Thornton Lake - Historical perspectives and current conditions
Outline

- Introduction
- Historical perspective
- Willamette River management
- Current conditions
- Summary

Photo courtesy M. Azevedo
Introduction

- Calapooia – Albany Assessment
- Thornton Lake included in work area
- Historical research
- Site visits
- Stakeholder meetings
**Thornton Lake Origin**

- Historical side channel of the Willamette River
- Remains connected to river via groundwater
- Nearly annual surface water connection

**Qg1:** Sand and gravel that is related to or post-dates Missoula Floods – terraces paralleling Thornton Lake, deposits 12,000-15,000 years ago

**Qalc:** Floodplain deposits of the Willamette River, deposits < 12,000 years ago
Historical Perspective

- General Land Office (GLO) survey - 1851
- U.S. Geological Survey - 1916
- First aerial photos - 1936
- Flood photos - 1964
Timeline

**Historical Floods** (symbol is scaled according to flood magnitude)

**Historical Events**

- **1850–1895** Early Settlement
  - Settlers arrive via Oregon Trail
  - Steamboats become main source of transportation in Willamette Valley
  - Corps of Engineers begins navigation improvements in 1868 (snag removal, construction of wing dams, closing side channels)
  - Floodplain largely avoided by settlers; some logging and patches of agriculture

- **1895–1932** Settlement Expansion
  - Navigation improvements continue
  - Large-scale timber harvest along floodplain and uplands
  - Some expansion of agriculture on to floodplain

- **1932–1972** Development
  - 13 flood control dams constructed
  - Extensive bank protection revetments constructed
  - Agriculture and suburban communities expand onto historic floodplain

- **1970s–1995** Continued Development
  - Much of Willamette stabilized by flood control dams and revetments
  - Migration rates and avulsion frequency decrease
  - Expansion of urban developments onto historical floodplain

Wallick et al. 2007
Land nearly level is subject to inundation during the rainy season.

E1/2 timbered with vine maple fir, Balm of Gilead, undergrowth hazel and briars.

W1/2 open, fir, oak, and some hazel.

The lake is 150 chains (90 ft) wide is fed by springs and is very deep and in high water flows S.W. into the Willamette.

S.E. bank high, N.W. low.
1936 Air Photo

Thornton Lake
Connector Channel
Backwater
1964 Flood
Willamette River Management

- Pre-dam period: 1892 - 1942
- Dam construction: 1942 - 1968
- Regulated period: 1968 – present
- 13 dams
  - 11 flood control
  - 2 re-regulating
Willamette River Peak Flows

Willamette River at USGS Albany Gage -
Comparison of Historical and Regulated Instantaneous Peak Discharge

- Historical Period - Pre-Dams (1892 to 1942)
- Dam Construction Period (1942 to 1968)
- Regulated Period - Post-Dams (1968 to 2010)

2-year Regulated Event
River Response

- Lower peaks and higher base flows
- Reduced sediment delivery
- Willamette narrowing
- Riparian encroachment
- Reduced connectivity
Current Conditions

- Outlet control
- Connectivity
- Variable development around lake
- Conservation opportunities

Courtesy A. Higinbotham
Land Use
Stormwater
Channel-Floodplain Connectivity

- Interaction between river and lake
  - Ground water
  - Surface water
- Fish use
- Nutrient and water exchange
  - Scour
  - Deposition
2-yr Inundation
2-yr Inundation
2-yr Inundation

Thornton Lake

Willamette River

191.7 ft

193.5 ft
Jan. 28, 2012 Air Photo

Photo at 330 pm on 01/28/12 - 68,400 cfs at Albany Gage, > 2-yr event
Jan. 28, 2012 Air Photo

Photo at 330 pm on 01/28/12 - 68,400 cfs at Albany Gage, > 2-yr event
High Water Ground Photo

Photo courtesy M. Azevedo
Oblique Air Photos

January 21, 2012 Flood

~80,000 cfs at Albany < 5-yr event

Photos courtesy W. Kieffer
Summary

- Historical side channel to the Willamette
- Variable connectivity based on river stage
  - Connects at less than a 2-year event
  - Connects less frequently than historically
- Connected multiple times during 2012
- Land use has affected surface water and sediment discharge to lake