Watershed Management Strategies for Bear Creek

Presentation Outline

- Brief History of the Astoria Watershed & Water Supply System
- Water System Operations at the Watershed
- Water System Projects
  - Slow Sand Filter Project
  - Emergency Spillway Project
- Watershed Stewardship Projects
  - Forestry Management Practices and Need for Stewardship Projects
  - Types of Stewardship Projects
- Finances of Watershed Management
- Capital Improvement Fund Security


Bear Creek Location
Legend
Astoria Water Treatment
Astoria Watershed
Rosburg
Wahkiakum
Ilwaco
Ruby Island
Sand Island
Chinook
Skamokawa
Fitzpatrick Island
Price Island
Pillar Rock Island
Woody Island
Goose Island
Grassy Island
Quinns Island
Welch Island
Tronson Island
Miller Sands
Snag Islands
Brush Island
Horseshoe Island
Tenasillahe Island
Marsh Island
Green Island
North Island
Seal Island
Marsh Island Light
Long Island
McGregor Island
Mott Island
Karlson Island
Grassy Island
Russian Island
Minaker Island
Lois Island
Svensen Island
Astoria
Warrenton
Jeffers Garden
Fry Island
Grant Island
Haven Island
Astoria Water Treatment
Gearhart
Clatsop
Google earth
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2018 Google
N
5 mi

Bear Creek Dam 1895

History of the Astoria Water System

- The "OLD WORKS"
  - Built by Columbia Water Company, a private corporation in 1883-84
  - Water source was Bear Creek, about 12 miles above the town
  - Original line was lap-welded wrought-iron pipe (6, 8 & 10 in.)
  - The system was grossly under built and found to be inadequate shortly after construction
  - With much public outcry the State Legislature appointed a Board of Water Commissioners authorized to purchase the works of the Columbia Water Company and to construct a new system
  - Old system was purchased for $75,000 and the new system was built for $500,000

The New Dam of 1911 & 1953


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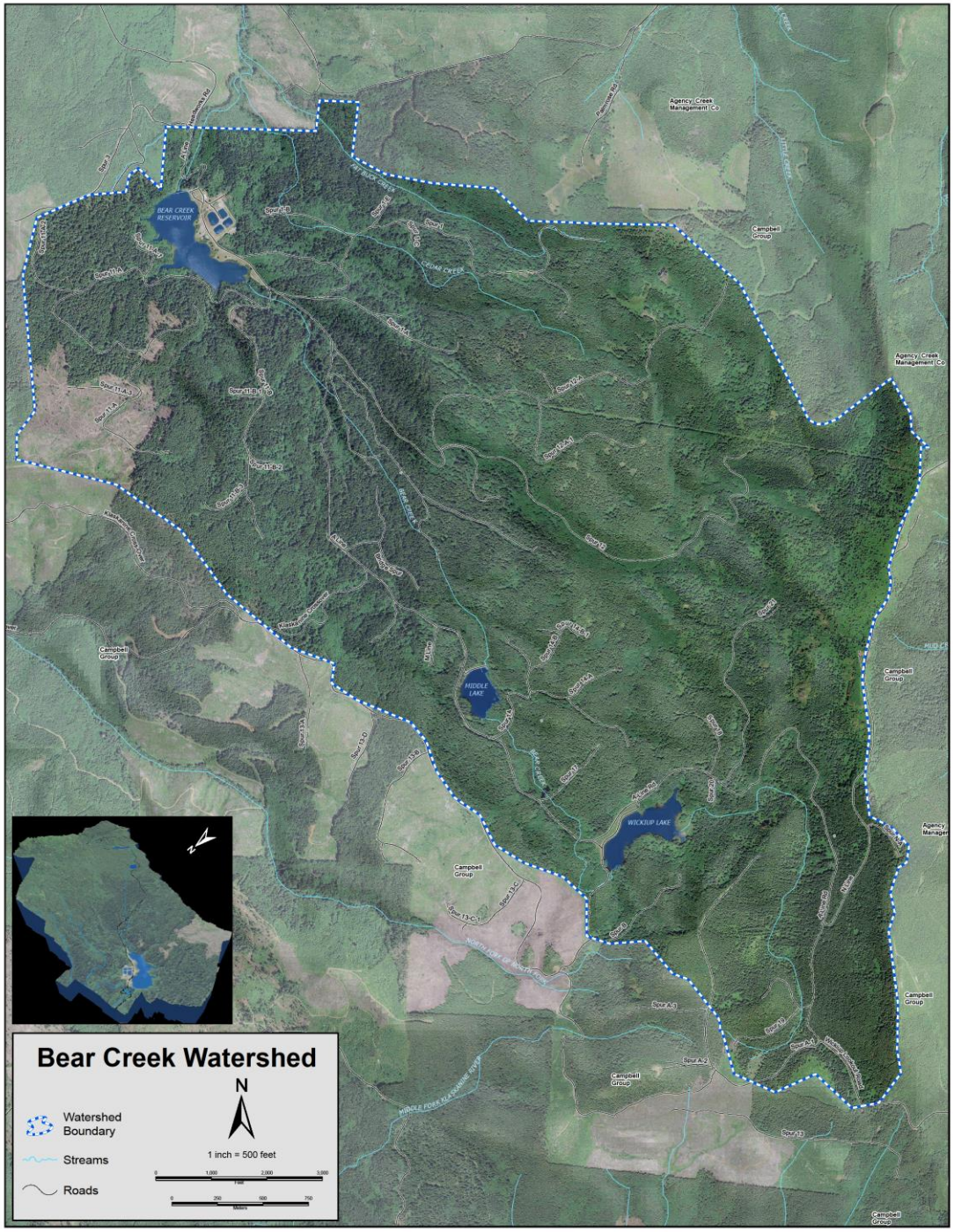
Drinking Water Treatment System

History of the Watershed, Cont'd

- The New System
  - 3,700 acre watershed – City owned
  - Certified through the Forest Stewardship Council (FSC)
  - City sold Forest Carbon Offset Credits in 2015 and 2020
  - Concrete Gravity Dam built in 1911
  - Classified as a High Hazard Dam (69 homes located below dam)
  - Determined Unlikely to Fail during CSZ Event after Seismic Study in 2015
  - 90 foot high dam (raised from 75 feet in 1953), 275 feet wide
  - Stores 200 million gallons (about 105 days storage)
  - 21-inch transmission main to City

Watershed

- 3,700 acre watershed
- City owned
- FSC Certified
- 3 Reservoirs
  - Main Lake (200 MG)
  - Middle Lake (52 MG)
  - Wickiup Lake (100 MG)



Dam Operations

- Emergency Action Plan (EAP)
  - Competed by City in December 2012 and updated annually
  - Has special emergency level for CSZ earthquake
  - Emphasis on a potential failure during a CSZ earthquake
  - Initial public outreach to make residents aware of potential hazard
  - Follow up meeting after study to present the good news of unlikely failure
- Main Drain System
  - 48 inch at base of dam
  - Needs to be rehabilitated or abandoned
- Rehabilitation of 24 inch drain (Interim measure)
  - Original valves rebuilt last summer
  - New 24 inch Welded HDPE Piping used
  - Can be used to lower reservoir elevation in a flood event or an emergency
  - Has been tested during a large storm event and was successful at lower reservoir elevation
  - City staff calculated draw down rate at about 1-foot per day
- Barrel Gate
  - Used to regulate reservoir elevation (3-foot adjustment range)
  - Rebuilt a few years ago

48 Inch Main Drain

24 Inch Drain (New)

Barrel Gate

Slow Sand Filter Project

Emergency Spillway Project

- State Dam Program mandated that the City develop an emergency spillway in our 1998 Water System Supply Plan
- Four locations have been investigated and all are problematic
- We are looking at the option of passing the PMF over the dam if it is safe to do so
- Will need a Probable Maximum Flood (PMF) study to size the emergency spillway structure or determine if one is not needed – plan to budget for FY 21/22
- Will most likely need a project to either construct an emergency spillway or modify existing spillway to carry the PMF

Watershed Stewardship

- Forestry Management Practices and Need for Stewardship Projects
  - Our forest has provided an excellent source of drinking water for over 100 years
  - Our Forest Certification from the FSC and our Forest Management Plan have provisions for progressive thinning within the watershed to support the single objective of providing the best possible quantity and quality of drinking water
  - We generate revenue annually while maintaining the highest water quality standards
  - Stewardship is important to continued improvements in our watershed

Watershed Stewardship

- Types of Stewardship Projects
  - Pre-commercial Thinning – needed to improve quality of forest starting with the 70 acre blowdown area from the 2007 windstorm – $25,000 – $35,000 typical cost
  - Supplemental Planting Projects – $15,000 – $20,000 typical cost
  - Update of Forest Management Plan – $17,000
  - Roadway Water Quality Improvements (Cedar Creek) – needed to replace failing culverts under the roadway. If roadway collapses sediment will cause severe water quality issues at Cedar Creek diversion structure and access for fire protection will be impacted – costs to be determined.

Thinned on Left and Not on Right

Thinned Area of Bear Creek

Thinned Area above Main Lake

Finances of Watershed Management

- Watershed activities are included in the Capital Improvement (CI) Fund
- Revenue (typical fiscal year)
  - Annual Timber Harvest Project – $200,000 +/-
  - This project size is a manageable size harvest for operational purposes
- Expenditures (typical fiscal year)
  - Forest Management Plan Activities – $80,000
    - City Forester management of harvest project
    - Forest Stewardship Council (FSC Fees)
    - Ongoing Carbon Credit Offset Sales Fees (registry & audits)
  - Forest Fire Protection (ODF) – $12,800
  - Watershed Road Repairs – $45,500
- Financial Talking Points
  - A few years ago we realized the potential for years when we may not receive timber harvest bids due to a poor market, lack of interested buyers or as with this last fiscal year conflict with the carbon project activities.
  - Timber market fluctuations may also impact the revenue amount each year
  - We will have carbon project financial obligations for the next 40 years
  - There are stewardship projects needed that may be hard to fund out of timber revenue alone which is our past source of funding for this work

Summary

- By reserving some of the carbon project proceeds we can:
  - Secure CI funding for carbon project obligations for next 40 years
  - Secure CI funding for future years when we may not receive timber harvest bids
  - Give us the flexibility to not do a harvest project when the timber market is poor
  - Help offset some of the expenses for much needed stewardship projects