

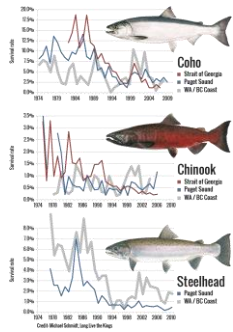
Watershed Approach to Recovering Urban Streams:

Developing and Implementing a Watershed Management Plan

STEVE HITCH, PE – CITY OF REDMOND



Puget Sound Salmon



Puget Sound Salmon

Healthy aquatic habitat where people live and work is almost gone.



Bellevue Stream Team

Stormwater Management

Development prior to 2013 is not equipped with sufficient stormwater controls.



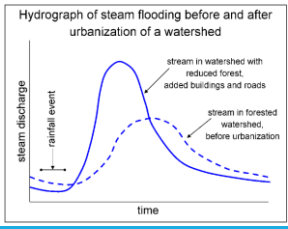
The Dilemma

Washington Municipal Stormwater Permit

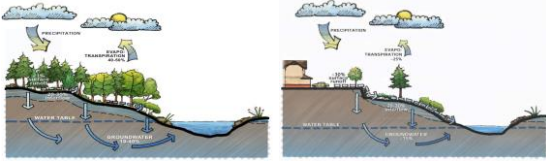
- Tied to new development and redevelopment
- Treatment designed to improve conditions relative to existing conditions
- New requirements for LID
- Does not specifically target areas of ecological importance



Hydrology



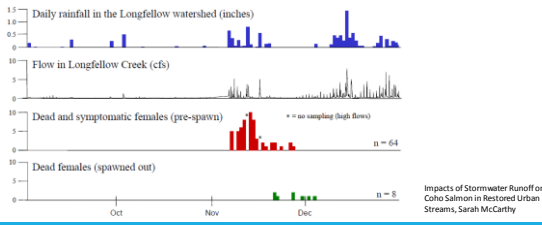
Hydrology

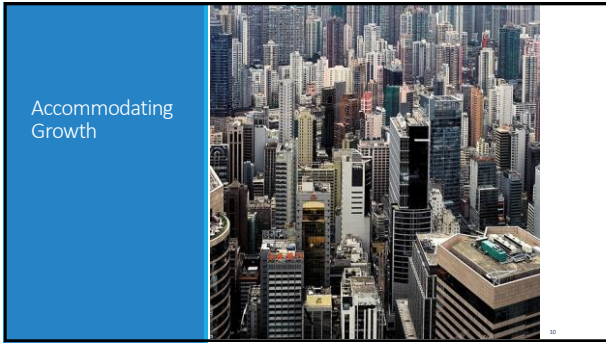


Water Quality

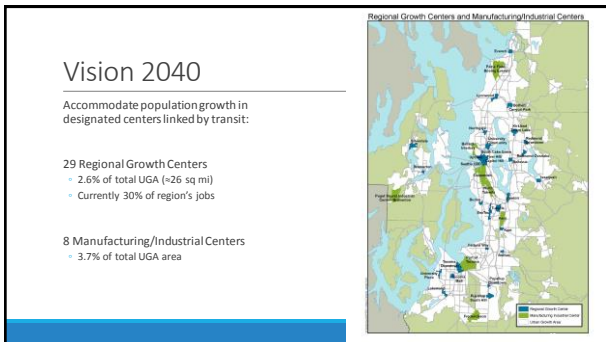



Water Quality





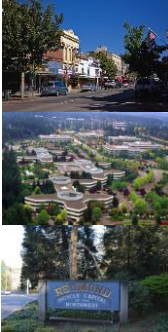






City of Redmond

- 17 Square Miles
- 60,000 residents
- 85,000 employed
- Built out in the 70's-90's
- Committed to Restoring Streams
- Rapid redevelopment in urban centers



Typical Urban Streams

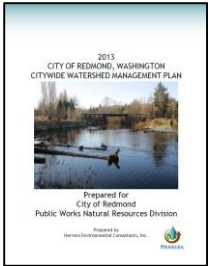
- Erosion
- Incision
- Poor Water Quality
- Low Base Flows



Redmond Citywide Watershed Plan
Approved in February 2014

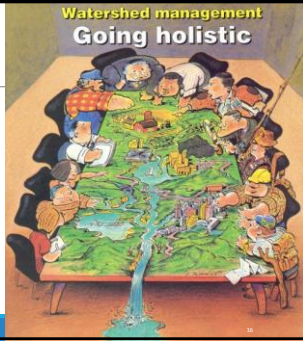
Goals

- Provide baseline of scientific information evaluating watershed rehabilitation potential
- Prioritize a subset of watersheds with greatest potential to respond to rehabilitation efforts
- Identify specific tools to rehabilitate highest priority watersheds by 2060



Watershed Planning Guiding Principles

- Address multiple regulations with one effort (TMDL, NPDES, ESA)
- Prevent NEW stormwater impacts everywhere
- Focus improvements to existing stormwater impacts where it makes sense (benefit)
- Create a citywide plan that addresses stormwater and environmental asset needs
- Make participation optional to developers (and capital projects)



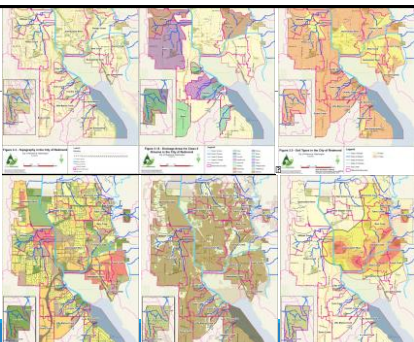
Elements of the Plan

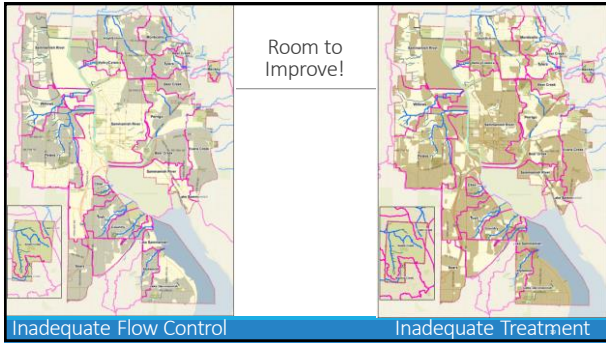
- Build Partnerships—yes, even with Ecology
- Characterize Watersheds
- Set goals for future desired conditions
- Implementation Plan
- Performance Measurement
- Adaptive Management

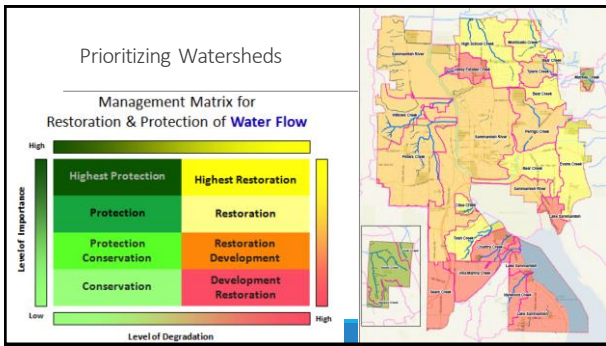


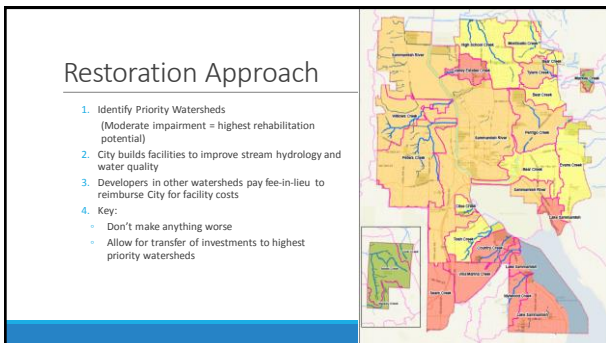
Lots to Learn

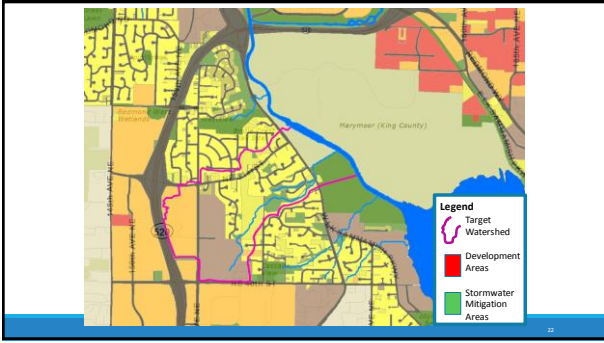
- Topography
- Soil Types
- Stream Maps
- Land Use
- Wellhead Protection Zones
- Presence of stormwater facilities
- Water Quality data
- Fish presence
- B-IBI Data
- Flow characteristics

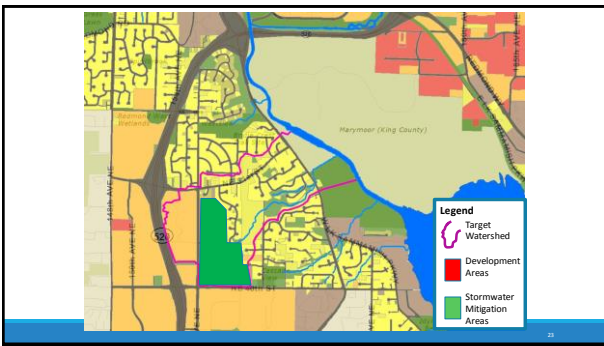


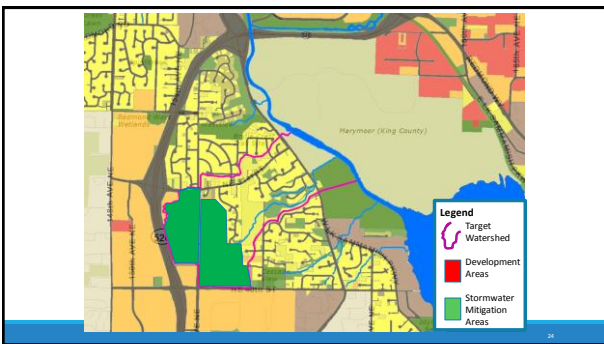


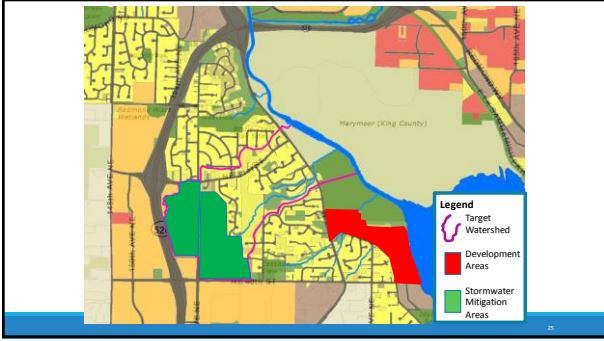


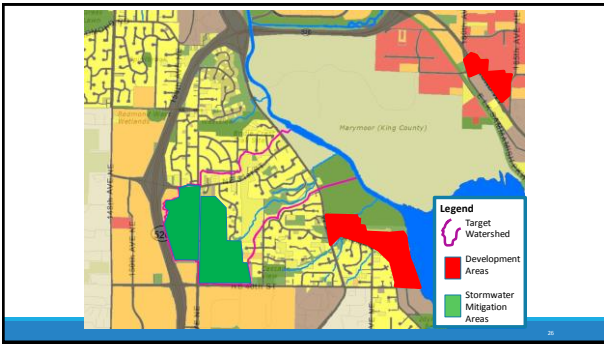


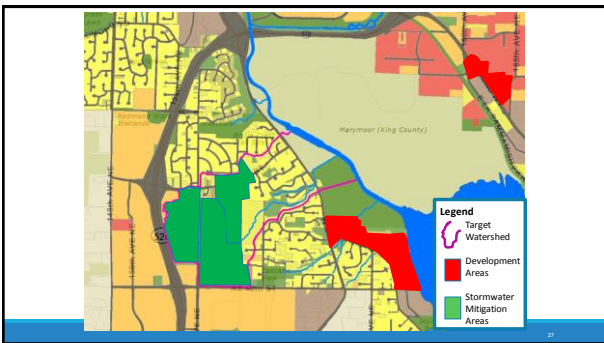


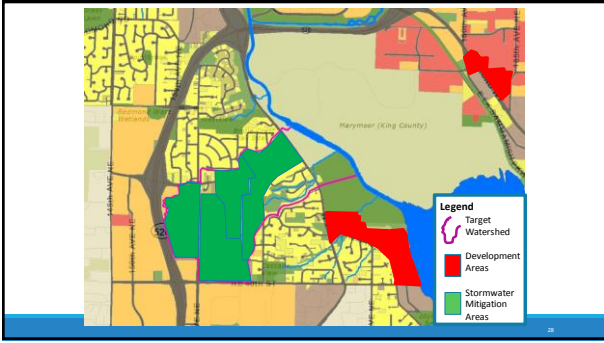


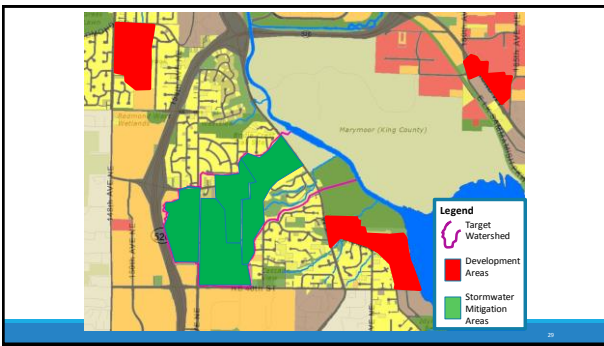


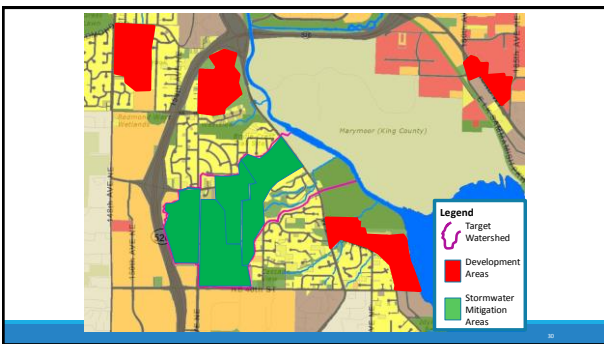


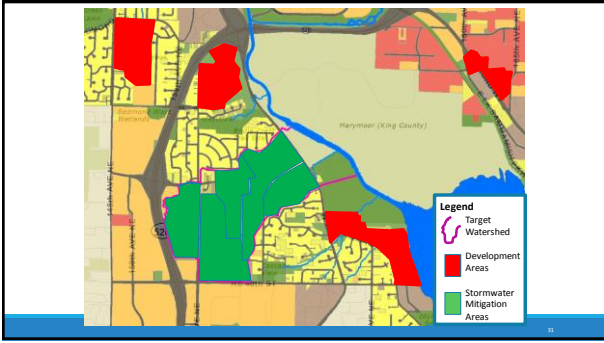


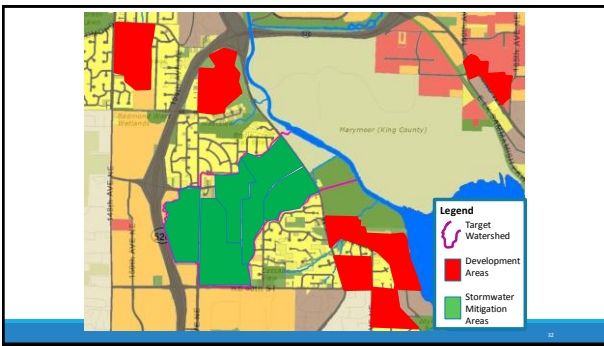












Watershed Planning

Ecology created watershed characterization model
Covers all of western Washington
Aligns with Redmond's local analysis

Water Flow Restoration and Protection Priorities
WRWA # Cedar/Sammamish

Redmond Watershed Plan Implementation



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Watershed Planning - How it Works

- City approval of watershed approach
- Develop a detailed plan for specific improvements by watershed
- New stormwater impacts will typically be addressed at or close to the site
- Improving existing impact can be moved to priority areas
- City projects can benefit



Watershed Planning How it Works (Continued)

- Tracking (accounting)
- Performance (outcome) monitoring is essential
- Funding strategy
- Have public support to invest in the environment

| Activity | Priority | Responsible Party | Start Date | End Date | Status |
|----------------------------|----------|-------------------|------------|----------|-------------|
| Watershed Assessment | High | City of Redmond | 2015 | 2016 | Completed |
| Watershed Plan Development | High | City of Redmond | 2016 | 2017 | In Progress |
| Watershed Implementation | Medium | City of Redmond | 2017 | 2018 | Planned |
| Watershed Monitoring | Medium | City of Redmond | 2018 | 2019 | Planned |
| Watershed Funding | Medium | City of Redmond | 2018 | 2019 | Planned |
| Watershed Public Support | Medium | City of Redmond | 2018 | 2019 | Planned |

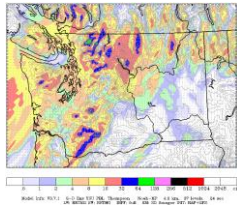
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Redmond Paired Watershed Study Experimental Design

| Watershed Type | Watershed Name | WQ Sites (#) | Physical Habitat Sites (#) | Dominant Land Use/Cover | Watershed Areas (acres) | Watershed Area in Redmond (acres) |
|----------------|----------------|--------------|----------------------------|-------------------------|-------------------------|-----------------------------------|
| Reference | Colin | 1 | 1 | Forest | 1,990 | 90 |
| Reference | Seidel | 2 | 3 | Forest | 1,188 | 615 |
| Application | Monticello | 3 | 5 | Residential/Commercial | 345 | 264 |
| Application | Tosh | 2 | 4 | Residential/Commercial | 299 | 276 |
| Application | Evans | 2 | 2 | Residential | 397 | NA |
| Control | Tyler's | 3 | 2 | Residential/Commercial | 168 | 167 |
| Control | Country | 2 | 2 | Residential/Commercial | 212 | 212 |

Redmond Paired Watershed Study Experimental Design

- Water quality monitoring
 - 12 storm flow events annually
 - 4 base flow events annually
- Habitat monitoring
 - Annually
- Hydrologic monitoring
 - Continuous
- Sediment monitoring
 - Annually
- Biological monitoring
 - Annually



Questions?

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