



# **SURFACE WATER STORAGE IN WASHINGTON STATE**

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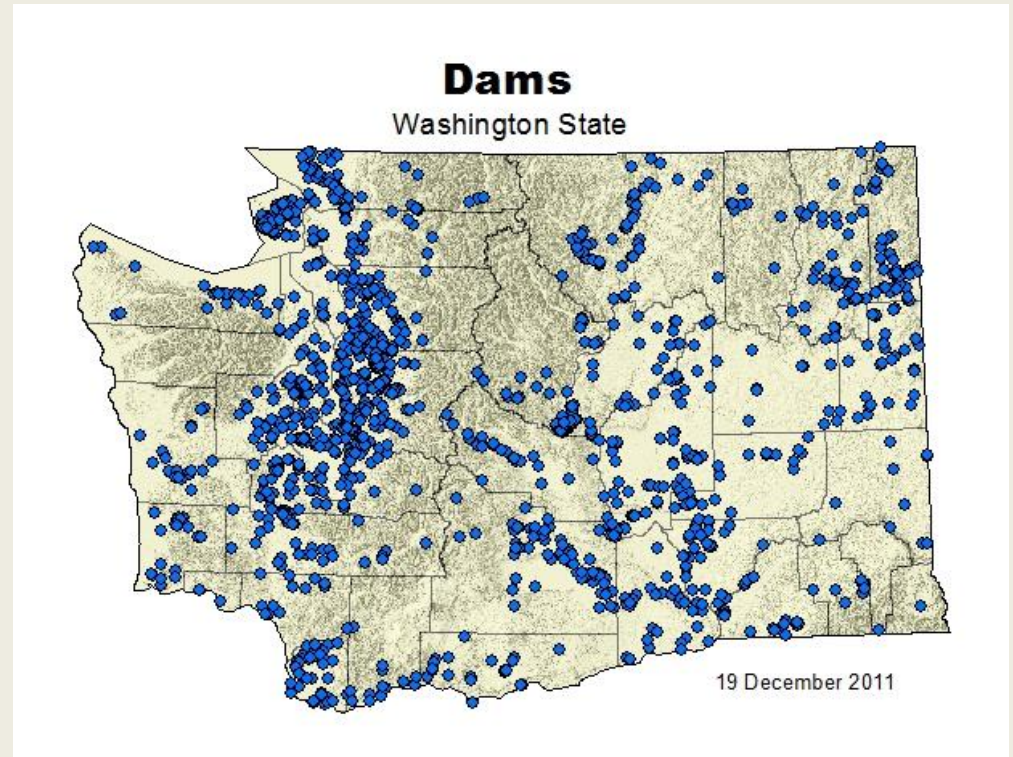
# HISTORY OF DAM CONSTRUCTION IN WASHINGTON STATE

- 1141 dams in Washington State >10 acre-feet, 106 are large dams (higher than 50 ft)
- Types of use – irrigation, flood control, municipal water supply, hydroelectric, navigation, recreation, mining
- Owners include federal, state, utilities, cities, private
- Large dam building era ended in 1960's, although many small dams are constructed each year



# REASONS FOR HALT IN LARGE DAM CONSTRUCTION

- Good sites built upon
- Cost is very high
- Environmental and social impacts



# REVERSING THE TREND....

- Dam removal
  - Elwha dams
  - Condit Dam
- Has been studied for other large dams (Lower Snake River dams)
- Reasons?
  - Cost of relicensing & ESA
  - Environmental impacts outweigh benefits
  - Cost of maintenance & operations



# AND WHEN OWNERS WANT TO KEEP LARGE DAMS

- Relicensing and ESA consultations have required extensive fish and wildlife mitigation programs (fish passage, hatcheries, habitat restoration, flow restoration) for existing dams
- Examples are PSE Baker River project, City of Tacoma Cowlitz and Cushman projects, Mid-Columbia dams for PUDs, Federal Columbia River Power System, etc...
- Costs run into hundreds of millions of dollars



# WHY NEW INTEREST IN WATER STORAGE?

- Increasing demand for water, over-appropriated basins, droughts, instream flow needs and climate change have brought renewed interest in water storage
- Started with Water Storage Task Force and report to legislature in 2001
- Watershed planning and review of water storage opportunities
- Ecology set up Office of Columbia River and Legislature authorized \$200 million to aggressively seek out new water supplies for both instream and out-of-stream uses
- In some areas, new water storage makes sense

# WHAT NEW LARGE STORAGE PROJECTS ARE BEING EXAMINED?

- Yakima River Basin – 3 reservoir expansions, one new reservoir
- Chehalis River Basin – reservoir primarily for flood damage reduction
- Other WRIAs for water supply primarily for irrigation or instream flow (example WRIA 31 – Horse Heaven Hills)
- Pumped Storage along Columbia River – many sites considered, may not be cost effective
- In several locations, proposals to either draft or increase storage volumes (example is Lake Roosevelt)
- Smaller reservoirs still being built for various purposes

# PROPOSED YAKIMA RIVER BASIN WATER STORAGE PROJECTS

- **Lake Kachess Inactive Storage**
  - Draw down reservoir in droughts by 200,000 acre-feet
- **Cle Elum Lake Pool Raise**
  - Raise lake level by 3 feet, 14,000 acre-feet storage
- **Wymer Reservoir**
  - New off-channel reservoir with 162,500 acre-feet storage
- **Bumping Lake**
  - Expand existing reservoir by 160,000 acre-feet





# WHY ARE THESE PROJECTS DIFFERENT?

- Department of Ecology and Bureau of Reclamation led planning process that resulted in Integrated Water Resource Management Plan. Water storage one element of Integrated Plan that also includes:
  - Fish passage
  - Habitat/watershed protection and restoration
  - Extensive water conservation
  - Water marketing
  - Groundwater storage
  - Modifications to existing facilities



# GOALS OF INTEGRATED PLAN

- Provide opportunities for ecological restoration and enhancement, including fish passage
- Improve water supply during drought years (70% proratable supply)
- Provide for efficient and adaptable water supply management
- Contribute to sustainable economy and environment



# BENEFITS OF INTEGRATED PLAN

- Water supply for proratable (junior) irrigation districts during drought years
- Water supply for future M&I growth
- Large instream flow benefits in all years
- Water for climate change impacts
- Instream flow, habitat restoration and fish passage benefits will result in 182-470,000 additional fish annually
- Supported by basin interests including Yakama Nation, irrigation districts, cities, counties, state and federal fish agencies, environmental groups (American Rivers, NWF)



# PROGRESS ON IMPLEMENTING INTEGRATED PLAN

- Programmatic EIS for Integrated Plan issued in 2012
- Legislature provided about \$137 million for Integrated Plan implementation for the 2013-2015 period for:
  - Purchase of 50,000 acres of private forest land for \$99M in Teanaway watershed (habitat/watershed protection element of Integrated Plan)
  - Ecology was appropriated \$32M to move several Integrated Plan projects and activities forward during this period. That will include engineering and permitting activities on Kachess and Cle Elum expansions, fatal flaw studies on Bumping Lake expansion



# PRIMARY TECHNICAL AND ENVIRONMENTAL ISSUES

- **Lake Kachess Inactive Storage**
  - Construct lake tap with 1,000 cfs pump station, provide fish passage in tributaries, recreation
- **Cle Elum Lake Pool Raise**
  - Shoreline protection and private property impacts
- **Wymer Reservoir**
  - 450 ft high dam, inundation of shrub-steppe habitat, 400 cfs pump station on Yakima River, potential for water quality impacts to Yakima River
- **Bumping Lake**
  - New dam 4,500 ft downstream of existing, inundation of old-growth forest and tributary with Bull Trout spawning habitat

# CHALLENGES TO IMPLEMENTING INTEGRATED PLAN AND STORAGE

- Cost and funding; \$4.2 Billion for implementation of Integrated Plan although Benefit/Cost ratio is about 2.
- Permitting; water storage projects are very controversial, these projects do have impacts in reservoir areas such as change in recreational use, inundation of fish habitat and old growth forest loss. Overall benefit to basin outweighs those impacts.



# CHEHALIS RIVER FLOOD HAZARD MITIGATION PROJECT

- Legislature appropriated \$28 million in 2013 for a study of flood retention, local flood reduction projects, projects to reduce flooding and benefit fish and to pay for state agency participation in the study.
- Purpose is to reduce flood damage; a series of floods have caused widespread damage including closures for extended periods of time of I-5. Flood damage estimate from 2007 flood is over \$900 million.
- Flood retention project is in-channel reservoir in upper Chehalis River with 80,000 acre-feet of flood storage.



# PRIMARY TECHNICAL AND ENVIRONMENTAL ISSUES

- 240-290 ft high dam, reservoir area = 1,000 - 1,450 acres
- Type of dam and reservoir (no pool vs. permanent pool)
- Fish passage for juveniles and adults past dam
- Loss of spawning and rearing area in reservoir
- Wetlands and wildlife habitat in reservoir and downstream areas
- Sediment and wood supply and transport downstream
- Temperature and water quality downstream
- Extent of project benefits



# STATUS OF PROJECT

- In initial phase, following work is underway:
  - Collection of data on fish use – smolt traps, snorkel surveys
  - Habitat mapping
  - Engineering studies of type of dam/reservoir and fish passage
  - Hydrologic and hydraulic studies
  - Water quality studies
  - Sediment transport studies
  - Economic studies
  - Studies of small flood reduction projects
  - Studies on how to protect I-5 from flooding
  - Aquatic Species Enhancement Plan
  - Coordination, input and review by technical committees from state agencies, Chehalis Tribe and other organizations



# NEXT STEPS

- The results of all these studies will be provided to the Chehalis Basin Work Group, which is appointed by governor to provide policy oversight.
- Work Group makes a recommendation to the governor and legislature whether to proceed to next phase
- Next phase could take another 6 years and cost around \$36M

# BIG ISSUES FOR THESE PROJECTS

- Yakima – cost, how to pay, opposition to parts of Integrated Plan as people are trying to decompose the plan into individual components which on their own may not pencil out economically or their individual effects seem great.
- Chehalis – environmental impacts, cost, how to pay, opposition to a new instream dam.

# SUMMARY

- Several large new or expanded reservoirs are proposed in Washington State
- The ones that get built will have broad ecologic and societal benefits and will have broad support from the public
- Funding will be a challenge no matter the benefits

# QUESTIONS?