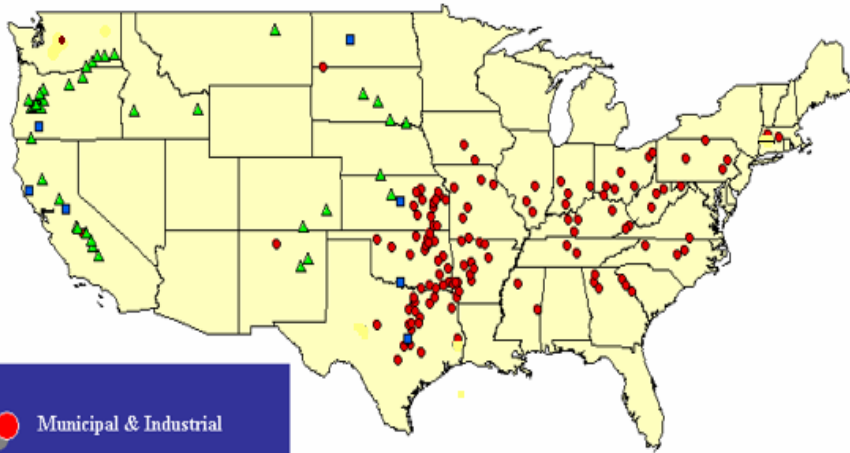




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Cerillos, PR

# *Reservoir Reallocation and Climate Change: USACE Portfolio Assessment*

**Rolf Olsen**  
**Institute for Water Resources**  
**U.S. Army Corps of Engineers**



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# *Outline*

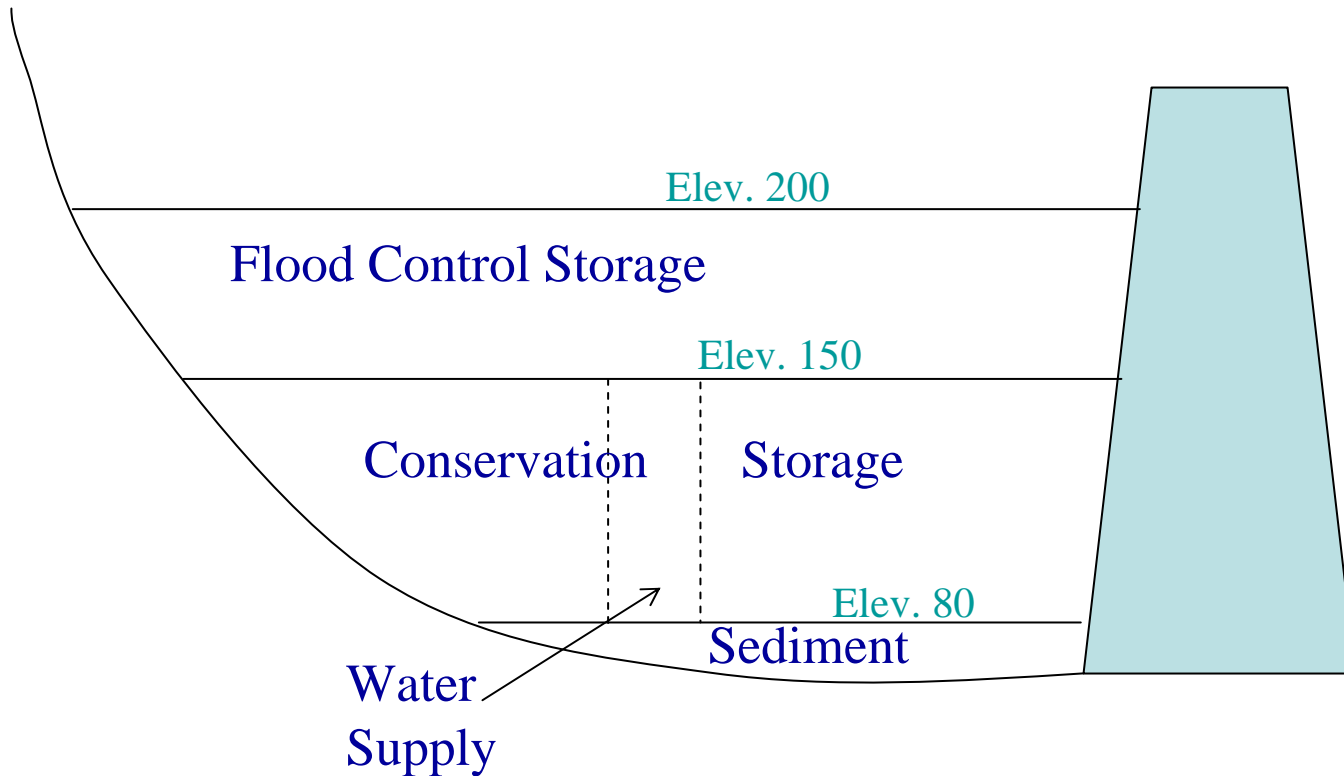
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- Reservoir Storage and Purposes
- Adaptations to Climate Change
- Need for Data on Reservoir Storage
- USACE National Portfolio Assessment for Water Supply Reallocations



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# Water Supply in a Multipurpose Project





# *Reasons for Reallocation*

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- Many existing water resources projects were designed decades ago
  - Used a relatively short hydrologic record and assumed stationarity.
- Hydrologic conditions may also be changing for many reasons,
  - Climate change and variability
  - Land use-changes
- Demographic, social, and ecosystem changes may result in changing uses for reservoir storage.



# *Types of Reallocation*

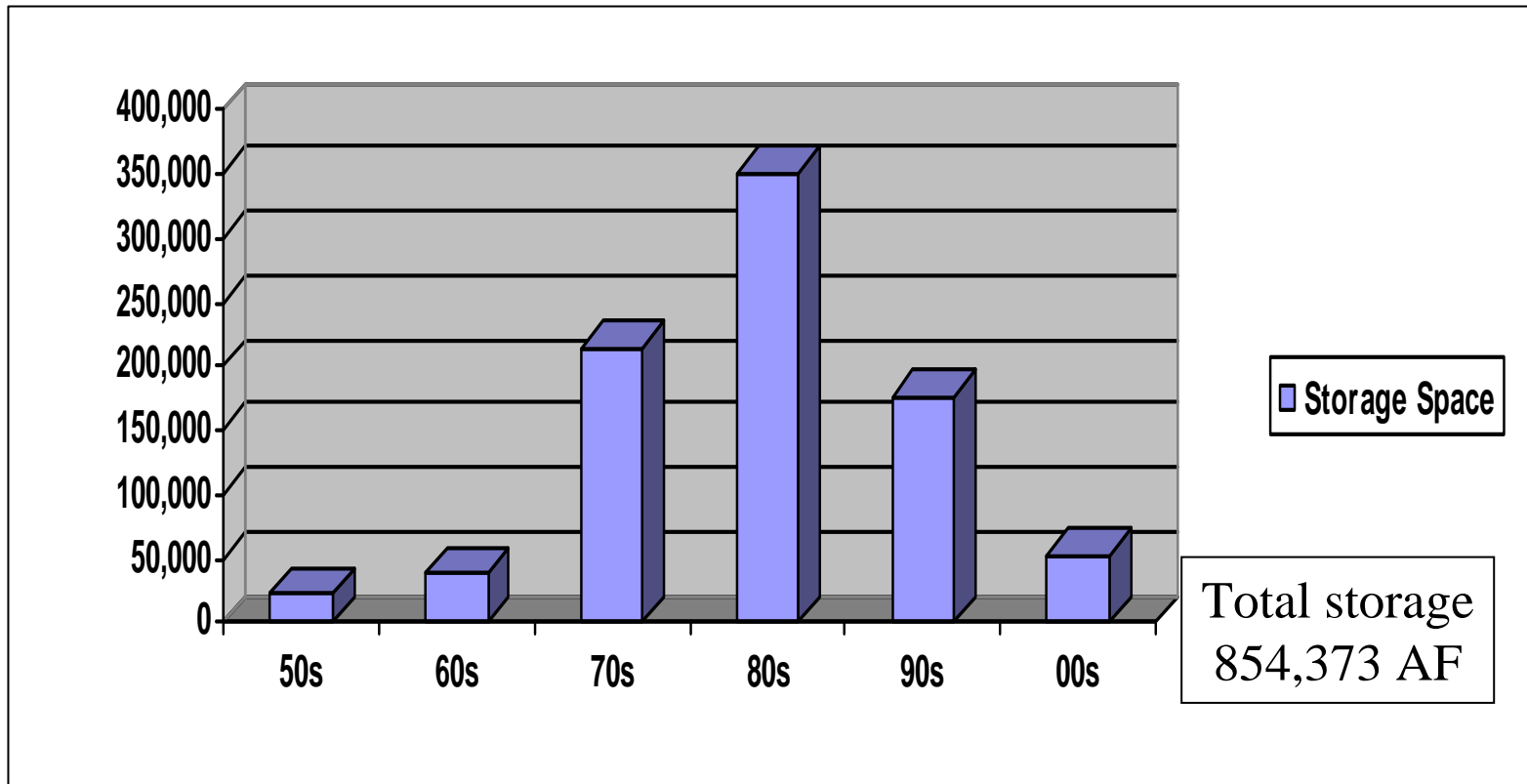
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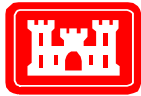
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- Temporary use of storage allocated for future conservation purposes and sediment
- Storage made available by change in conservation demand or purpose
- Seasonal use of flood control space during dry seasons
- Reallocation of flood control space
- Modification of reservoir water control plan and method of regulation
- Raising existing dams
- System regulation of Corps and Non-Corps reservoirs
- Use of water supply storage not under contract

# Water Supply Reallocations

## Storage Space from Reallocations (acre-feet)





# *Potential Climate Change Adaptation Strategies*

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- Intergovernmental Panel on Climate Change (IPCC) states integrated water resources management (IWRM) should be the “instrument to explore adaptation measures to climate change.”
- Adaptations to climate change include making better use of existing water resources.



# *Potential Climate Change Adaptation Strategies*

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- Evaluate if there are benefits from revising reservoir storage rules and authorized purposes as climate changes.
  - New uses for reservoir storage that have a greater economic or social value than current uses.
  - Flood storage space could be evaluated based on updated hydrologic records and future projections.
- An adaptive management process can have flexibility to adapt to observed climate conditions on an annual basis.
- Some projects may be operated more efficiently as part of a system of reservoirs rather than as a single project.



# *Water Management Workshops*

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- Two workshops in spring 2007 brought together California water managers to discuss climate change and reservoir operations.
- What does climate change mean to California reservoir rule curves?
- When should a water control manual be modified?
  - How much modification can be done depends on the original Congressional authorization.



# *Water Management Workshops*

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- Some interim conclusions from the meetings:
  - Long range goal should be to begin a dynamic, transparent process for updating rule curves.
  - Desire to increase flexibility in operations to improve system adaptability under climate change.
  - Systems perspective should be employed that considers all objectives and integrates all operations.
  - Current knowledge on climate change and variability may not be specific enough to adequately evaluate flood rule curves.

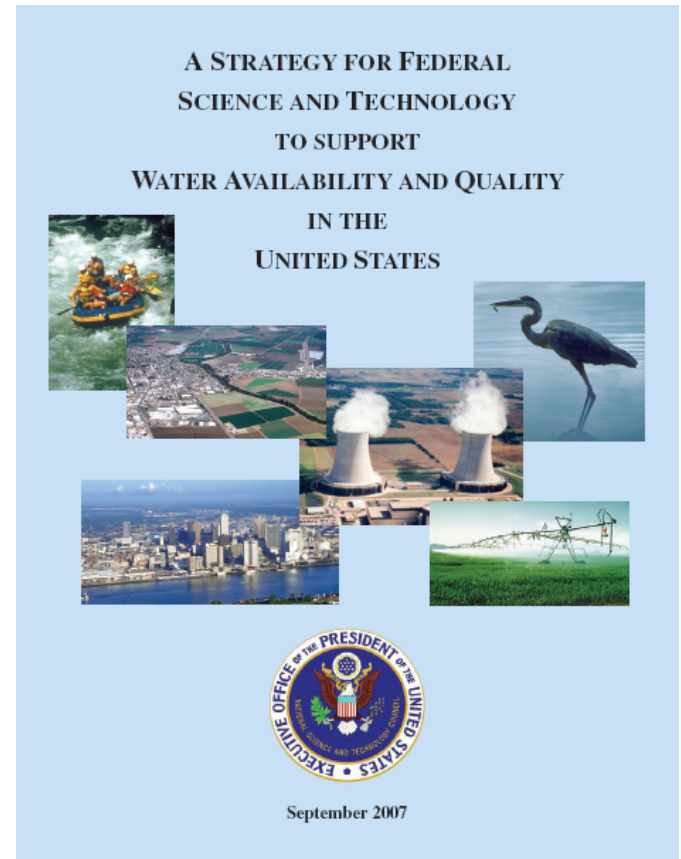


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# *Subcommittee on Water Availability and Quality (SWAQ)*

- **SWAQ committee was charged with:**

- (1) Identify science and technology needs to address growing issues related to fresh water supplies.
- (2) Develop a coordinated, multi-year plan to improve research to understand the process that control water availability and quality, and
- (3) Enhancing the collection and availability of the data needed to ensure an adequate water supply.

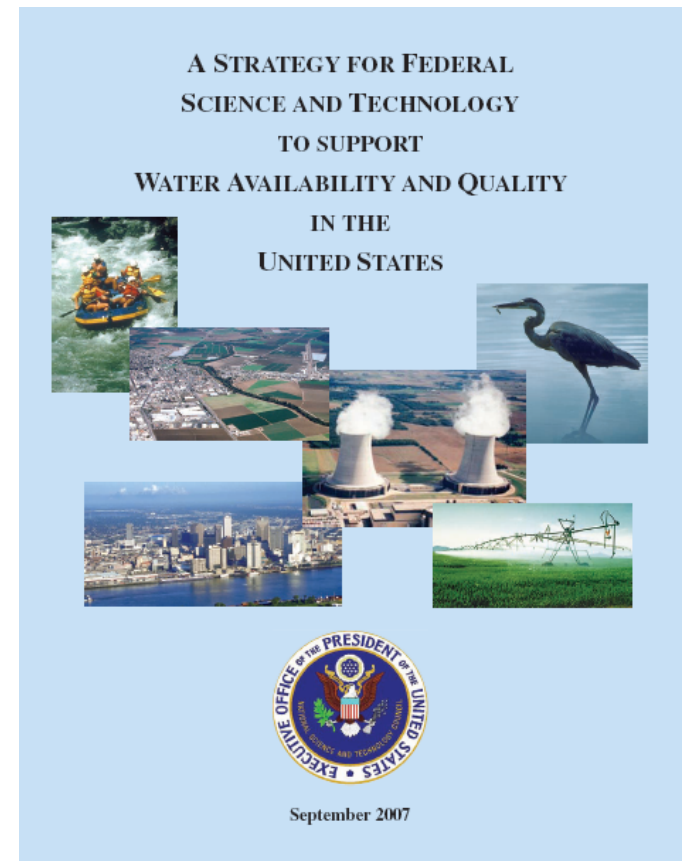




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# SWAQ Water Availability

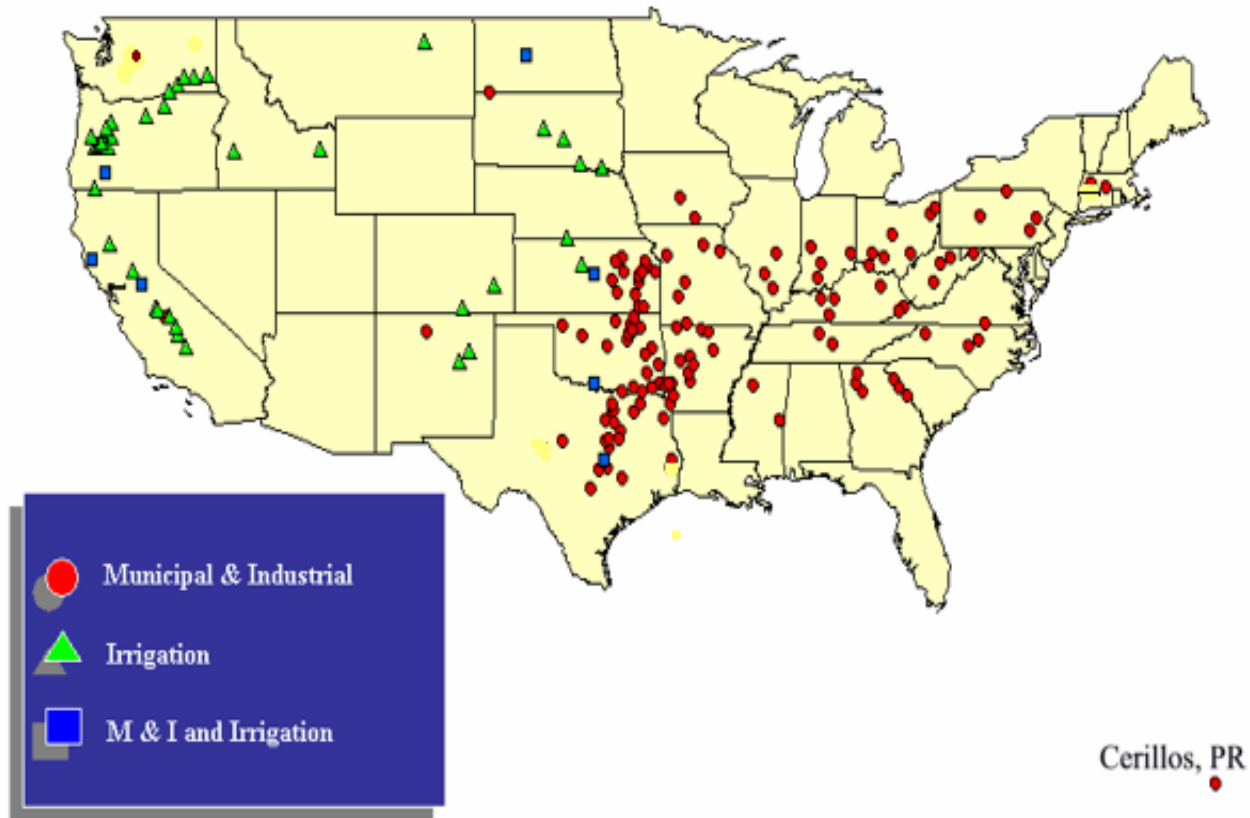
- **Challenge 1: US should accurately assess the quantity and quality of its water resources**
  - Know water resources and how they are changing
  - Know water use
  - Know the role of ecosystems in maintaining water availability and quality
  - Know the water infrastructure

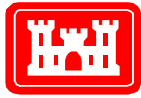




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# *National Portfolio Assessment for Water Supply Reallocations*





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# ***National Portfolio Assessment for Water Supply Reallocations***

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## **Plan of Study for Portfolio Assessment**

- 280K in the 2008 budget to initiate an appraisal of projects to identify the best candidates for opportunities for operational changes and/or reallocation.
- 300K in the 2009 budget is to further investigate those projects where opportunities for changes are identified.
- To get into the Presidents budget, OMB put in a requirement for the study to determine the feasibility of alternative funding arrangements for reallocation studies



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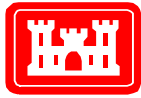
# *National Portfolio Assessment for Water Supply Reallocations*

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## **Projected Results for 2009**

- Portfolio of projects for reallocation
- Paper on alternative funding arrangements for reallocations
- Collect data on water management and sediment activities
  - Baseline data set for investigating the evolution of operating water management policies
  - An assessment of sediment filling and impacts to operating purposes and management practices
  - Database for sediment data collection efforts



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# ***CORPS Water Supply Portfolio & Water Management/Sediment Survey***

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## **Water Management Survey**

### **Questions**

- What is the status of the Corps Water Management function?
- What drives changes to Corps reservoir operations?
- Are changes reactive or proactive?
- What % of reservoir inflows are released for environmental, hydropower, water supply, flood, etc?



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# ***CORPS Water Supply Portfolio & Water Management/Sediment Survey***

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## **Sediment Management Survey**

- Basin Hydrology
- Primary Land Use
- Current % Filled (Due to Sedimentation)
- Average Filling Rate as a % of Total Storage
- Impacts to Authorized Purposes (Due to Sedimentation)
- Sediment Management Practices
- Obstacles to Sediment Management Practices
- Dates of Sediment Survey
- Survey Technique



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# *National Portfolio Assessment for Water Supply Reallocations*

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## Proposed 2010 Activities

### National Portfolio Assessment – Assessment of Data

- **SWAQ Water Availability:** Provide information on water use and water infrastructure
- **Portfolio Increment** – Data collected will be analyzed to identify how the Corps projects can address the future water supply challenges and achieve national goals as identified by a Sept. 07 report from the Executive Office of the President.
- **Sustainable Rivers Increment** – To support definition of environmental flow needs, model application, implementation of operational changes, and monitoring at selected Sustainable Rivers Project pilot sites.
- **Climate Change Increment** – To support studies to evaluate possible changes in reservoir operations for adaptation to climate change.



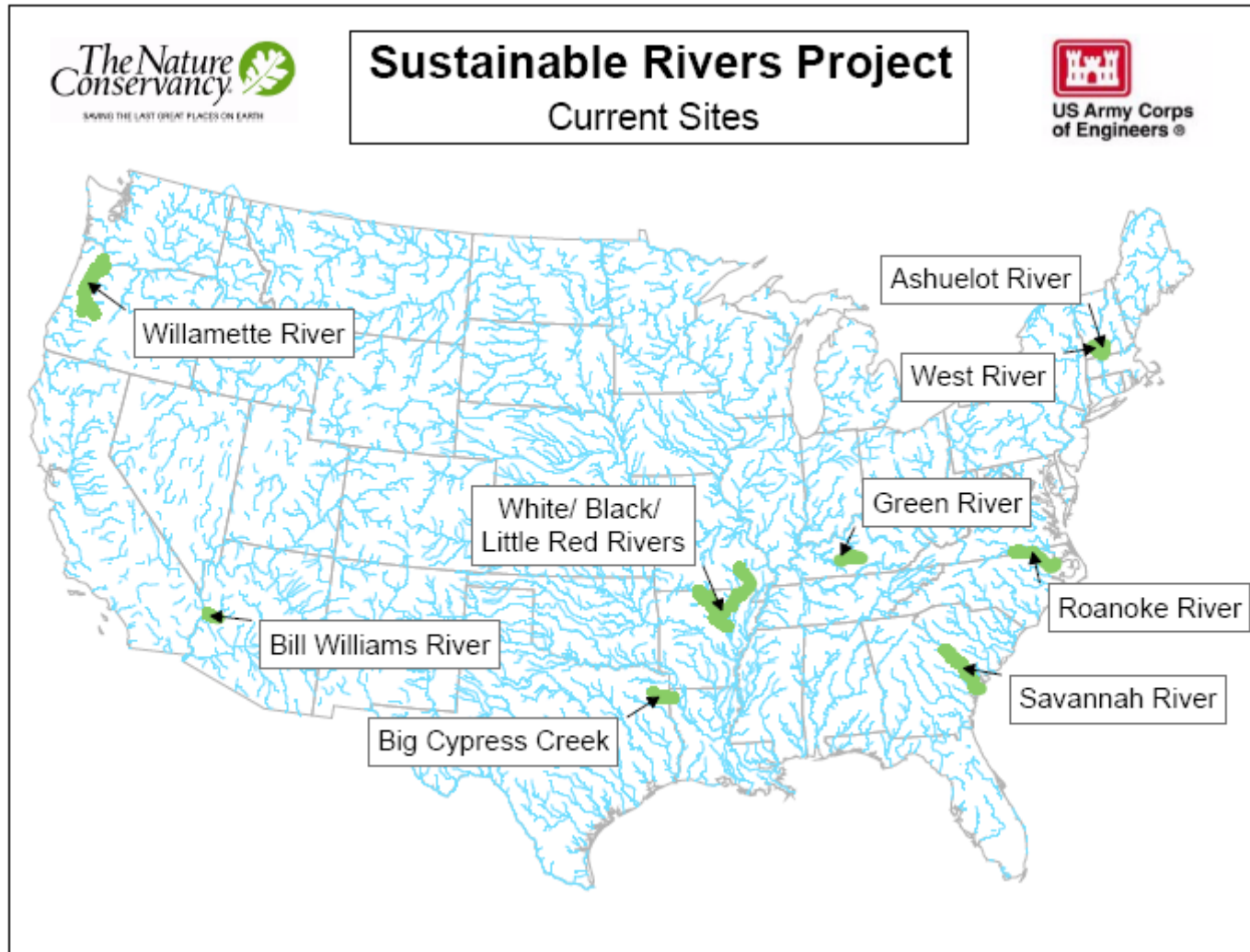
## *Environmental Flows*

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- The Nature Conservancy and the United States Army Corps of Engineers in July 2002 formed a partnership to restore and preserve rivers across the country.
  - Under the Sustainable Rivers Project, the Conservancy and the Corps work together to improve reservoir management
    - Protect the ecological health of rivers and surrounding natural areas
    - Continue to provide services such as flood risk reduction and power generation.



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# Sustainable Rivers Project





# Conclusion

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- Adaptation to climate change: Make better use of existing water resources
  - New uses for reservoir storage that have a greater economic or social value than current uses
- Recently limited Federal funding has been provided for reallocation studies
- National Portfolio Assessment for Water Supply Reallocations to provide basic data and describe opportunities for reallocations