Large-Scale Watershed Restoration:
Perspectives from Washington, DC on the Everglades,
Missouri River, and Columbia River

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Large Scale Restoration

- Large Scale Restoration Efforts
  - System-wide – River or Watershed Scale
  - Multi-Component
  - Systems cross many political & jurisdictional borders
  - Complex
  - Expensive

- Administration’s Priority Ecosystems
  - Chesapeake Bay
  - Florida Everglades
  - Great Lakes
  - California Bay Delta
  - Gulf of Mexico
  - Others:
    - Puget Sound
    - Columbia River
    - Missouri River
Large Scale Restoration

- Examples from the Army Corps
  - Florida Everglades
  - Missouri River
  - Colombia River

- Key Questions
  - How did these efforts begin?
  - How are they similar?
  - How are they different?
  - What lessons can be learned?
Florida Everglades Restoration

• Why Everglades Restoration?
  • The Modern Restoration program is a reaction to the Central & South Florida Project (C&SF)
    • C&SF is Multi-purpose
    • Highly successful in many ways
    • Consistently funded

• C&SF institutionalized both USACE and SFWMD involvement
  • Created institutional capacity to operate, maintain, and retrofit the C&SF
  • Longstanding partnership between USACE & Florida

• 50 years of operations demonstrated clear Ecosystem changes and impacts
  • Focus on maintaining landscape and restoring hydrology
Central & Southern Florida Project (C&SF)

- Authorized by Congress - 1948
- Project Purposes:
  Flood control, water conservation and control, regional water supply, prevention of salt water intrusion, fish and wildlife conservation, and water supply to Everglades National Park
- Project includes:
  10 locks, 1,000 miles of canals, 720 miles of levees, over 150 water control structures, and 16 pump stations
Authorization History

- **Product of Many Authorization & Initiatives**
  - 1986—First re-examination of the Kissimmee River
  - 1989—Everglades Expansion Act
    - Expanded Everglades National Park
    - Authorized the Modified Water Delivery project
  - 1992—Kissimmee Restoration Authorized
    - First major USACE environmental restoration project
  - 1995—Authorization of the C-111 South Dade Project
  - 1996—Major “Re-Study” of C&SF
    - Led to the Comprehensive Everglades Restoration Plan
    - Authorization of 10 “Critical Project”
  - 2000—Authorization/Approval of Comprehensive Everglades Restoration Plan (CERP)
  - 2007—Authorization of first generation CERP projects
  - 2014—Authorization of second generation CERP projects
Pre-Drainage: Largely southern flow, broad, slow moving water, connected Lake O & Kissimmee systems.

Current System: Significantly Reduced Southern flows, major East and Western Flows, disconnected Everglades, reduced size.

Restoration: Increased southern flow, reduced East & East and West flows. Restored Kissimmee floodplain.
**Everglades Lessons Learned**

- Landscape Restoration is complex and difficult
  - Institutional capacity and relationships are critical
  - Consistent funding is critical to establish teams and momentum
  - Need a unified set of goals and priorities

- Stakeholder Commitment and Support is Critical

- The Comprehensive Everglades Restoration Plan (CERP) has served the Everglades Extremely Well
  - Provides a stable, consistent vision for Restoration
  - Created institutional capacity
  - Avenue for Stakeholder support
  - CERP is not perfect, but largely holds up
Missouri River Recovery

• The Missouri System
  • The Missouri was developed through the Pick-Sloan Plan
  • Authorized in the Flood Control Act of 1944

• Pick-Sloan Plan
  • Joint plan between Army Corps and Bureau of Reclamation
  • Authorized USACE levees, navigation channels, and reservoirs along Missouri mainstem
  • Authorized many BOR irrigation projects and dams along tributaries
  • Multi-State, Multi-purpose
  • Established & Institutionalized Competing Priorities
Authorized Purposes

- Flood Control
- Navigation
- Irrigation
- Power
- Water Supply
- Recreation
- Fish and Wildlife
Pick-Sloan Plan

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Multi-Purpose Storage:
1. Flood Damage Reduction
2. Water Supply
3. Hydropower (USACE)

Irrigation & Hydropower (Bureau of Reclamation)

Navigation and Water Supply (USACE)
Missouri River Recovery

• Why Missouri River Recovery?
  • Endangered Species Act
    • Northern Great Plains Piping Plover
    • Least Tern
    • Pallid Sturgeon, listed 1990
  • Continued Operations as usual would jeopardize species, thus Reasonable & prudent alternatives (RPA’s) are necessary

• 11 years of negotiations with Services
  • Biological Opinion (BIOP) finalized in 2000
  • BIOP Amended in 2003
  • BIOP Upheld in Federal Court

• 2003, 2006 - Update to Missouri River Master Manual
  • To include restoration operations, such as habitat pulses

• WRDA 2007 – Establishment of Missouri River Recovery Implementation Committee
Key Restoration components

RPA Driven Goals, Objectives, Timelines:

RPA Goal: b) (2015) Minimum emergent inter-channel sandbar habitat acres on average per river mile during the nesting season shall be as follows: Gavins Point - Segment 10 (80 ac), Garrison - Segment 4 (50 ac [20 ha]), Fort Randall - Segment 8 (20 ac) and Lewis and Clark Lake - Segment 9 (80 ac). This emergent sand shall be comprised of a minimum 60 percent dry sand.

RPA Goal: restoration of riverine form and functions, as well as some semblance of the pre-development or natural hydrograph. Missouri River habitat restoration involves a combination of reservoir operational changes (e.g., hydrograph and temperature), structural modifications (e.g., chute restoration), and non-structural actions (e.g., floodplain acquisition or easements).

Flow Changes

Spring Pulse & Flow augmentation

Integrated Science & Monitoring

Sturgeon Propagation

4,700 juvenile to 1-year old pallid sturgeon (per year class) for subsequent stocking
Missouri Lessons Learned

• Missouri River Restoration is **Compliance** Driven
  • Often seen as being done at expense of other purposes
    • Example Flow releases are seen as being at expense of flood damage reduction, recreation, or navigation
    • RPA goals are proscriptive, with timelines that do not always match budget realities
    • Requires willing seller land acquisition, which is not always predictable

• Stakeholder Support is difficult
  • Upstream vs. Downstream interests
  • Conflicting priorities among purposes
  • No institutionalized sponsor(s)
    • MRRIC attempting to fulfil this need

• **No Missouri Masterplan outside of BIOP**
  • Restoration tends to be opportunistic
  • Mixed priorities & conflicting goals
  • Can create difficulties in funding streams, institutional capacity
Columbia River

• The Columbia System
  • Federal Columbia River Power System (FCRPS)
    • 31 Federal Dams (USACE, BOR, Bonneville Power)
    • Begun in 1930s, continued through 1950s, with many different authorizations

• FCRPS
  • Joint plan between Army Corps and Bureau of Reclamation
  • Authorized USACE levees, navigation channels, and reservoirs along Missouri mainstem
  • Authorized many BOR irrigation projects and dams along tributaries
  • Multi-State, Multi-purpose, established Competing Priorities
Federal Columbia River Power System

- **Three Main Authorized purposes**
  - flood control,
  - power generation
  - navigation

- **Three Main agencies**
  - US Army Corps of Engineers
  - Bureau of Recreation
  - Bonneville Power Administration

- **Infrastructure**
  - 31 Dams
  - 465 Navigable River Miles
  - 1079 miles of levees

- **Capacity**
  - Corps of Engineers: 14,524 MW
  - Bureau of Reclamation: 7,536 MW
  - **Total Federal Hydro**: 22,060 MW

- **Navigation**
  - ~50M tons of cargo traffic
  - $20 billion in economic activity
  - Largest wheat export system

- **Fish & Wildlife**
  - Fish Mitigation was included in projects
  - Upstream fish ladders
  - Hatcheries
Columbia River Fish Mitigation

• Why Columbia River Fish Mitigation?
  • Endangered Species Act
    • Listing of Salmonids, beginning in 1992, and continuing
      • Chinook, Coho, Steelhead, Sockeye
      • Endangered runs of certain types of Salmon
    • Continued Operations as usual would jeopardize species, thus
      Reasonable & prudent alternatives (RPA’s) are necessary

• BIOP & Litigation Cycle
  • First Biological Opinion (BIOP) finalized in 2000
  • BIOP Amended in 2004, 2008, 2014
  • BIOPs amended based on litigation

• 2008 – Columbia River Fish Accords
  • Agreement between Federal, State, Tribal Governments
  • Accords supplement the CRFM BIOP requirements & seek to avoid lawsuits
Columbia River Fish Mitigation

- **Key Restoration components**
  - **Hydrology**
    - Operate the FCRPS to provide flows and water quality to improve juvenile and adult fish survival
    - Modify Columbia and Snake River dams to maximize juvenile and adult fish survival
  - **Habitat**
    - Protect and improve tributary habitat based on biological needs and prioritized actions
    - Improve juvenile and adult fish survival in estuary habitat.
  - **Hatcheries**
    - Ensure that hatchery programs funded by the FCRPS Action Agencies as mitigation for the FCRPS are not impeding recovery
    - Preserve and rebuild the genetic resources through safety-net and conservation actions
  - **Predation Management**
    - Implement predation control measures to increase survival of juvenile salmon and steelhead (avian, marine mammal, etc….)
- **Research, Monitoring, And Evaluation**
- **Adaptive Management**
Columbia River Fish Mitigation

- Restoration components
  - Adult Passage
  - Juvenile Passage
  - Habitat restoration
  - Operations

Combined with refined spill operations, surface passage has reduced the percentage of fish that go through powerhouses, turbines and bypass facilities, decreased fish travel time through the system and increased overall dam survival.
Columbia Lessons Learned

- Columbia River Restoration is mostly **Compliance** Driven
  - BIOP/Litigation cycle tends to drive goals & objectives
  - Columbia River Fish Accords, Tribal Treaty rights also drive goals
  - 2014 BIOP serving as the “masterplan” (for the moment)
    - RPA goals remain proscriptive, with timelines that do not always match budget realities
    - Has led to good measurement & monitoring processes
    - Columbia River Mitigation is a relatively mature program

- **Stakeholder Support is critical**
  - Very Strong State, Local & Tribal interest in restoring Salmon
    - There are still conflicting priorities & goals
    - Tribal Treaty rights add importance to actions
    - Columbia River Fish accords have avoided additional litigation
    - Hatchery vs. native fish remains a constant debate
  - Bonneville Power often serves as the institutional sponsor(s)

- **Measureable Results have been extremely helpful**
  - Fish & Fish passage improvements appear to be working on mainstem
  - New focus will be on Willamette and other tributaries
  - Measurement is expensive
Lessons Learned

• Ecosystem scale restoration is long and difficult
  • Inherent controversies
    • Flood control, navigation, hydropower, ecosystem, agriculture
    • Controversies can slow funding & progress
    • No one-size fits all model

• Need to develop a holistic system-wide vision
  • Must Balance competing needs
  • Attempt to avoid internal conflicts
  • Cannot be site by site without a larger vision

• Must address human & ecological issues
Moving Forward & Getting Started

• Getting Started
  • Build coalitions
  • Develop Shared Goals & Objectives
  • Identify Non-Federal Match

• Emerging Issues & Processes

• Examples:
  • Central Everglades Planning Project
  • Puget Sound Nearshore Ecosystem Restoration
Conclusions

• Restoration vs. Compliance
  • Compliance focuses on ESA listed species
  • Restoration focuses on multiple species & landscapes

• Having a unified plan is Critical
  • Unified vision, goals & objectives vision, prioritization
  • Without unity, programs are difficult to implement
  • Without a plan, the Courts often create one

• Litigation influence
  • All programs have been, and continue to be, influenced by litigation
  • Litigation may or may not be helpful to restoration

• Large Scale Restoration works, but it is a commitment