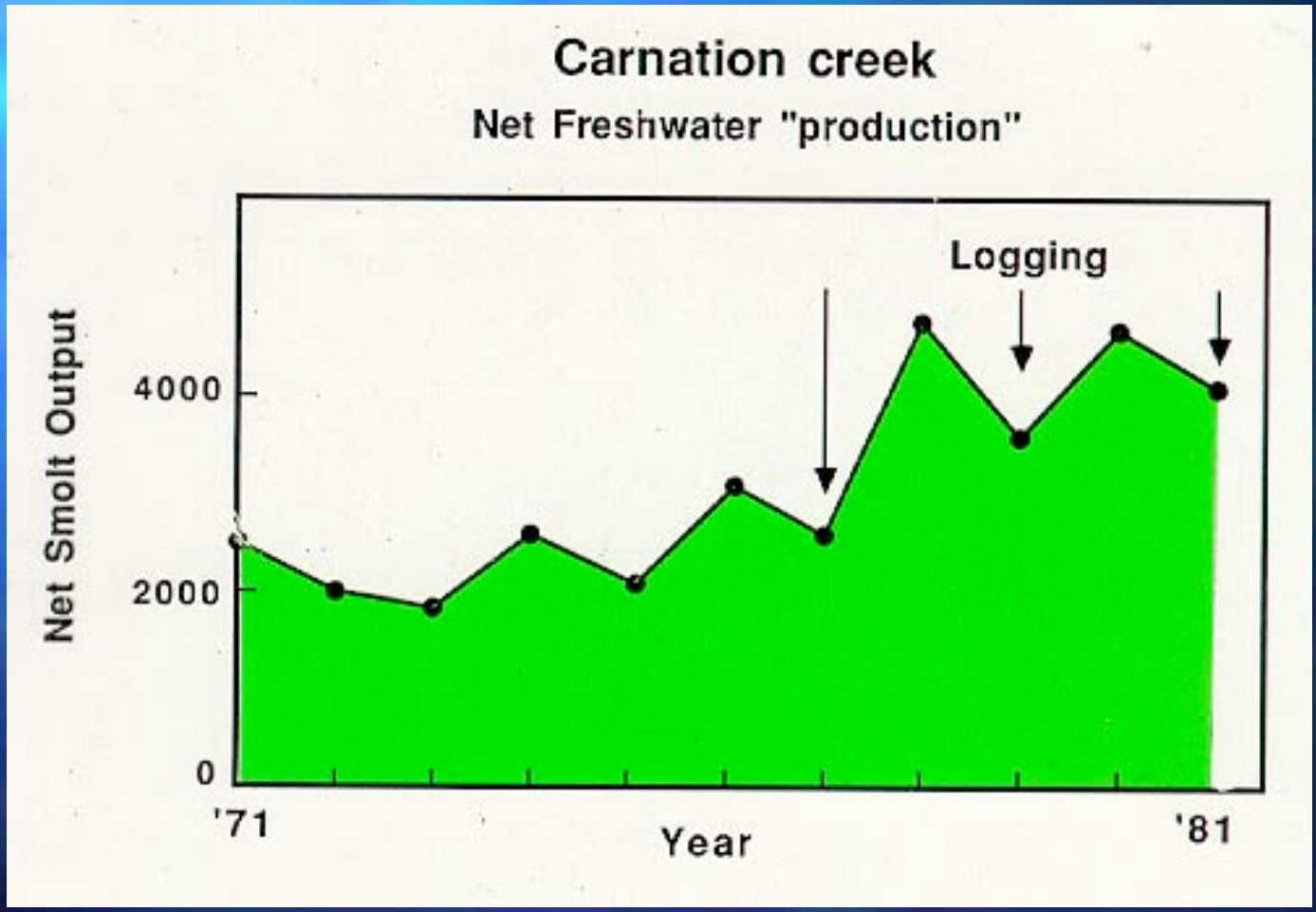
Nature is really hard to second guess: does logging hurt salmon?

Factor	Bad Effects	Good Effects
Silt	Reduces egg survival Triggers emigration	Smaller juvenile territories Reduced visibility to predators
Temperature	Can be lethal in summer	Faster egg development, faster growth
Runoff	Carry out eggs and small juveniles	More rearing space
Nutrients	Algae blooms Low nighttime oxygen	More food
Bank cover	Loss of hiding places, insect food sources	Predatory birds more visible
Instream debris	Block migration (esp. adults)	Creates cover and and resting areas

We got it right on egg survival:

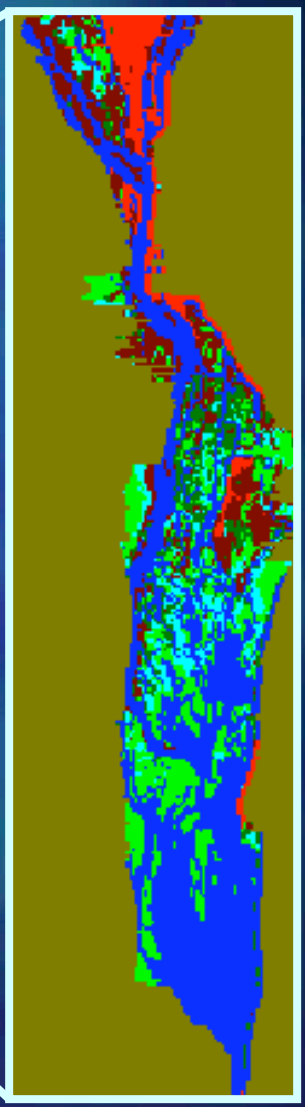


But we were just a wee bit off on net freshwater production (smolts going to sea were expected to decline):

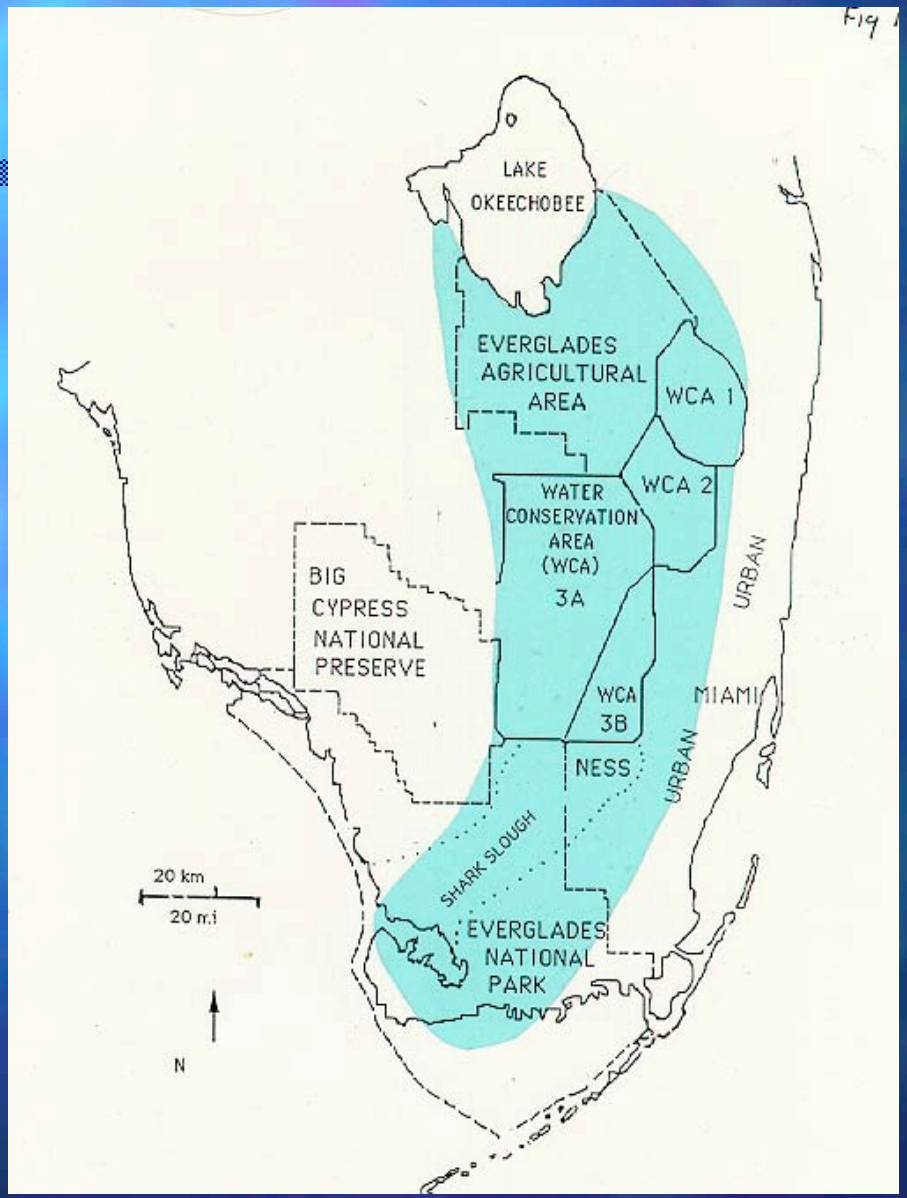


The Upper Mississippi: an engineer's paradise:

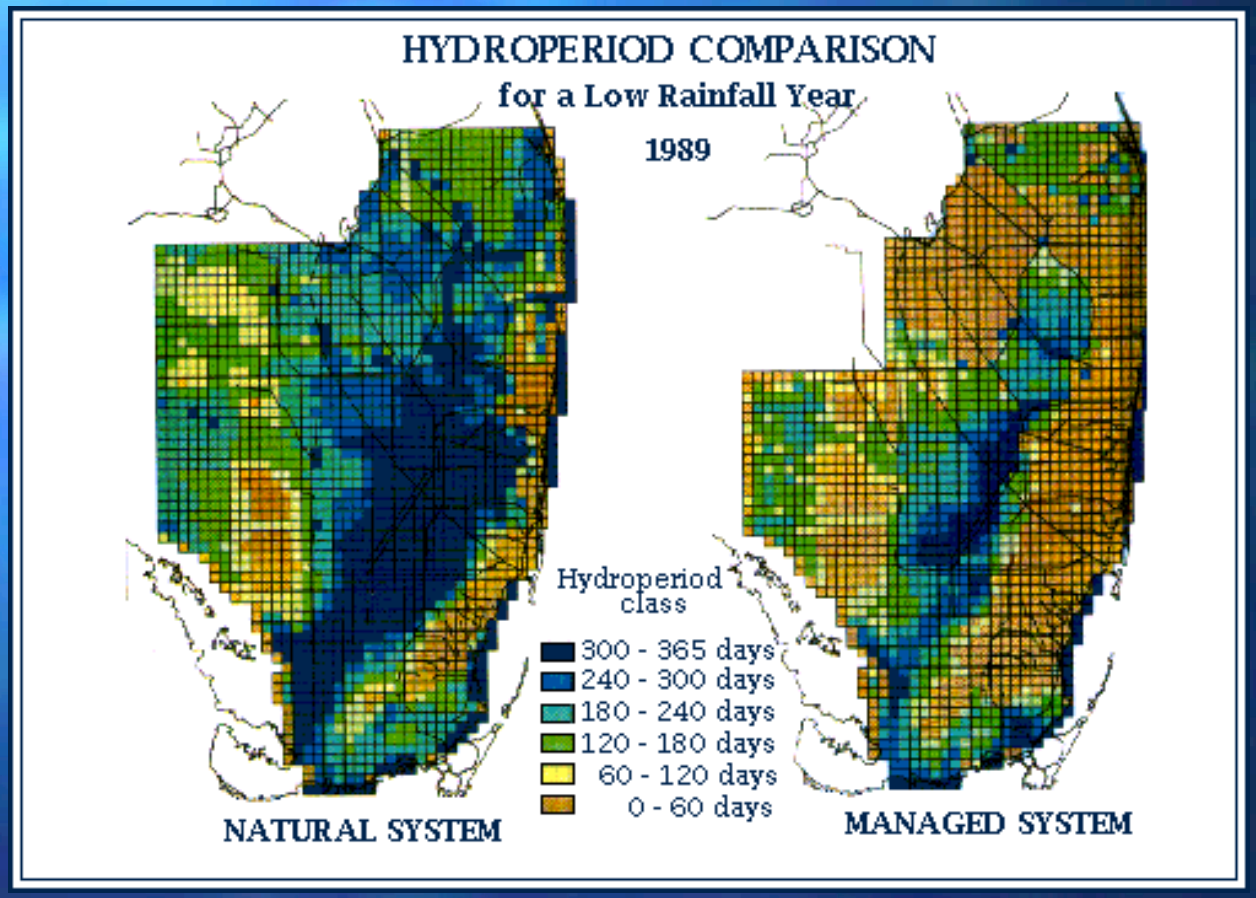
Pool 8



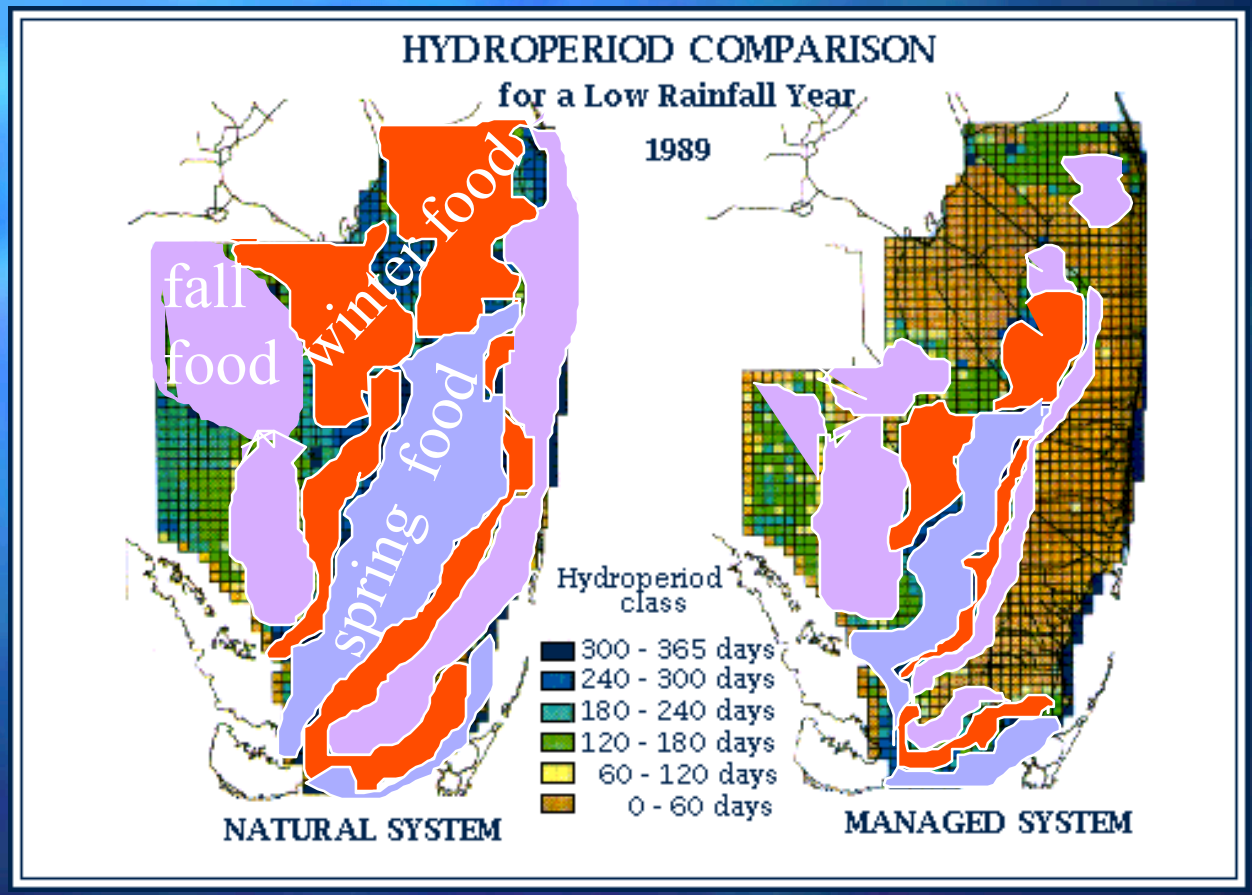
Everglades Restoration?



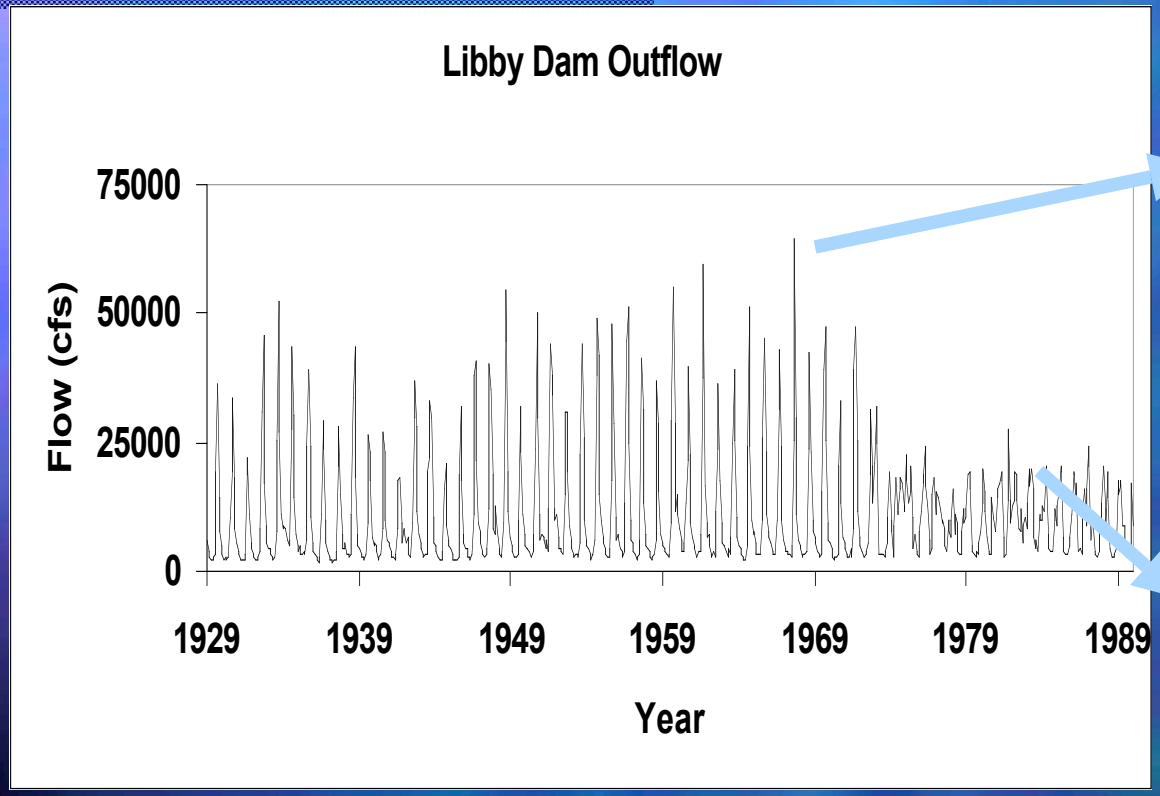
A much altered hydrology

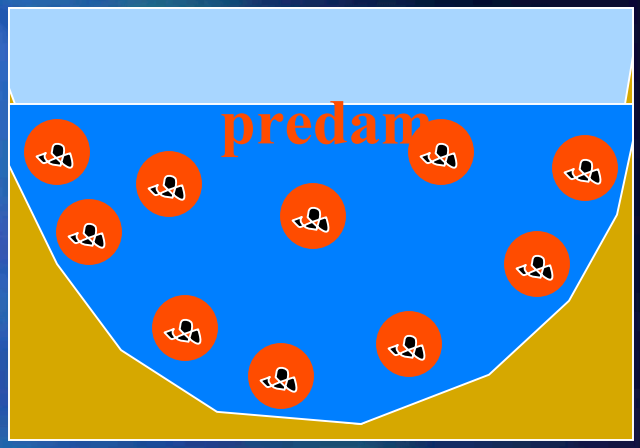


The birds saw it differently: seasonal drying concentrated the goodies

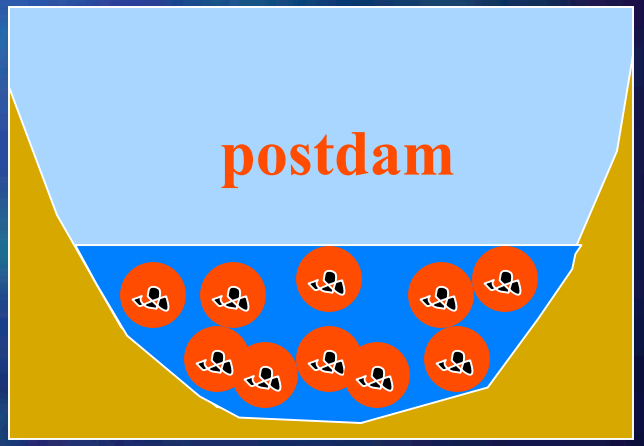


Profiting from floods: sturgeon, salmon





Red=predator risk
Blue=safe passage



There is widespread understanding now about the need for carefully planned, large-scale policy experiments

- Mostly we have stopped pretending that we can model everything right, before action is taken.
- Even the compulsive mappers are starting to admit that endless descriptive data won't solve the prediction problem either.

Implementation has been pathologically slow, costly, complex

- **Direct bureaucratic costs/delays**
  "detailed and comprehensive problem analysis", "restudies", "environmental assessments",...
- **Unnecessary, irrelevant research**
  "Fund my research and I'll solve your problem"
- **Myopic economic arguments**
  "The bottom line should include only those costs and benefits that I know how to quantify"
- **Faith in quick-fixes**
  "My technology will solve your problem"

All these things are brought together by beadle behavior

Beadle:

"a messenger or crier of a court; a parish officer whose business is to punish petty offenders; a church officer with various subordinate duties" (Webster)

Bureaucratic beadle:

“Decision making process must involve detailed, comprehensive problem analysis, research, and full consensus by all stakeholders”

When you need to cover your ignorance, write a thicker report

This is called “detailed and comprehensive problem analysis”

There are no well-defined standards or procedures for confronting uncertainty in public policy formation

- "Acceptable risk" is poorly defined.
- Experiments are visibly gambles, and public decisions are not supposed to be.
- Admission of uncertainty is too often seen as weakness, and it is too easy to hide from the problem by pretending that investment in research or engineering solutions will do the job.

Conclusion: can we break the decision making gridlocks?

- Public review processes are helping to expose bureaucratic and scientific snow jobs.
- Case studies are helping us learn how to make review processes more effective.
- Legislation can be developed to clearly define risk management authority and responsibility.