# **Willamette Valley Projects**

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US Army Corps of Engineers BUILDING STRONG<sub>®</sub>

# Overview

- Willamette basin & tributaries
- Willamette Valley Project history
- Authorized purposes
- Benefits of the dams and reservoirs
- Water management/project operations
- Current challenges
- Questions and answers















Foster Dam



Cougar Dam



### Dorena Dam





### 1943 Willamette Valley Flood

Oregon State Archives, Oregon Water Resources Department, OWR0085



# History

- 1936- Congress passed Flood Control Act authorizing Corps to survey flood problems in Willamette Basin
- 1938- Flood Control Act provided for first seven storage reservoirs



1894 flood, downtown Portland, Willamette River



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## History (continued)

 1940- Corps began construction of Fern Ridge and Cottage Grove dams

- 1950 and 1962 Flood Control Acts authorized additional structures
- 1969- 13<sup>th</sup> dam was completed at Hills Creek



Construction of Dexter Dam 1954



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# **Authorized Purposes**

- Flood risk management
- Hydropower
- Navigation
- Irrigation
- Recreation
- Fish & wildlife
- Water quality
- Municipal & industrial water supply



# **Flood Risk Management**

- Dams have prevented \$22.4 billion in flood damages to the Willamette Valley to date (about \$900 million annually)
- Total project controls 27% of the runoff area in the Willamette River Basin



Spilling flood waters at LOP Dam - Jan 2006



# Hydropower

- 8 hydropower plants
  (>10% of Corps' plants)
- 16 power generating units with 460 Megawatt capacity
- 1.17 million Megawatt hours produced in FY13 at a market value of \$93M.



**Big Cliff Dam & Powerhouse** 



# **Navigation/Water Quality**

- Authorized storage for navigation is used for water quality benefits
- Augment flows to improve temperature and turbidity conditions for fish
- Maintain statutory minimum flows at Albany/Salem



Willamette River



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## Irrigation/water supply

- 60,000 acre-feet of stored water is contracted for irrigation
- Bureau of Reclamation manages water sales from federal projects
- Municipal uses



Farmland below Fern Ridge Dam



# **Environmental Stewardship**

- Stewardship for critical habitat and ESA-listed species including:
  - winter steelhead
  - spring Chinook salmon
  - Oregon chub
  - bull trout
  - Fender's blue butterflies
  - Kincaid's lupine
  - Western pond turtles
  - red-legged frogs
  - ➤ bald eagles
  - migratory songbirds











# Recreation

- Over 3.5 million annual visitors
- \$100 million in economic benefits annually
- 3 campgrounds, 23 day-use areas, and 7 boat ramps managed by Corps
- 19 campgrounds, 32 day-use areas, 27 boat ramps, and 8 marinas managed through lease agreements



Detroit Lake



Cottage Grove Lake



# Water Management Summary

- 13 dam system
- Goal: balance and optimization
- Within bounds collaboration

#### **The Willamette River Basin**





### Detroit Reservoir Flood Risk Management Rule Curve





DETROIT



# Willamette Conservation Storage

Total = 1.6 million Acre-feet



## Willamette Storage 29 Oct 2015





### Oregon Snowpack Lowest on Record 2015 Water Year



State-wide, Oregon's snowpack this winter peaked at the lowest levels measured in the last 35 years. The chart above puts this year's record low snowpack into historical context. The height of each bar reflects the peak snowpack—from across the state of Oregon—for each water year. This year, 2015, is shown in red at the far right. Many snow monitoring sites set records for the lowest peak snowpack and earliest melt-out date since measurements began. In western Oregon, the snowpack peaked 60-90% below the normal amounts and the snow melted up to 3 months early. The snowpack in the eastern part of the state was only slightly better, peaking 30-80% below normal levels and up to 2 months earlier than normal. Lack of normal mountain snowpack has led to well below normal streamflow forecasts for the state. Currently, most of Oregon is included in the severe to extreme drought category, according to the National Drought Monitor. Water shortages across Oregon are expected this summer and Governor Kate Brown has declared a drought state of emergency in 15 counties as a result.



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Willamette Basin with Non-Exceedence Projections Based on Provisional SNOTEL Data as of Jul 22, 2015

However, as reflected state-wide, snowpack was at record low levels



### **Three Month Forecast**



Precipitation

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### **Snow Water Equivalent**







# Willamette System Challenges

- Environmental impacts & compliance
  - ► BiOp
  - Legacy contamination
- Increasing competition for water
  - Willamette Basin Review
  - Water Control Diagrams
- Dam safety / aging infrastructure
- Electrical reliability / compliance standards
- Physical & cyber security
- Climate variability



### Willamette BiOp Actions: A life-cycle approach



# Willamette System – BiOp



# Willamette BiOp - PFFC



**Remaining Significant RPAs** – "BiOp Big Four"

- Detroit North Santiam:
  - Temp Control (Ph 1 of DSP)
  - Downstream Passage (Ph 2)
- Cougar McKenzie River:
  - Downstream Passage
- Lookout Point Middle Fork Willamette:
  - Downstream Passage

### **The Willamette River Basin**





# **Challenges - Spillway Gates**

- Spillway Tainter gates at 9 dams needed repairs
- Repairs to wire ropes and gear boxes are nearly complete
- Repairs to steel arms are being funded in order of priority
- Repairs are expensive, complicated and timeconsuming



![](_page_28_Picture_6.jpeg)

![](_page_28_Picture_7.jpeg)

![](_page_28_Picture_8.jpeg)

# **Willamette Spillway Gate Status**

Portland District Spillway Gates: Grand Total Cost \$349M (as of 15 Apr 2014, \$K)						
Project	Sharking Constants				Gate Rehab (# gates)	
(# gates)	Electrical Controls	wire kopes	Gearbox Refurb	Trunnion Pins	Immediate	Long Term
Willamette Valley						
North Santiam Subbasin						
Detroit(6)	FY15 PS funded	Done	FY15 PS funded (\$11,100 needed for construction of 2 gates; in FY16 budget request)		\$19,300 (4)	
Big Cliff(3)	Done	Done	Done	Done	Done	Done
South Santiam Subbasin						
Green Peter(2)	Funded: FY	13	Done	Funded: FY13 (1 gate)		\$2,000 (1)
Foster(4)	\$715	Done	\$618	Done	Done	Done
Mckenzie River Subbasin						
Cougar(2)	FY15 PS funded (\$5,150 needed for construction of 1 gate; in FY16 budget request)					\$4,825 (1)
Blue River(2)	FY14 PS started; Funded for construction of 1 gate in FY15    \$4,825 (1)					\$4,825 (1)
Middle Fork Willamette Subbasin						
Hills Creek(3)	Funded: FY15	Done	Done	Funded: FY15 (1 gate)		(\$2)
Lookout Pt(5)	Funded: FY14	Done	Done	Funded: FY14 (2 gates)		\$12,900 (3)
Dexter(7)	Done	Done	Done	Done	Done	Done
Fall Creek(2)	Funded: FY13	Done	Funded: FY13	Done	Funded: FY13 (1)	Funded: FY15 (1)
Coast Fork Willamette and Long Tom Subbasins						
Fern Ridge(6)	\$2,000	\$1,500	\$2,500	Not needed	Not needed	Not needed
Rogue Valley						
Applegate(2)	Not needed	Done	Done	Done	Not needed	Not needed
Lost Creek(3)	\$1,000	\$750	\$1,000	\$500	\$4,100(1)	\$7,000 (2)
Columbia River						
Bonneville(20)	\$7,500	\$2,500	\$6,700	Not needed	Not needed	\$80,000 (20)
The Dalles(23)	\$8,500	\$2,900	\$7,700	\$4,000	Not needed	\$92,000 (23)
John Day(20)	Not needed	Not needed	Not needed	\$10,000	Not needed	Not needed
Totals (110)	\$19,715	\$8,150	\$18,518	\$14,500	\$17,850	\$269,950

![](_page_29_Picture_2.jpeg)

# **Detroit Spillway Gate Work**

- Wire ropes complete
- Electrical control work complete
- Gearboxes, structural work in progress
  - ► Sept-Dec 2017
  - ► Sep-Dec 2018

![](_page_30_Picture_6.jpeg)

![](_page_30_Picture_7.jpeg)

## **Physical & Cyber-security**

![](_page_31_Picture_1.jpeg)

![](_page_31_Picture_2.jpeg)

### Call Corps Watch: 1-866-413-7970 Callers can remain anonymous

![](_page_31_Picture_4.jpeg)

# **Challenges – Looking Ahead**

![](_page_32_Figure_1.jpeg)

# WATER 2100 Overview

- Cooperative effort, evaluates how climate change, population growth, and economic growth will change the availability and the use of water in the Willamette River Basin (WRB) on a decadal to centennial timescale.
- The six-year project began in October 2010, and is a collaborative effort of faculty from Oregon State University (OSU), the University of Oregon (UO), and Portland State University (PSU). It is funded by the National Science Foundation (NSF).

![](_page_33_Picture_3.jpeg)

# WATER 2100 - Questions

- Where are climate change and human activity most likely to create conditions of water scarcity?
- Where is water scarcity most likely to exert the greatest impact on ecosystems and communities?
- What strategies would allow communities to prevent, mitigate, or adapt to scarcity most successfully?

![](_page_34_Picture_4.jpeg)

# Discussion

![](_page_35_Picture_1.jpeg)

![](_page_35_Picture_2.jpeg)

# **For More Information:**

- About the Corps, Portland District: <u>www.nwp.usace.army.mil</u>
- Videos of the Willamette system: <u>http://www.youtube.com/user/PortlandCorps</u>
- Willamette Valley Project Office: 541-684-4300
- Erik Petersen, Operations Project Manager
  541-684-4301

![](_page_36_Picture_5.jpeg)