

How do we begin to management such a complex system?



# The world is very complex....

Everyday land owners and managers (e.g. Interior Department bureaus) must make complex land management decisions, often with uncertain or incomplete information. Adaptive management offers a tool to help make better decisions in this context of uncertainty as more information is accumulating.

# Adaptive Management

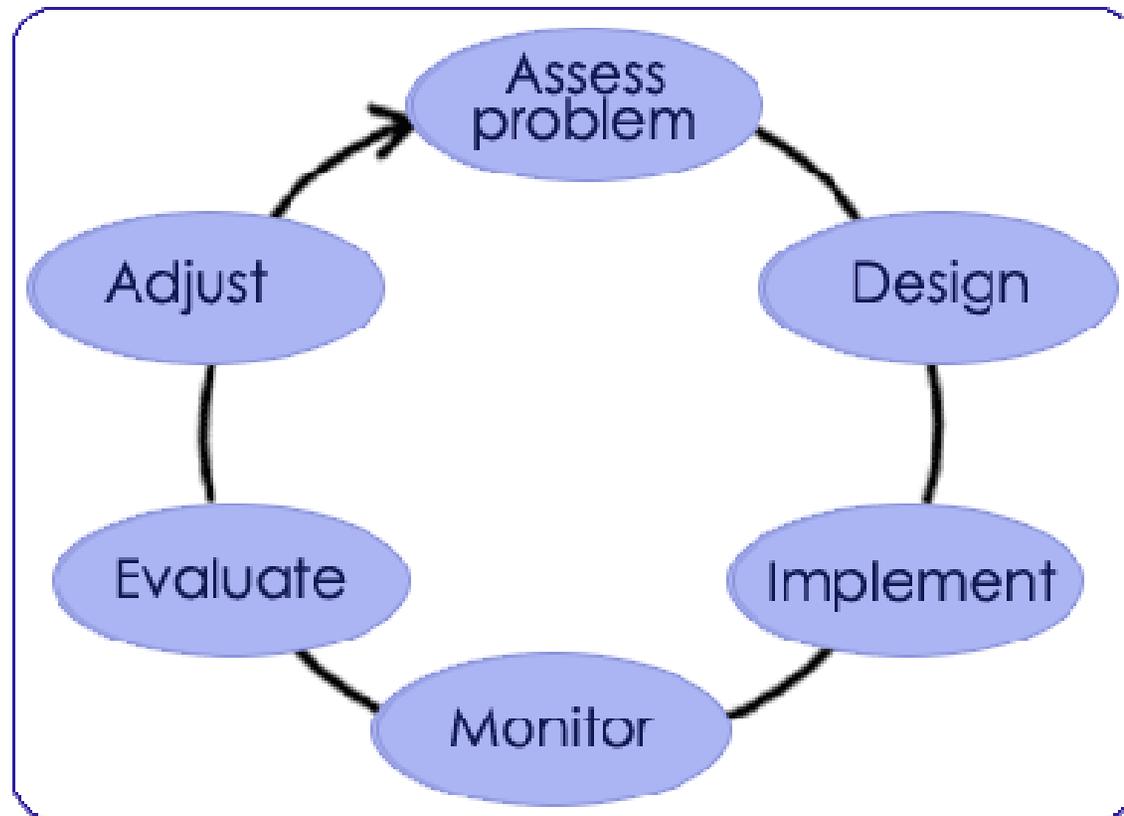
- A systematic approach for improving resource management by learning from management outcomes.
- Parallel concepts found in:
  - Business - total quality management and learning organizations
  - Experimental science - hypothesis testing
  - Systems theory - feedback control
  - Industrial ecology

# Adaptive Management

- helps science managers maintain **FLEXIBILITY** in their decisions, knowing that uncertainties exist and provides managers the latitude to change direction
- will improve **UNDERSTANDING** of ecological systems to achieve management objectives
- is about taking **ACTION** to improve progress towards desired outcomes.

# Adaptive Management

- Adaptive management involves ongoing, real-time learning and knowledge creation, both in a substantive sense and in terms of the adaptive process itself.



# When Should Adaptive Management be Used?

- Management choices are available.
- There is an opportunity to apply learning.
- Management objectives can be identified.
- Information value is high.
- Uncertainty can be expressed as testable models.
- A monitoring system can be established to reduce uncertainty.

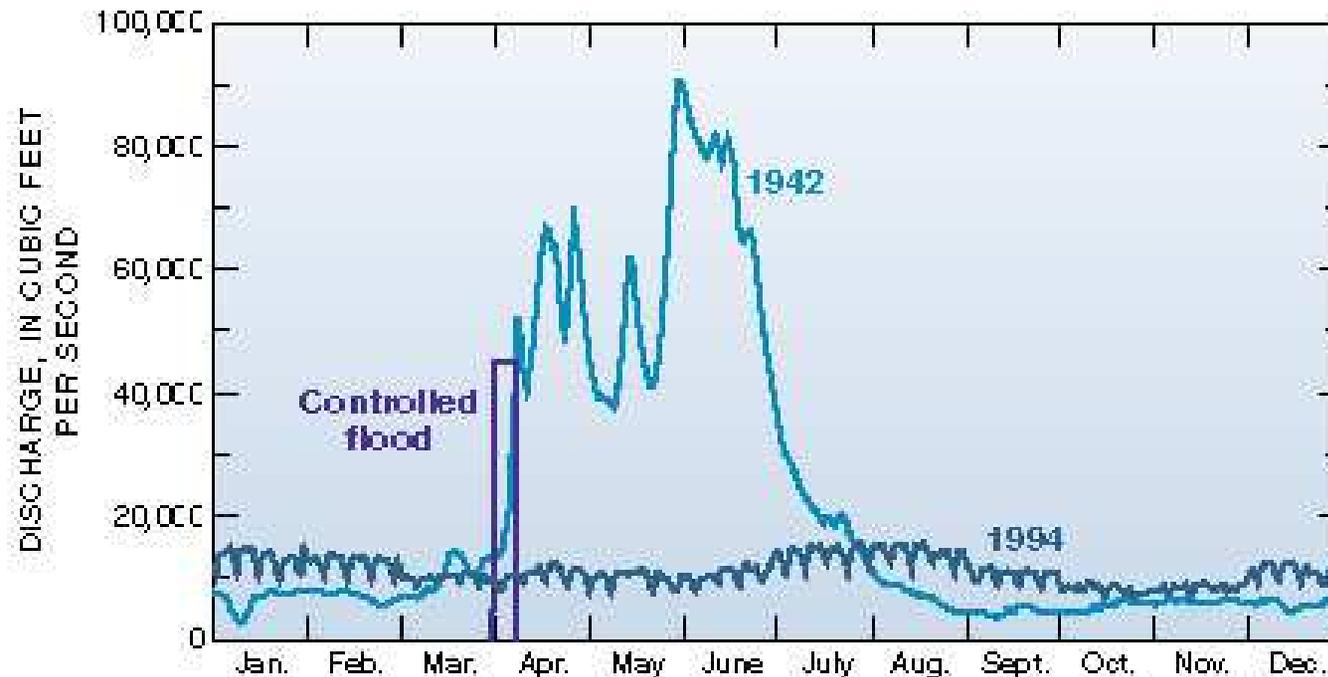
# Adaptive Management Implementation

From an operational point of view, adaptive management simply means learning by doing and adapting to what is learned:

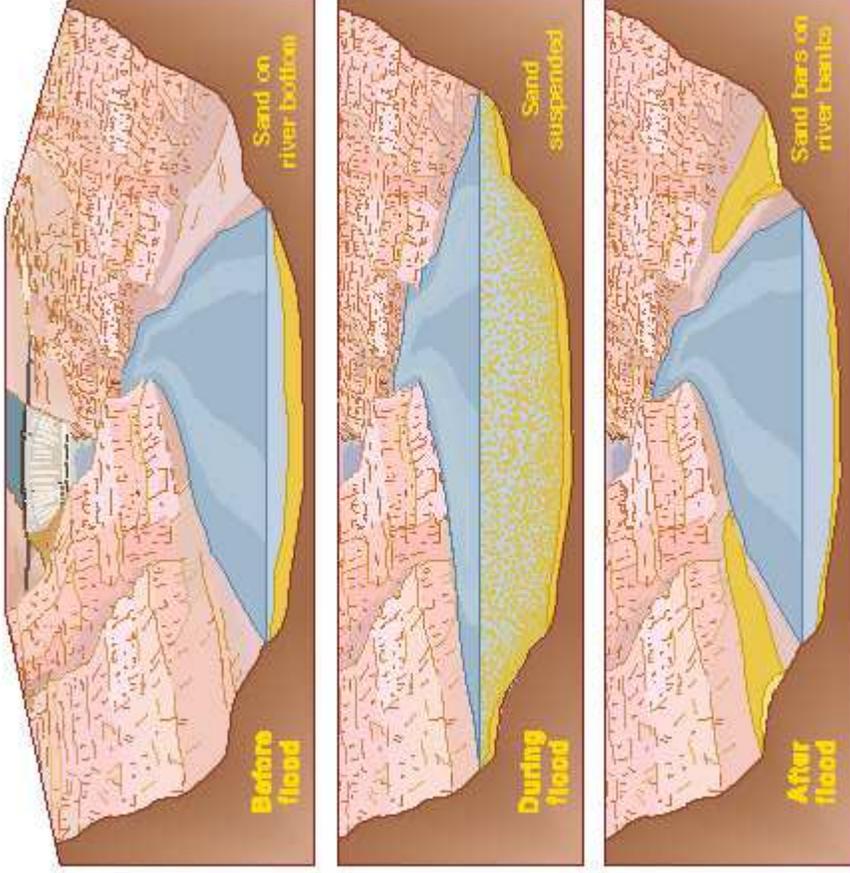
- Ensure stakeholder commitment to AM for duration of enterprise
- Identify clear, measurable, and agreed-upon objectives
- Evaluate management effectiveness over time
- Identify management actions for decision making
- Model different benefits and costs as outputs of management through time
- Design and implement a monitoring plan

# Adaptive Management Examples

- the control of water releases from a dam (e.g. recreation of flooding events on Colorado River)



The proposed controlled flood compared to pre-dam (1942) and post-dam (1994) flows.



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

# Adaptive Management Examples

- direct manipulation of plant or animal populations through harvesting, stocking, or transplanting (e.g. reintroduction of the wolf in Yellowstone National Park)



# Adaptive Management Examples

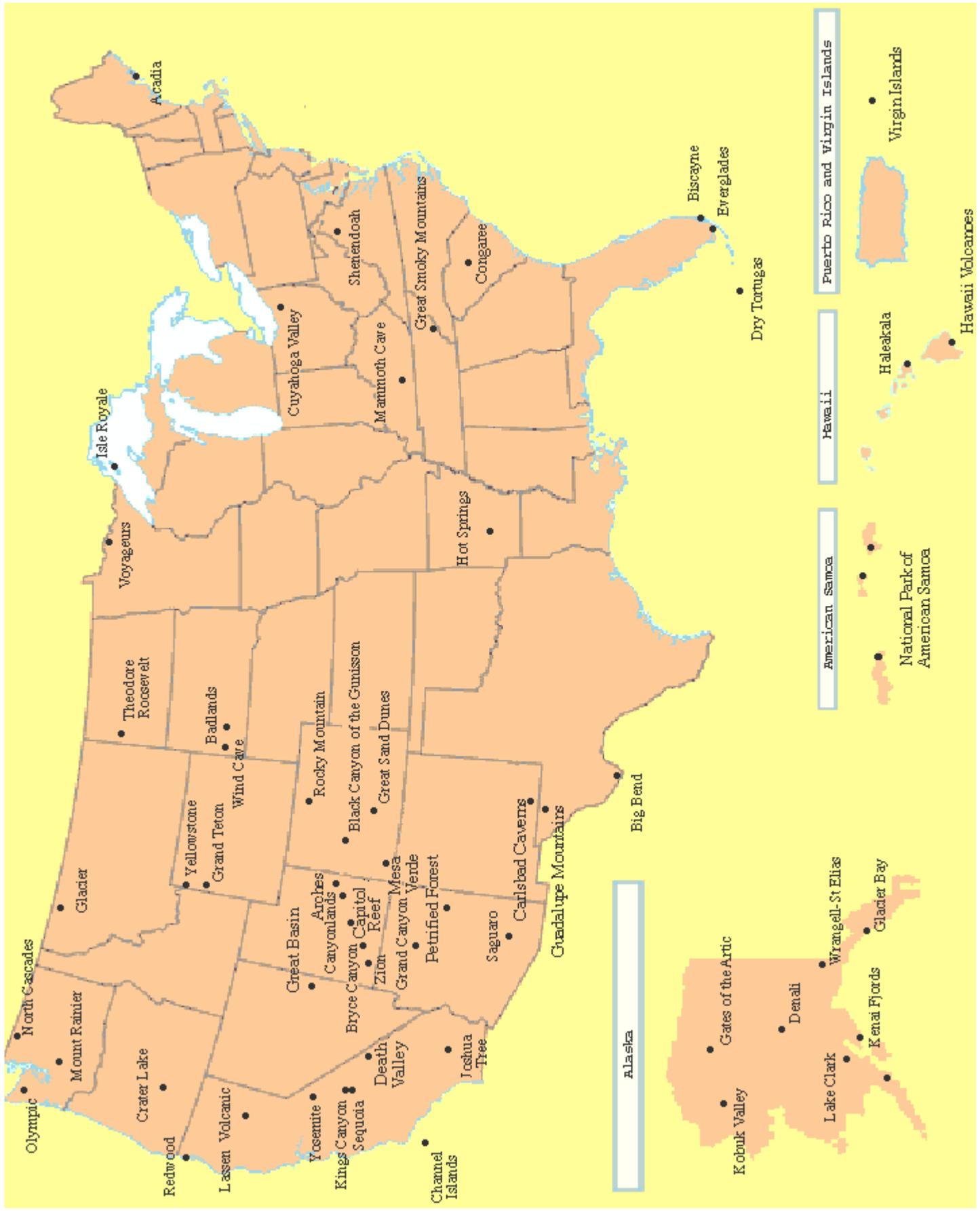
- manipulations of ecosystems through chemical or physical changes to habitats (e.g. removal of invasive species)



# AM example – Forest Fire Policy

- Creation of the U.S. National Parks System:
  - On August 25, 1916, President Woodrow Wilson signed a bill that mandated the agency "to conserve the scenery and the natural and historic objects and wildlife therein, and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."
- Management plans:
  - Based on scientific knowledge
  - Minimized change
  - Optimized human contact





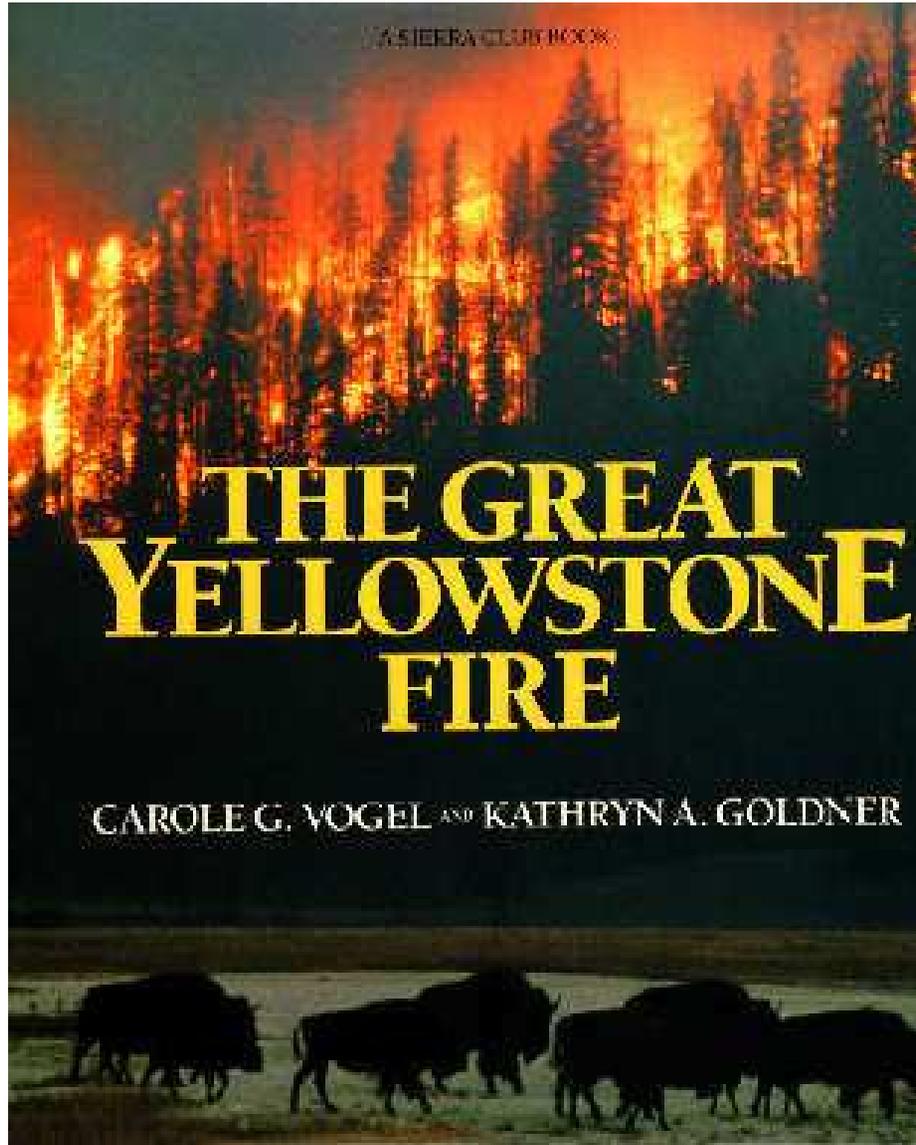
Alaska

American Samoa

Hawaii

Puerto Rico and Virgin Islands

# Summer 1988



# Current Wildland Fire Policy

- Protection of human life is the first priority in wildland fire management. Property and resource values are the second priority, with management decisions based on values to be protected.
- Where wildland fire cannot be safely reintroduced because of hazardous fuel build-ups, some form of pretreatment must be considered, particularly in wildland/urban interface areas.
- Wildland fire, as a critical natural process, must be reintroduced into the ecosystem. Fire will be allowed to function as nearly as possible in its natural role to achieve the long-term goals of ecosystem health.

# Current Wildland Fire Policy, cont.

- Wildland fire management decisions and resource management decisions go hand in hand and are based on approved Fire Management and land and resource management plans.
- Structural fire protection in the wildland/urban interface is the responsibility of tribal, state, and local governments.
- Federal agencies must place more emphasis on educating internal and external audiences about how and why we use and manage wildland fire.



**1 week after fire**



**1 year after fire**



**1 year after fire**



**18 years after fire**

# Discussion Questions

- Can you think of any differences in wildland fire management between the US and Ukraine? What does this imply?
- Can you think of any other examples of adaptive management?