KING COUNTY FLOOD CONTROL DISTRICT

King County

King County
Flood Hazard Management Plan Update
Cedar/ Sammamish Rivers

Public Meeting

December 5, 2012

Goals of the Presentation – Cedar and Sammamish R. Plan Update

- Context - Brief summary info about the Cedar/ Sammamish Watersheds and Floods
- Flood Plan Accomplishments since 2006
- Overview of Implementation Strategy
- Future Direction – Flood Plan Update

Cedar River Watershed

Cedar River Overview

- Watershed188 sq mi, 45 mi long River
- 100-yr flow = 10,300 cfs at Landsburg
  12,000 cfs at Renton
- Recent Major Floods:
  Jan. 2009 = 9,390 cfs at Renton
  Nov. 1990 = 10,600 cfs at Renton
- Summer Low flow typically 150 to 300 cfs
- Regulated by Chester Morse releases

Cedar River Watershed

Cedar River Flood Risk Overview

- Risk Factors:
  - Deep and Fast Overbank Flows
  - Bank erosion and channel migration
  - Flood Inundation
  - Sediment aggradation and channel maintenance (Renton)
  - Wood Accumulation and Risk Management
  - Outdated Infrastructure – primarily rock revetments
  - Landslides – e.g. 2001

Cedar River Flood Risk Overview Contd.

- Flood Hazards Risk Focus Areas:
  - Business Core – primarily Renton (Boeing Plant, airport, etc)
  - Suburban and Rural Residential
  - Roads and Bridges
  - Cedar River Trail/ Hwy 169
  - Utilities – e.g. Fiber Optic Cable (in Trail)

Cedar Flood Risk Reduction Strategy

"Reduce flood damages while improving the habitat conditions for ESA listed fish and addressing recreational safety on the River."

- Buyout or remove people from harms way
- Protect critical infrastructure and development
  - City of Renton/ Boeing/ Airport (Sediment mgmt)
  - Cedar River Trail - Revetments
  - Utilities – e.g. Verizon fiber optic
  - Roads and Bridges
- Maintain/ repair revetments w/ required mitigation
  - 65 Revetments (a few levee – minor flood protection)
- Setback levees (revetments) where possible in in partnership with WRIA restoration plans.

Cedar Strategy Contd.

- CIP projects based on detailed feasibility/ geomorphic analyses, design and safety reviews (Levee Setback Feasibility)
- Technical information – sediment accumulation and channel migration analyses, flood highwater marks, LIDAR data.
- Flood warning, outreach and public involvement – share project information early
- Coordination on dam operations*.

** Note: Flood control not a primary function or responsibility for operation of the dams*

Other Strategies Considered

- Modifications to dam or dam operations
  - Multi-purpose dam:
  - Water supply, power production
  - HCP drives fisheries flows
  - Flood control <u>not</u> a primary purpose but operated that way if possible.
  - Geology prohibits increasing dam storage.
- Building or Raising levees
  - Encroachment in floodway
  - Area between homes and river limited
  - Cost

Other Strategies Contd.

- Strengthen Revetments
  - Vulnerability
  - Cost to rebuild to current environment standards
  - Doesn’t reduce floods
  - Difficult permitting – may not move towards salmon recovery.
- Dredging the River
  - Except for Renton, expensive, limited benefits and very challenging permitting.

Cedar River Flood Risk Reduction Accomplishments (Since 2006)

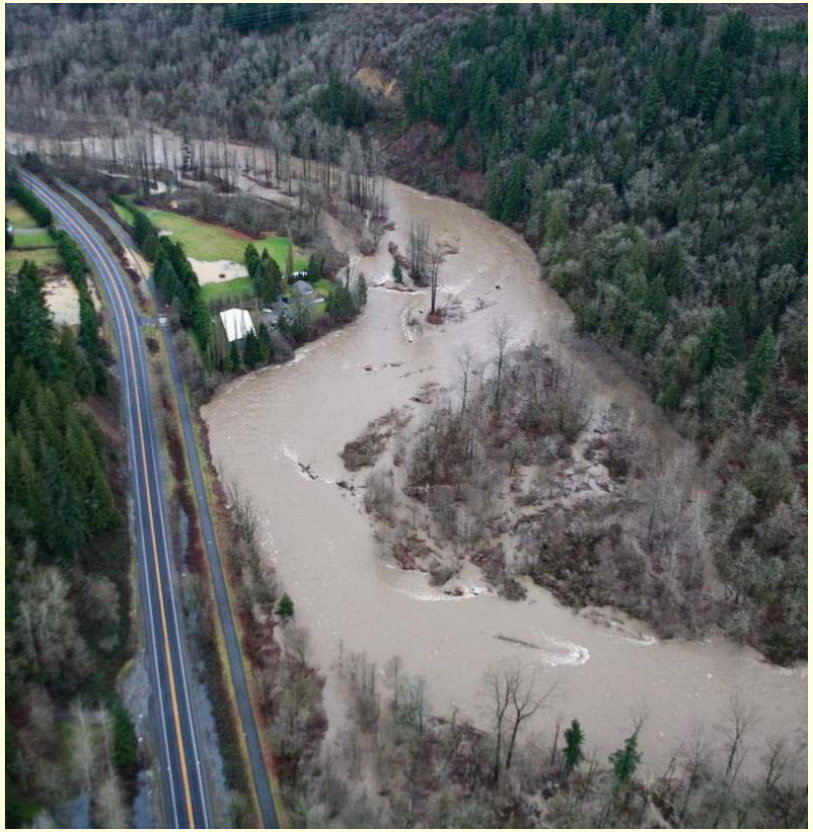
- 20 flood damage repairs - 2850 LF of bank protection;
- Acquired 80 homes = 93 acres of protected floodplain
- Setback of 2 major levees along 2730 LF of bank, reconnecting 31 acres of floodplain (Cedar Rapids)
- Improved coordination on dam operations reduced flooding and damages (e.g., January 2011 flood);
- Conducted large wood inventory and recreation studies;
- Initiated Cedar River basin outreach strategy and hosted two (annual) public meetings.

Recent Project Examples

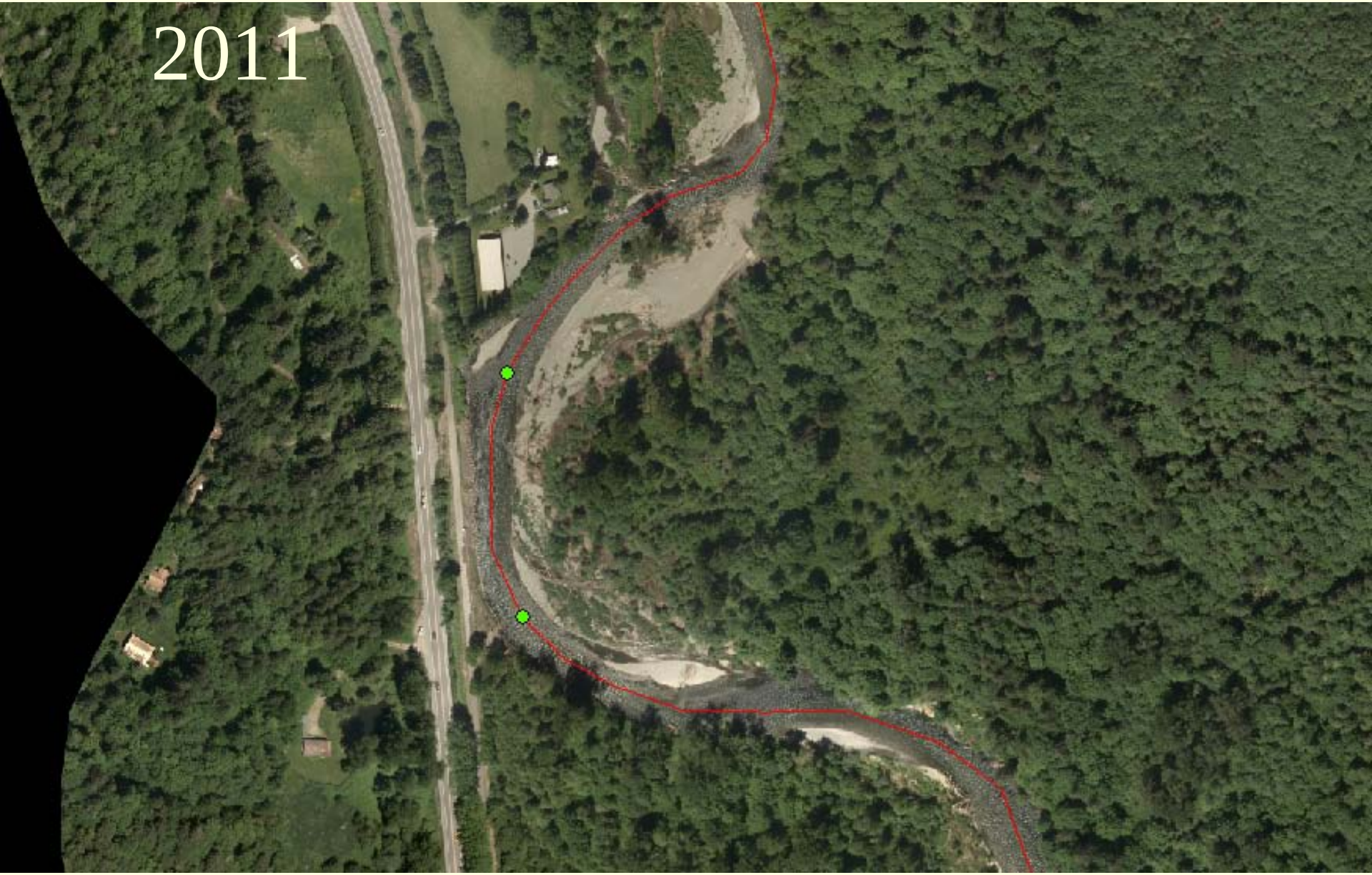
Flood damage repair projects:

- Belmondo Reach – 2009 Flood Damage Repair
  - Log jam constructed 2010
  - Toe rock with live plant geogrid 2012
  - ELJ/ groin with geogrids and planting 2013
- Cedar Rapids – Setback levee Rt Bank 2012
- Rainbow Bend/ Cedar Grove Acquisition
  - Restoration to begin 2013

Belmondo Revetment



- Channel migration area
- Gravel bars & wood
- Severe bank erosion
- Infrastructure at risk


2011

2007

2002

Capital Projects:
Cedar Rapids Levee Setback

Cedar Rapids Rt Bank Repair
Before and After

View Downstream prior to construction

Cedar Rapids Rt Bank Repair

Post construction

Capital Projects:
Rainbow Bend Levee Buyouts

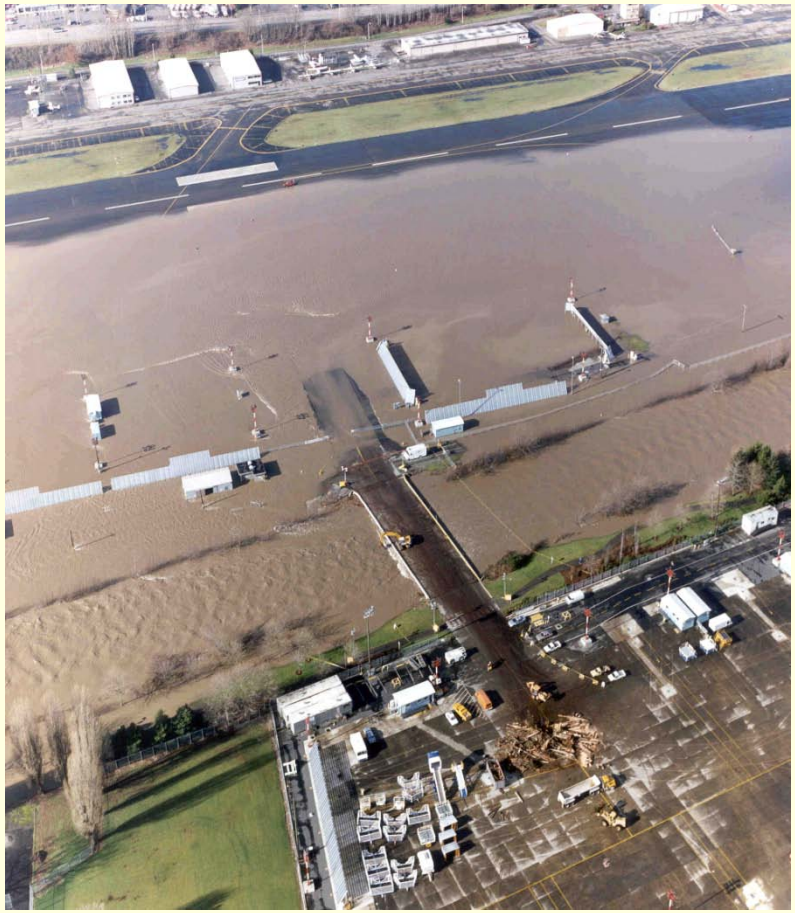
November 1990

January 2009

51 Mobile Homes removed – Cedar Grove
Restoration scheduled for 2013

Rainbow Bend Floodplain Reconnection

Renton 205 Project: Renton Airport



- Dredging channel to maintain capacity

February 1996
Flood peak 7520 cfs in Renton

January 2009
Flood peak 9470 cfs in Renton

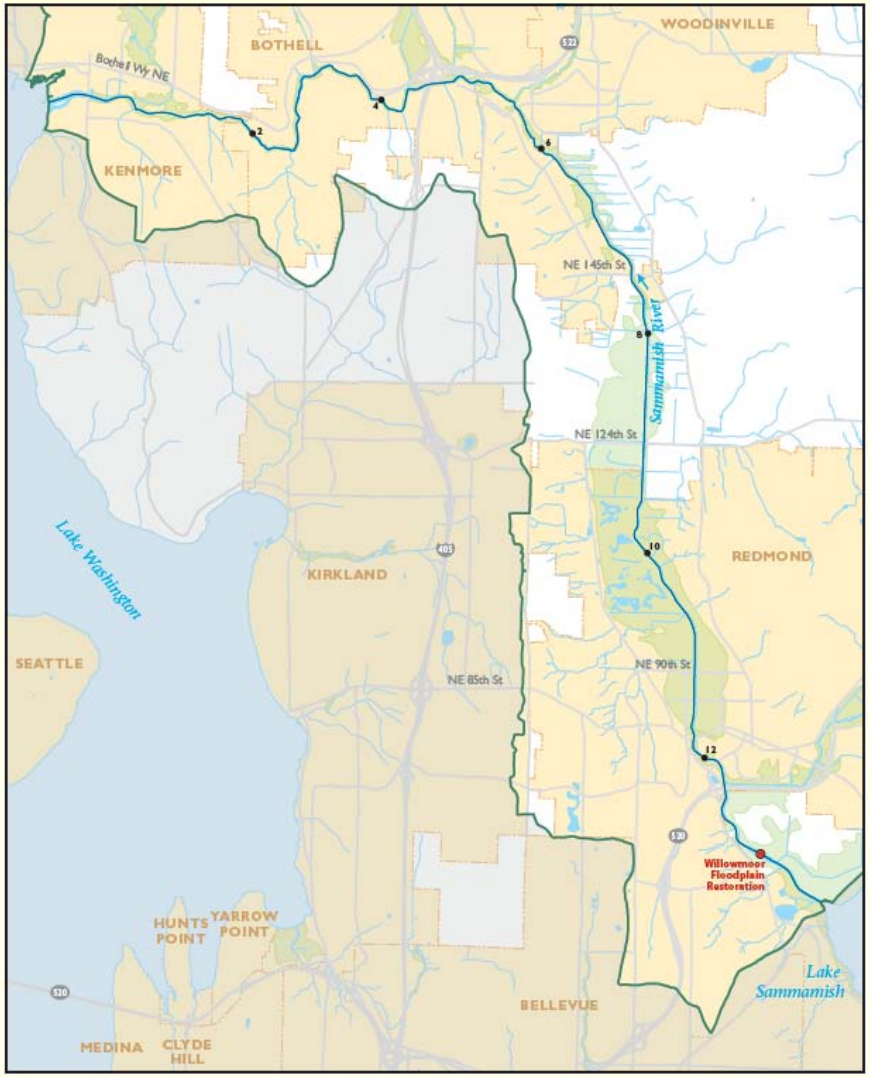
Cedar River Emerging Issues

- Costs – Expensive projects:
  - Renton Gravel Removal > $5M
  - Acquisitions – growing interest → demand exceeds funding.
  - Levee Setback costs – pending detailed feasibility and risk evaluation
- Wood and Sediment Management
  - Active and Passive recreation
- Safety Review
- Flood Response and Community Involvement
- Multi-objective partnerships – habitat restoration
- Flood Events 2006, 2009 and 2011
  - Repairs and new areas of concern

Capital Project Outlook

- Cedar Rapids Right Bank Levee Setback - 2012
- Belmondo Mitigation and Repair – FEMA funded
  - 2012 and 2013 (includes mitigation for wood
- Cedar River Gravel Removal – Renton
- Rainbow Bend Floodplain Reconnection
  - Partnership – WRIA recovery team and City of Seattle
- Elliott Reach Floodplain Reconnection
- Levee Setback Feasibility
  - Rhode & Getchman
  - Jan Rd & Rutledge-Johnson
  - Herzman
  - Byers Road

Sammamish River Basin



- 240 sq mi basin
- 14 mi from Lake Sammamish to Lake Washington
- 100 year flow = 1649 cfs L. Samm.

  5,255 cfs L. Wash

Sammamish River Flood Risk Overview

- Risk Factors:
  - Low flood risk - Sammamish River Flood control channelization and dredging 1964
  - Vegetation growth in channel and on banks
  - Degraded habitat conditions
  - Sediment Accumulation in Transition Zone
  - Lake level concerns
- Areas Affected by Flood Hazards:
  - Agricultural, recreational, and residential uses
  - City parklands and suburban development

Sammamish River Corps Flood Control Project - Transition Zone

Increased Level of Maintenance Lake Level Issues

- 2011 Flood Reduction Work Plan
- Mowing Reed Canary grass and trim Willows
- Maintain buffer
- Monitoring – increased gages and flow measurement:
  - Approx. 0.4 Ft reduction in Lake level for 700cfs (28.0 Ft. NGVD)
- Sediment Removal Study – 0.1 to 0.2 Ft reduction potential

Facility Maintenance – Post mowing/ Willow Trimming

Accomplishments since 2006

- Coordinated with Cities to accommodate modifications to 1964 project
  - Redmond Instream Habitat Enhancement Projects
  - Revegetation Projects in Bothell & Woodinville
  - Bear Creek Restoration near mouth
- Increased vegetation management in Transition Zone
- Sediment Removal Study
- Partnership with City of Redmond to conduct feasibility study for Willowmoor Restoration Project
- Negotiating transfer of Kenmore Navigation Channel to City of Kenmore
- FEMA Approved Revised FIS and FIRMs

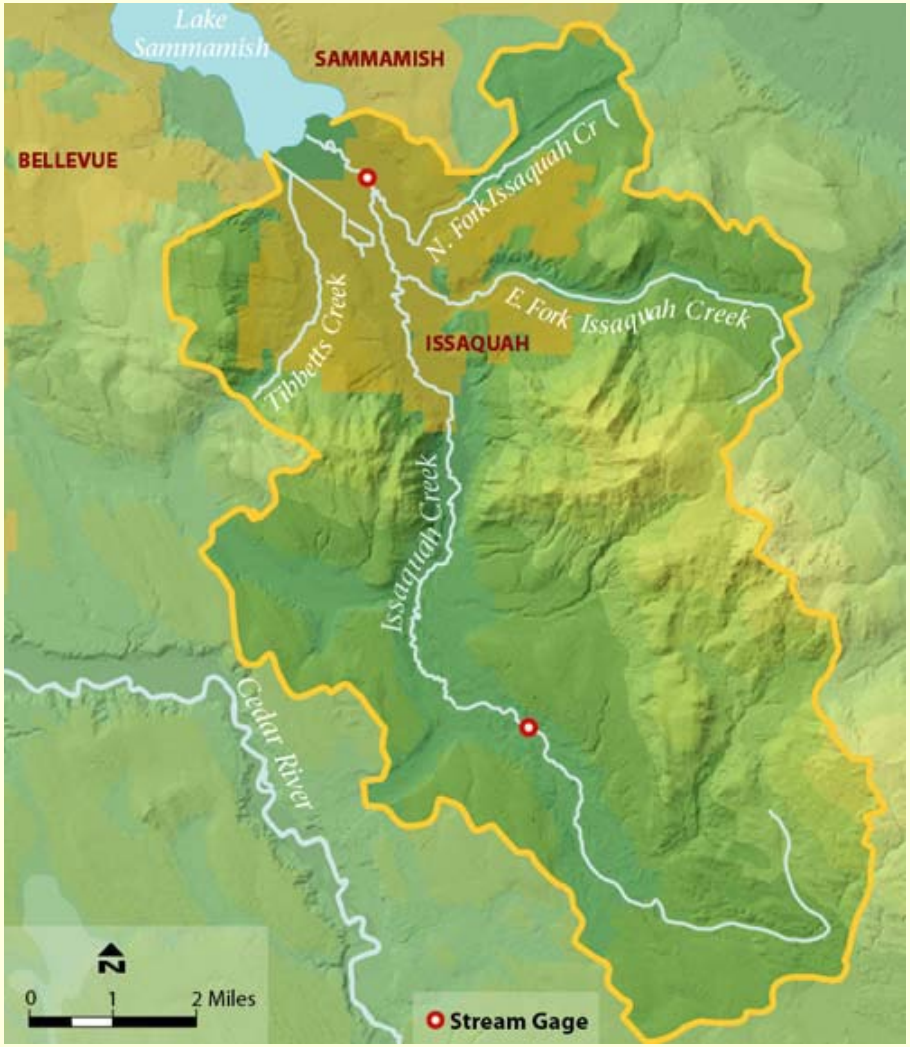
Sammamish Flood Hazard Mitigation Strategies

- Maintain flood conveyance while restoring degraded habitat conditions
  - Setback or reshape banks
  - Replace invasive with native vegetation
- Sediment removal to maintain conveyance
  - Upstream end - Transition Zone
  - Downstream end – Mouth
- Willowmoor Project w/ Redmond – longer term improvement to habitat and conveyance

Near Term Sammamish Projects

- Partner with Dept of Natural Resources on pilot Brazilian Elodea removal project
- Feasibility Study for Willowmoor Restoration Project – partner with City of Redmond – kickoff 2012:
  - Lake Level control and downstream flood management, and
  - Habitat Restoration
- Sediment Removal – $450,000 in 2013 Budget

Issaquah Creek Basin



- Largest trib to L. Sammamish
- 57 sq mi
- Lower 11 sq mi City of Issaquah
- 100 year flow = 4670 cfs

Issaquah Creek Flooding

Issaquah Creek Flood Hazard Mitigation Strategies (City)

- Acquisitions and elevations for flood-prone residential and commercial structures
- Flood proofing – e.g. Gilman Village
- Target mitigation actions for repetitive loss properties
- Open Space use for flood prone areas

Other Lake Washington Projects

Other on-going projects in Flood Plan:

- Coal Creek – City of Bellevue
  - 6 year CIP cost $8.4M
- Lyons/McAleer Creek – City of Lake Forest Park
  - 6 year CIP cost $1.0M

Summary – Cedar/ Sammamish

- Generally stay the course - 2006 Plan
- Update projects with detailed feasibility – geomorphic and other constraints
- Continue partnerships with Salmon Recovery Plan implementation
- Implement design rigor and safety reviews
- Technical studies such as sediment and wood loading, and recreational use.
- Evaluate costs

Thank you – Questions?

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