Storm & Surface Water Plan Update

Utilities Advisory Committee

May 4, 2017

Storm and Surface Water Plan Update

Tonight's Agenda

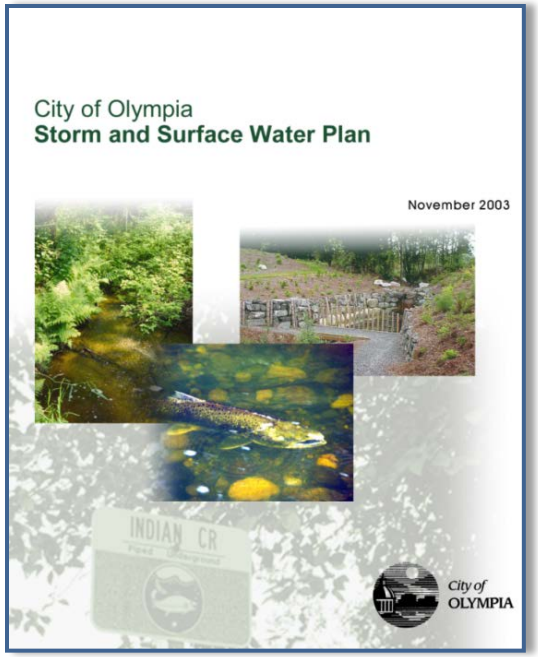
- The What:
  - Our mission & responsibilities
  - Infrastructure
- The Why:
  - Regulatory environment
  - Flooding challenges
  - Water quality challenges
  - Aquatic habitat challenges
- The How:
  - Current core services

Today's take away message – Plan's recommendations will be based on an analysis of data & more details to come

Storm and Surface Water Plan Update

Formatted to Tell Our Story

- The "What" Chapters:
  - Chapter 1 – Introduction
  - Chapter 2 – Context and Trends
  - Chapter 3 – Surface Water Management in Olympia
  - Chapter 4 – Built and Natural Infrastructure
- The "Why" Chapters
  - Chapter 5 – Legal and Policy Framework
  - Chapter 6 – Flood Mitigation
  - Chapter 7 – Water Quality
  - Chapter 8 – Aquatic Habitat
- The "How" Chapters
  - Chapter 9 – Core Services
  - Chapter 10 – Goals and Objectives: **PENDING**
  - Chapter 11 – Capital Improvement Program**: PENDING**
  - Chapter 12 – Finances: **PENDING**



What is the Utility Responsible For?

Responsibilities:

- Flooding
- Water Quality
- Aquatic Habitat

What is the Utility Responsible to Do?

Infrastructure

- Built
  - 160 miles underground pipe
  - 7,400 storm drains
  - 1,400 manholes
  - 167 flow control structures
  - 129 treatment facilities
  - 20 miles combined sewer/storm pipe
- Natural
  - Swales
  - Streams
  - Rivers
  - Lakes
  - Wetlands

Regulations

Regulatory and Policy Framework for Storm & Surface Water		
	Regulations and Statutes	**Plans and Policies**
Federal	▪ Clean Water Act ▪ Endangered Species Act ▪ Tribal Treaty Rights ▪ Surface Water Standards	
State	▪ Phase II Municipal Stormwater Permit ▪ Ecology's Stormwater Management Manual for Western WA ▪ Total Maximum Daily Load (TMDL)	▪ Puget Sound Partnership Action Agenda
City	▪ Olympia Drainage Manual ▪ Engineering Development and Design Guidelines ▪ Olympia Municipal Code	▪ Comprehensive Plan ▪ Capital Facilities Plan ▪ **Storm & Surface Water Plan**

Municipal Stormwater Permit

- Keep an updated Stormwater Management Program Plan.
- Maintain an education and outreach program for source control.
- Maintain an inventory and mapping of the stormwater infrastructure.
- Implement an Illicit Discharge Detection and Elimination (IDDE) program.
- Maintain a spill hotline.
- Implement and enforce the Drainage Design and Erosion Control Manual including low impact development.
- Inspect and enforce erosion and sediment control.
- Annually inspect and maintain all city-owned stormwater facilities.
- Annually inspect and enforce maintenance of private stormwater facilities.
- Inspect (and clean) all city-owned catch basins on a 2-year cycle.
- Comply with the TMDL-specific requirements.
- Contribute to the Regional Stormwater Monitoring Program.
- Report to Ecology to document compliance with permit requirements.

Flooding Challenges

Legacy Flooding

- A few significant projects remain
- New development and redevelopment corrects many deficiencies

Flooding Challenges

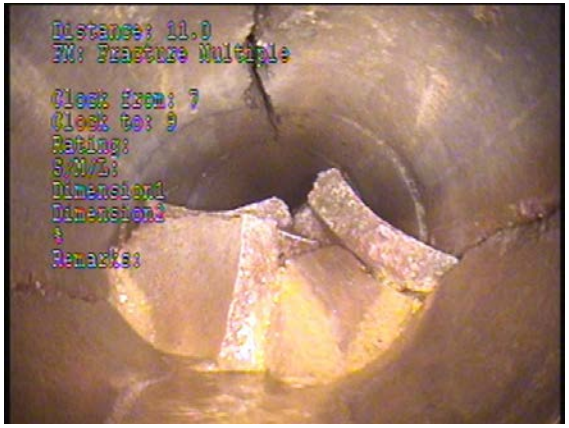
Low Impact Development

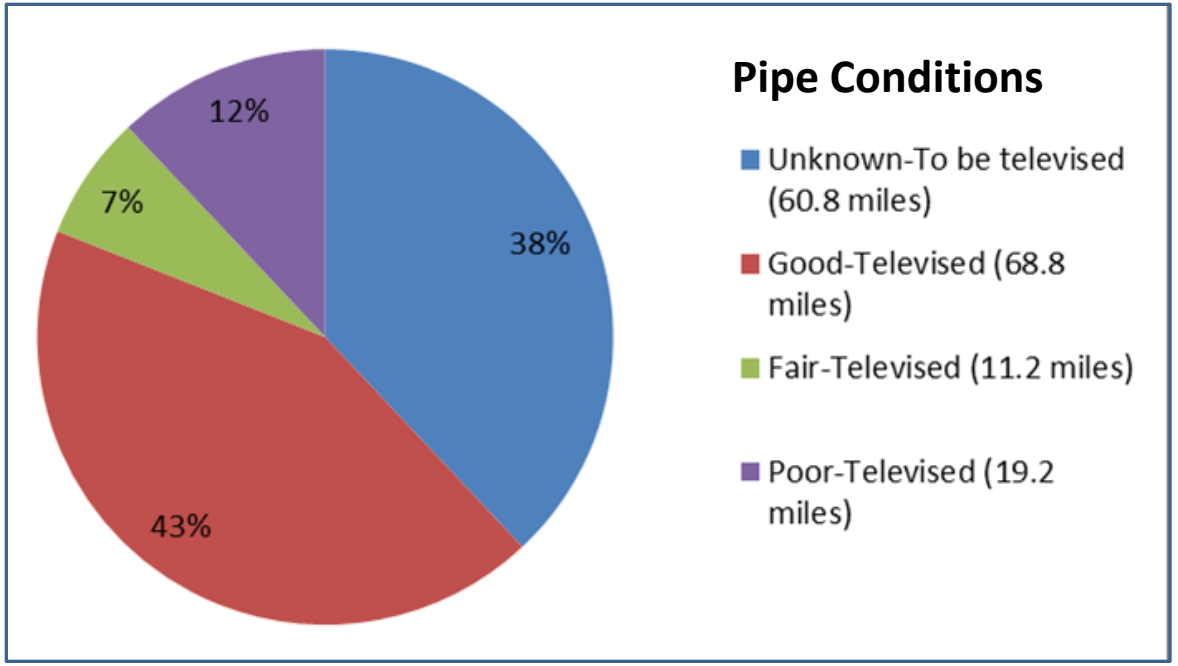
- Increased inspections and maintenance

Flooding Challenges

Asset Management

- Increase understanding of infrastructure and its condition

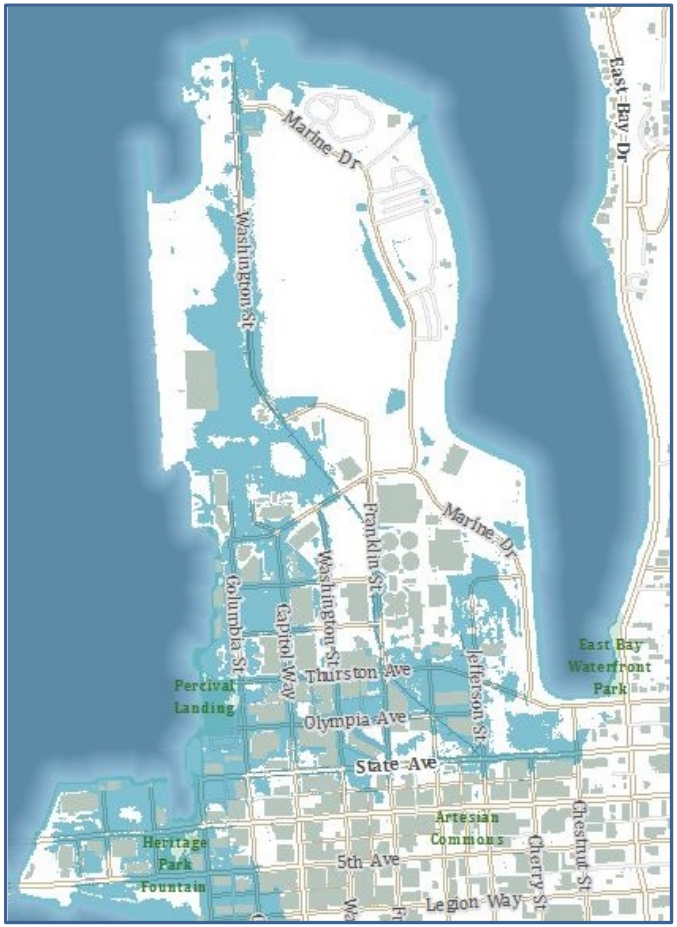




Flooding Challenges

Climate Change and Sea Level Rise

- More frequent and intense winter precipitation
- Increasing investment in infrastructure

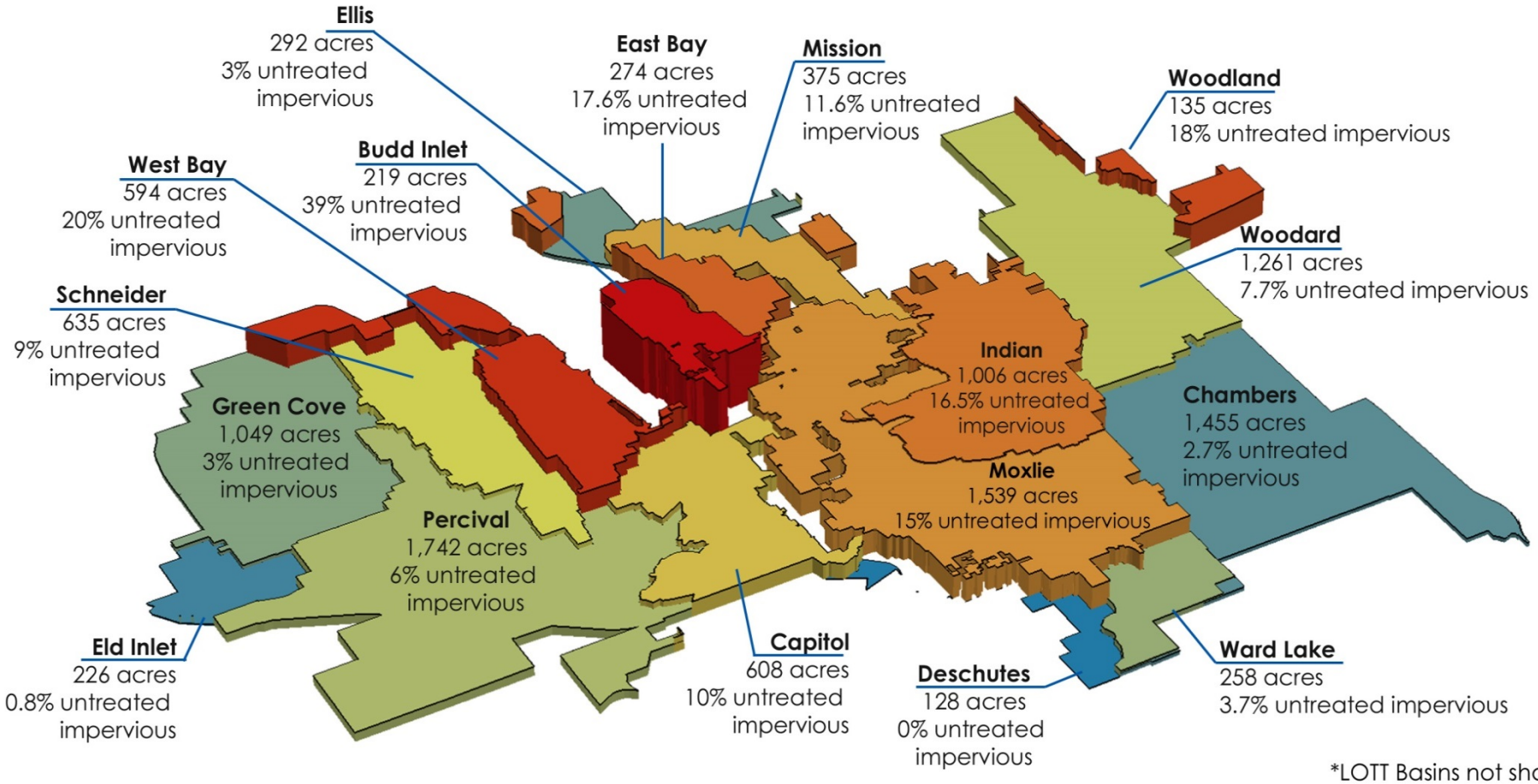


Water Quality Challenges

- Runoff from Pollution Generating Impervious Surfaces
  - Legacy Problem
  - Exacerbates other problems
  - Non-point (i.e., dispersed sources)
- Fecal Contamination
  - Chronic vs. infrequent
- Nutrients
  - Nitrogen - limited in Marine environments
  - Phosphorus – limited in freshwater environments
  - Contributes to low Dissolved Oxygen
- Temperature
  - Stream shade is a surrogate
  - Contributes to low Dissolved Oxygen
- Regulatory Oversight (303 d. List , NPDES permit, TMDL's)
  - One size fits all?

Water Quality Challenges

- Runoff from Pollution Generating Impervious Surfaces
  - Legacy Problem



Water Quality Challenges

Runoff from Pollution Generating Impervious Surfaces

- Ecology Study - Control of Toxic Chemicals in Puget Sound, Publication No. 11-03-024

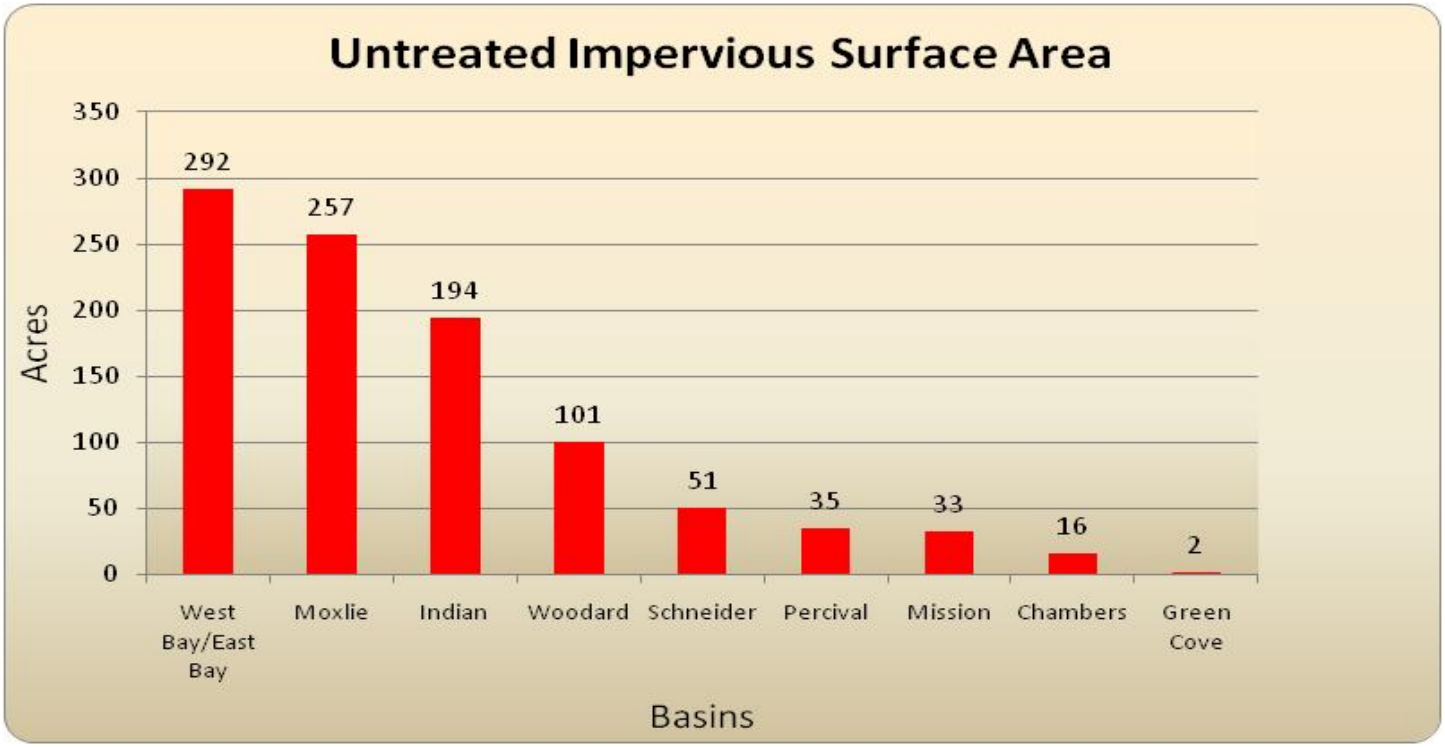
Estimated Annual Loading to Puget Sound from Stormwater Runoff Based on Sampling

Pollutant	(pounds per year)	(ounces per person per year)
Oil & Grease	18,000,000 – 23,000,000	67 – 86
Petroleum	710,000 – 800,000	2.7 – 3.0
Zinc	250,000 – 300,000	0.94 – 1.1
Copper	61,000 – 140,000	0.23 – 0.52
Polycyclic aromatic hydrocarbons (PAHs)	300 – 600	0.0011 – 0.0022

Water Quality Challenges

Runoff from Pollution Generating Impervious Surfaces

- 2010 Basin Analysis – Demonstrated strong correlation between untreated impervious surfaces and decreasing water quality.

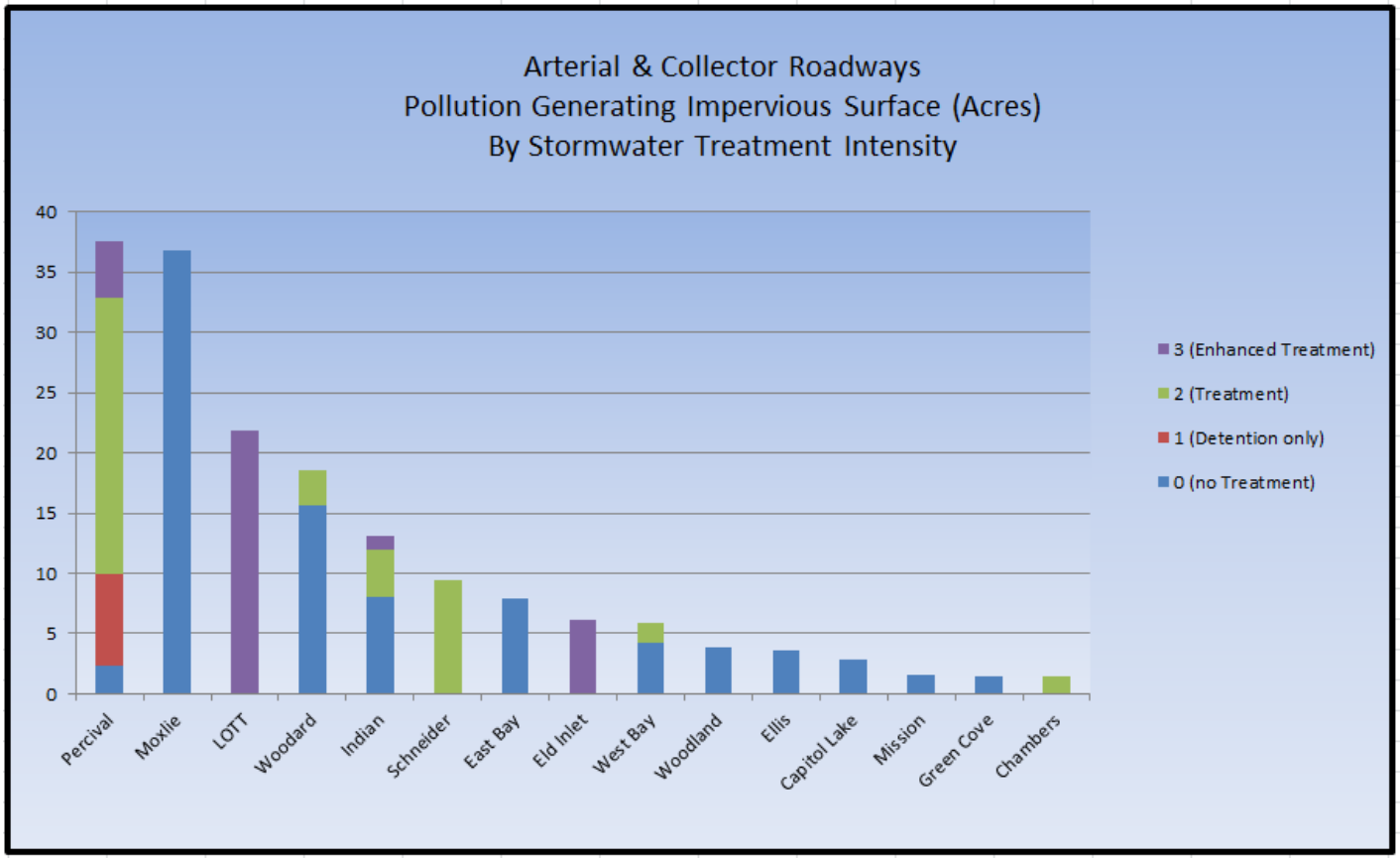


A regression analysis comparing the area of untreated impervious surfaces and both the WQI (R2=0.65) and the B-IBI (R2=0.53) showed moderate to strong correlations for both.

Water Quality Challenges

Runoff from Pollution Generating Impervious Surfaces

- Further analysis –Pollution Generating Impervious Surfaces by Basin by Treatment for Arterial and Collector roadways.



Water Quality Challenges

Runoff from Pollution Generating Impervious Surfaces - Summary

- Ecology "Toxins" study indicates largest loads of pollutants are from vehicles.
- 2010 Basin Analysis indicated correlation between untreated PGIS and poor water quality.
- Current analysis shows quantity of untreated PGIS by basin and treatment.
- Utility plans to prioritize new treatment infrastructure in these locations.
- Utility plans to increase inspections and maintenance of private storm systems.
- Utility Education efforts will focus on vehicle repair (i.e., Don't Drip and Drive).

Water Quality Challenges

Fecal Contamination

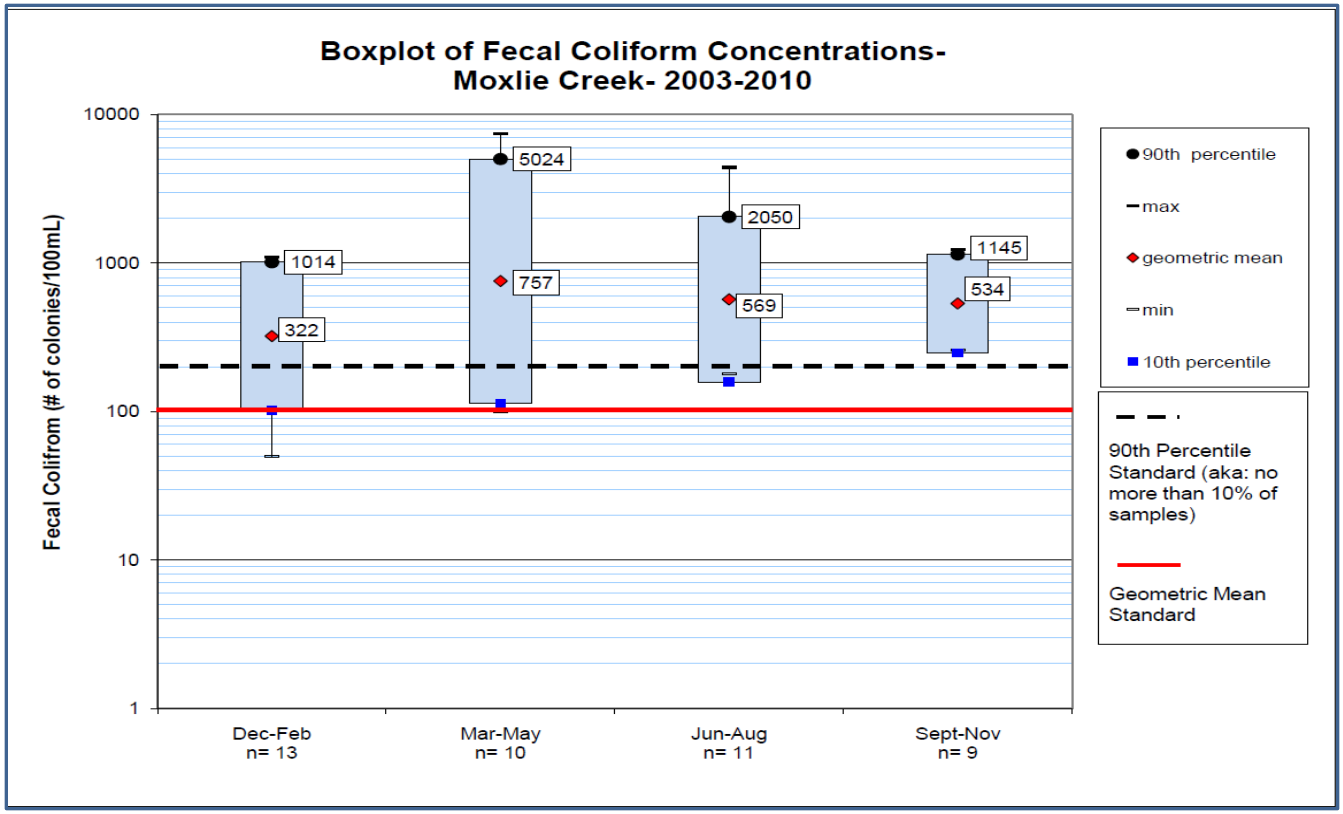
- Monitoring indicates chronic problems in several streams.

	Chambers		Ellis		Green Cove		Indian		Mission		Moxlie		Percival		Schneider		Woodard	
Water Year	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
1992-1993	Fail	Fail	Fail	Fail	Pass	Pass	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Pass	Fail	Pass	Pass
1995-1996	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Fail	Fail	Fail	Fail	Fail	Pass	Fail	Pass	Fail	Pass	Pass
1996-1997	Pass	Pass	Pass	Pass	Fail	Fail	Fail	Fail	Pass	Fail	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Pass
1997-1998	Pass	Pass	Pass	Fail	Pass	Pass	Fail	Fail	Fail	Fail	Fail	Fail	Pass	Pass	Pass	Pass	Pass	Fail
2002-2003	Pass	Fail	Pass	Fail	Pass	Pass	Fail	Fail	Fail	Fail	Fail	Fail	Pass	Pass	Pass	Fail	Pass	Pass
2003-2004	Pass	Fail	Pass	Fail	Pass	Pass	Fail	Fail	Fail	Fail	Fail	Fail	Pass	Pass	Pass	Fail	Pass	Pass
2004-2005	Pass	Fail	Pass	Fail	Pass	Pass	Fail	Fail	Fail	Fail	Fail	Fail	Pass	Pass	Pass	Pass	Fail	Fail
2006-2007	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Fail	Pass	Fail	Fail	Fail	Pass	Fail	Pass	Pass	Pass	Pass
2007-2008	Pass	Pass	NA	NA	Pass	Pass	NA	NA	NA	NA	NA	NA	Pass	Fail	NA	NA	Pass	Pass
2008-2009	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Fail	Pass	Fail	Fail	Fail	Pass	Pass	Pass	Pass	Pass	Pass
2009-2010	Pass	Pass	Pass	Pass	Fail	Fail	Fail	Fail	Pass	Fail	Fail	Fail	Pass	Pass	Pass	Pass	Pass	Pass
2010-2011	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Fail	Fail	Fail	Fail	Fail	Pass	Pass	Pass	Pass	Pass	Pass
2011-2012	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Fail	Fail	Fail	Fail	Pass	Pass	Pass	Pass	Pass	Pass
2012-2013	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Fail	Fail	Fail	Fail	Fail	Pass	Fail	Pass	Pass	Pass	Pass
2013-2014	Pass	Fail	NA	NA	Pass	Pass	Fail	Fail	NA	NA	Fail	Fail	Pass	Pass	NA	NA	Pass	Pass
2014-2015	Pass	Pass	NA	NA	Pass	Fail	Fail	Fail	NA	NA	Fail	Fail	Pass	Fail	NA	NA	Pass	Pass

Water Quality Challenges

Fecal Contamination

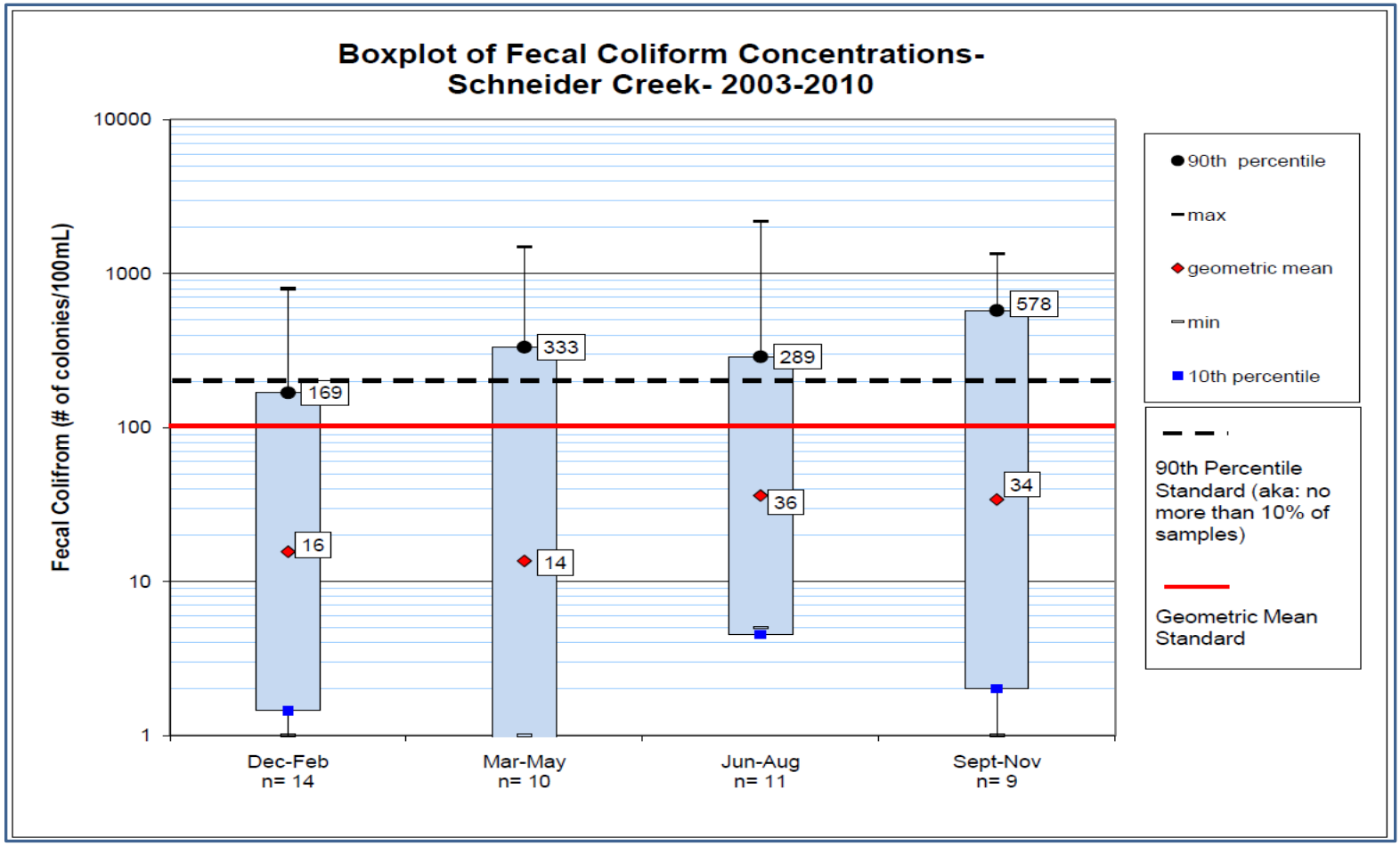
- Further analysis suggests the potential causes.



As a general rule:
When the Geomean (red diamond) is above the standard (red line) it is indicative of a chronic source. (i.e., failing on-site septic systems, and/or cross connections with the wastewater system.)
Moxlie, Mission and Schneider as indicated by their boxplots all fall into this category.

Water Quality Challenges

Fecal Contamination



When the 90th. percentile (black dot) is above the standard (black dashed line) it is indicative of contributions from stormwater and/or other infrequent sources.

Water Quality Challenges

Fecal Contamination – Outfall – Dry Weather Flow Analysis

- Outfalls that are flowing in late summer in the absence of rain indicates potential cross-connections with the wastewater system.
- Percival, Mission, Indian, Moxlie & Ellis creeks evaluated in 2010, 2011 and 2012.
- No dry weather flows were observed.
- Indicates no cross connections with waste water system.

Water Quality Challenges

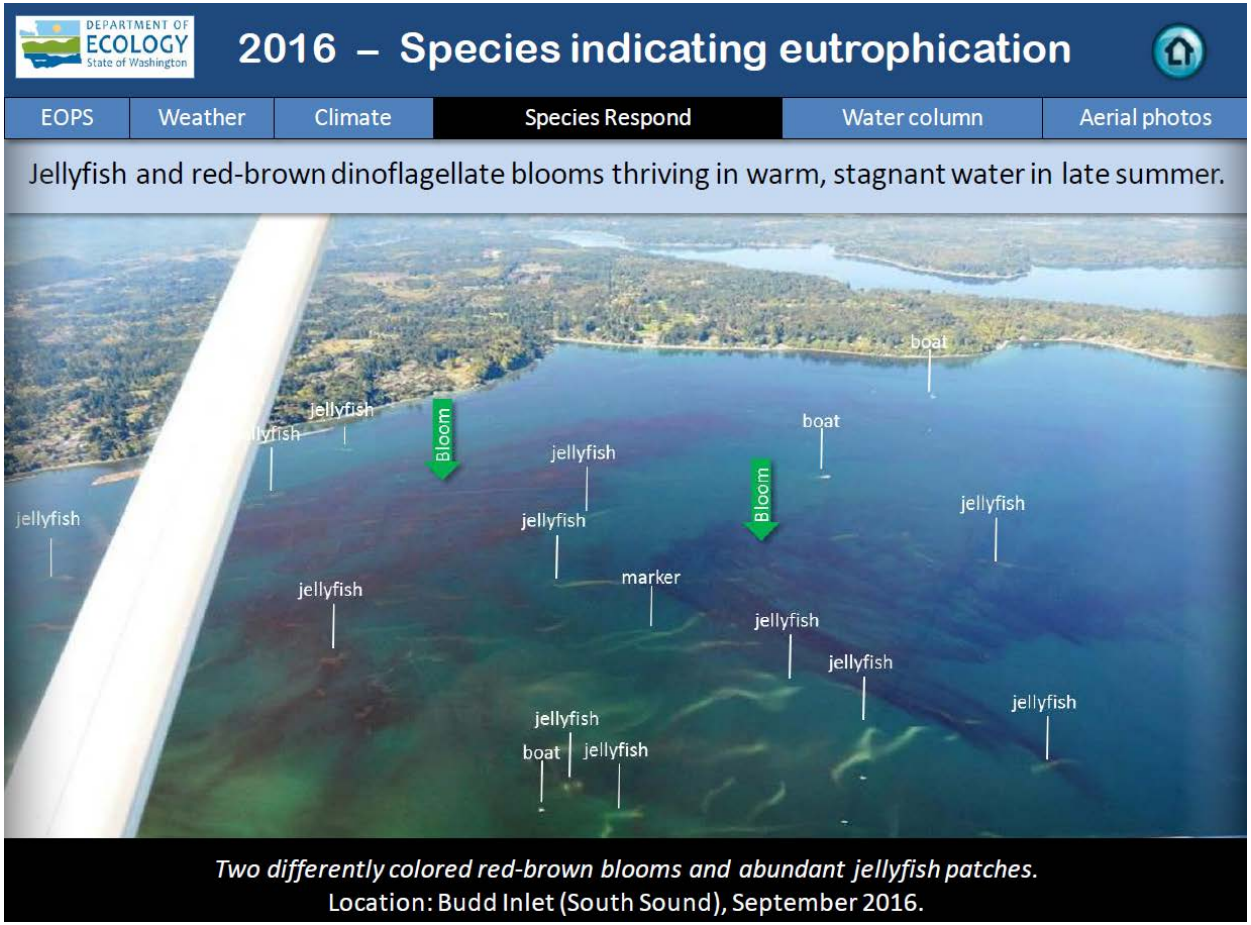
Fecal Contamination – Summary

- Chronic problems in Mission, Indian and Moxlie.
- Boxplot analysis indicates cross connection and/or failing on-site septic systems.
- Outfall Recon., indicates most likely not a cross connection.
- Suggests problems are associated with failing on-site septic systems.
- Utility will focus on partnering with Thurston County, and the Wastewater Utility to identify and fix failing on-site septic systems in the Mission, Indian and Moxlie basins.
- NPDES and TMDL's may require other programs (i.e., pet waste, etc.).

Water Quality Challenges

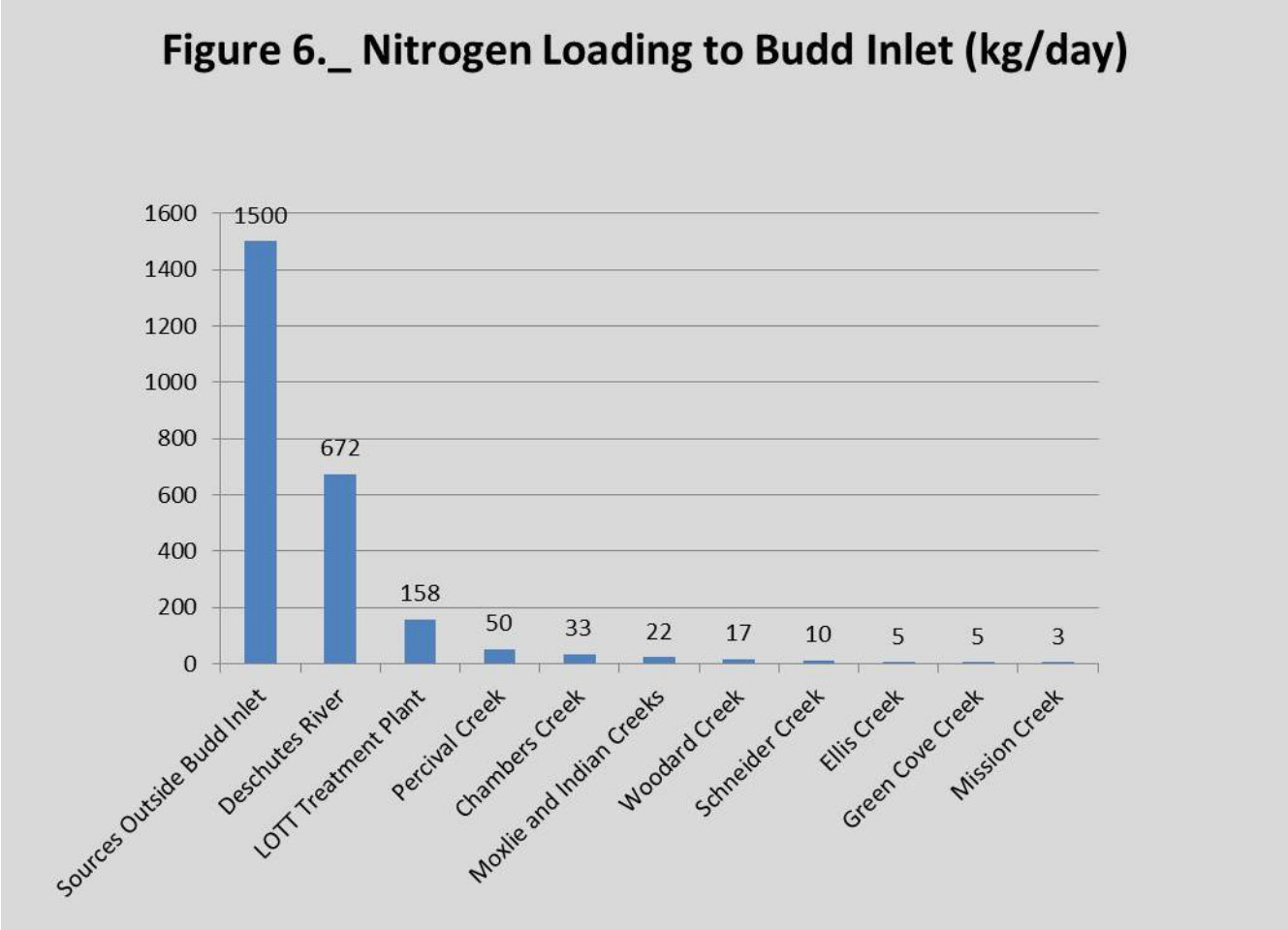
Nutrients / Temperature / Dissolved Oxygen

Why are they a problem for Water Quality?



Water Quality Challenges

Concentration vs. Load



Water Quality Challenges

Phosphorus – Limiting Nutrient for Freshwater Systems

- Soil Erosion can be a major contributor of Phosphorus in Streams.
- Fertilizers and Household detergents have been major sources of Phosphorus.
- State-wide regulations are in place to limit Phosphorus in these products.

Water Quality Challenges

Dissolved Oxygen - Exacerbated by:

- Excess nutrients
  - Nitrogen in Marine Environments
  - Phosphorus in Freshwater
- Warmer water temperatures
  - Colder water can hold more Oxygen

Water Quality Challenges

Nutrients /Temperature/Dissolved Oxygen – Summary

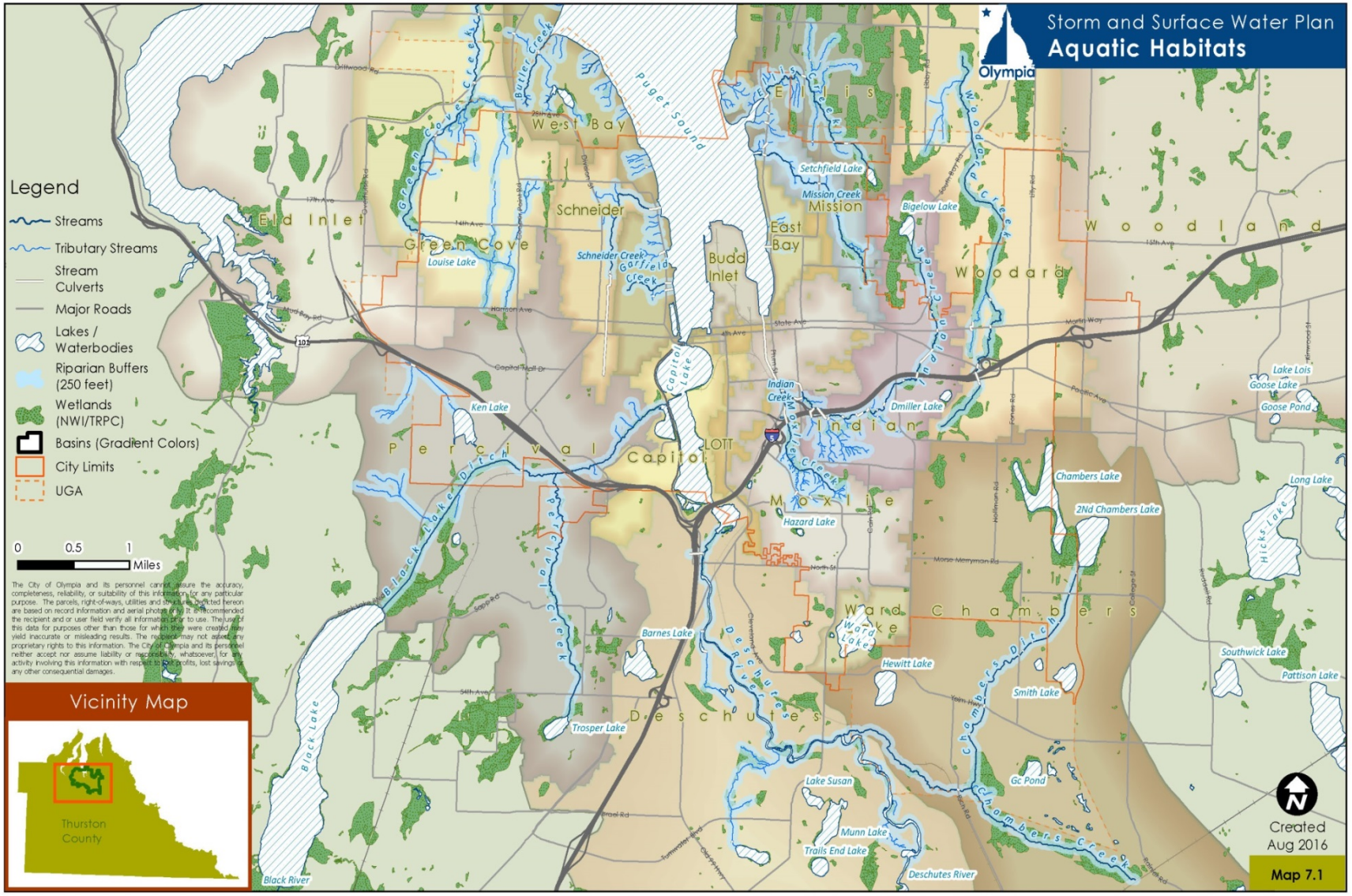
- Nitrogen is the nutrient of concern in Marine environments.
- Tributary streams in Olympia contribute Nitrogen loads, but minor compared to other sources.
- Phosphorus is the nutrient of concern for freshwater environments.
- Regulatory limits in detergents and fertilizers is expected to fix most problems.
- Continued enforcement of sediment and erosion control practices is warranted.
- All streams can benefit from greater shade to reduce stream temperature.
- Continue to ask for accountability from those parties responsible for nitrogen loads to Budd Inlet, as part of the Deschutes TMDL process.

Water Quality Challenges

Regulatory Oversight (303 d. List, NPDES, TMDL)

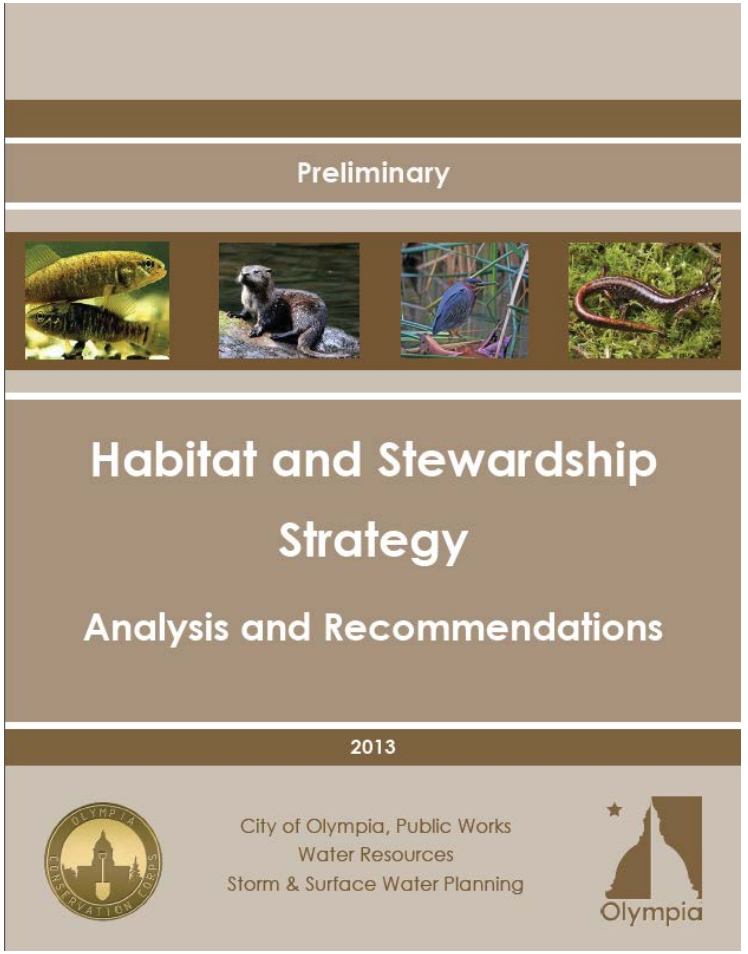
- TMDL (Total Maximum Daily Load) cleanup plans are driven by the 303 d. list.
- TMDL is a plan written by Ecology and submitted to EPA identifying how Ecology intends to clean up waters on the 303 d. List.
- The TMDL plan identifies needs and assigns numerical wasteload allocations.
- Numerical wasteload allocations are imposed only on those entities with permits.
- As such…Olympia will be required to develop and implement specific programs, etc. toward meeting our wasteload allocation. These requirements become part of our NPDES Municipal Stormwater Permit.
- Other's that are responsible may not be held accountable if Ecology doesn't have permit authority over them. For example:
  - Agriculture and forestry practices in the middle and upper basins of the Deschutes River
  - Waste-Water treatment from outside Budd Inlet (i.e., Chambers basinin Tacoma)
- NPDES Municipal Stormwater Permit – "one size fits all".

Aquatic Habitat



Aquatic Habitat Challenges

- Land Development Pressure
- Habitat Protection
- Habitat Quality
- Habitat Connectivity



Aquatic Habitat Challenges

- Land Development Pressure

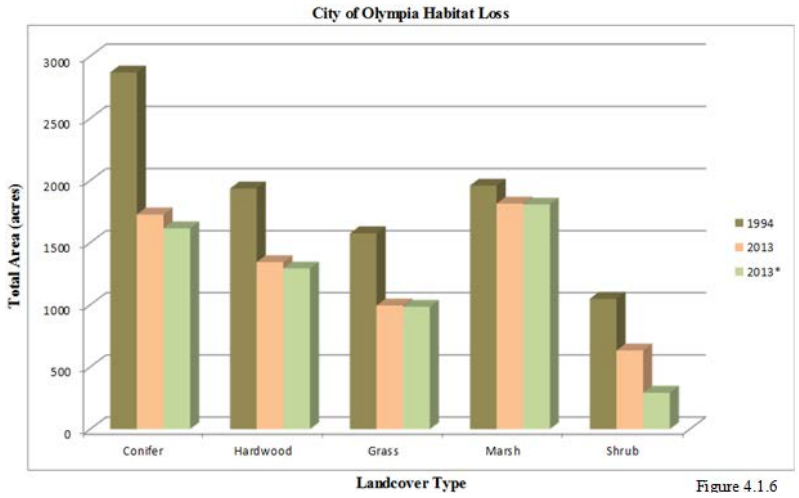


Figure 4.1.6

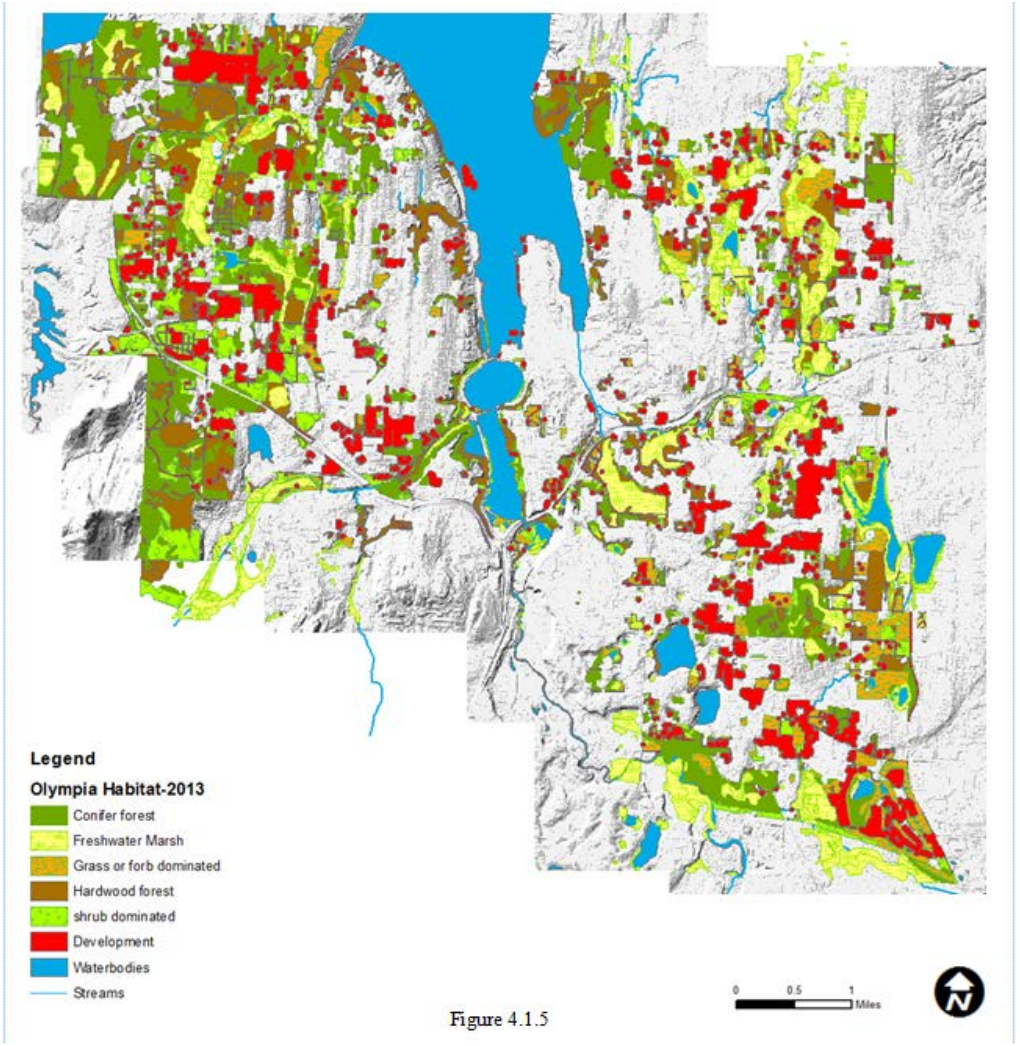


Figure 4.1.5

Aquatic Habitat Challenges

- Habitat Protection
  - Development will continue to impact habitat, however…
  - Critical Area Ordinance does provide protection for most aquatic habitat.
- Habitat Quality
  - Improve forest cover (esp. Stream Shade)
  - Lack of forest & understory diversity
  - Lack of Forest & Stream structure
  - Lack of coarse woody debris
  - Lack of snags
  - Invasive species
- Habitat Connectivity
  - Wildlife doesn't recognize property lines
  - Need programs for Public and Private Lands

Aquatic Habitat Opportunities

- All of our streams would benefit from full riparian shade (> 80%).
- Many species that depend upon aquatic habitats are also dependent on associated terrestrial environments. Work efforts and strategies need to extend to include these associated terrestrial habitats as well.
- Management of aquatic habitat requires a suite of programs that acknowledge the extent of these resources across a complex matrix of private and public ownership.
- The West Bay Habitat Restoration process identified opportunities for the City to engage in restoration of aquatic habitat in the West Bay of Budd Inlet.

Aquatic Habitat Opportunities

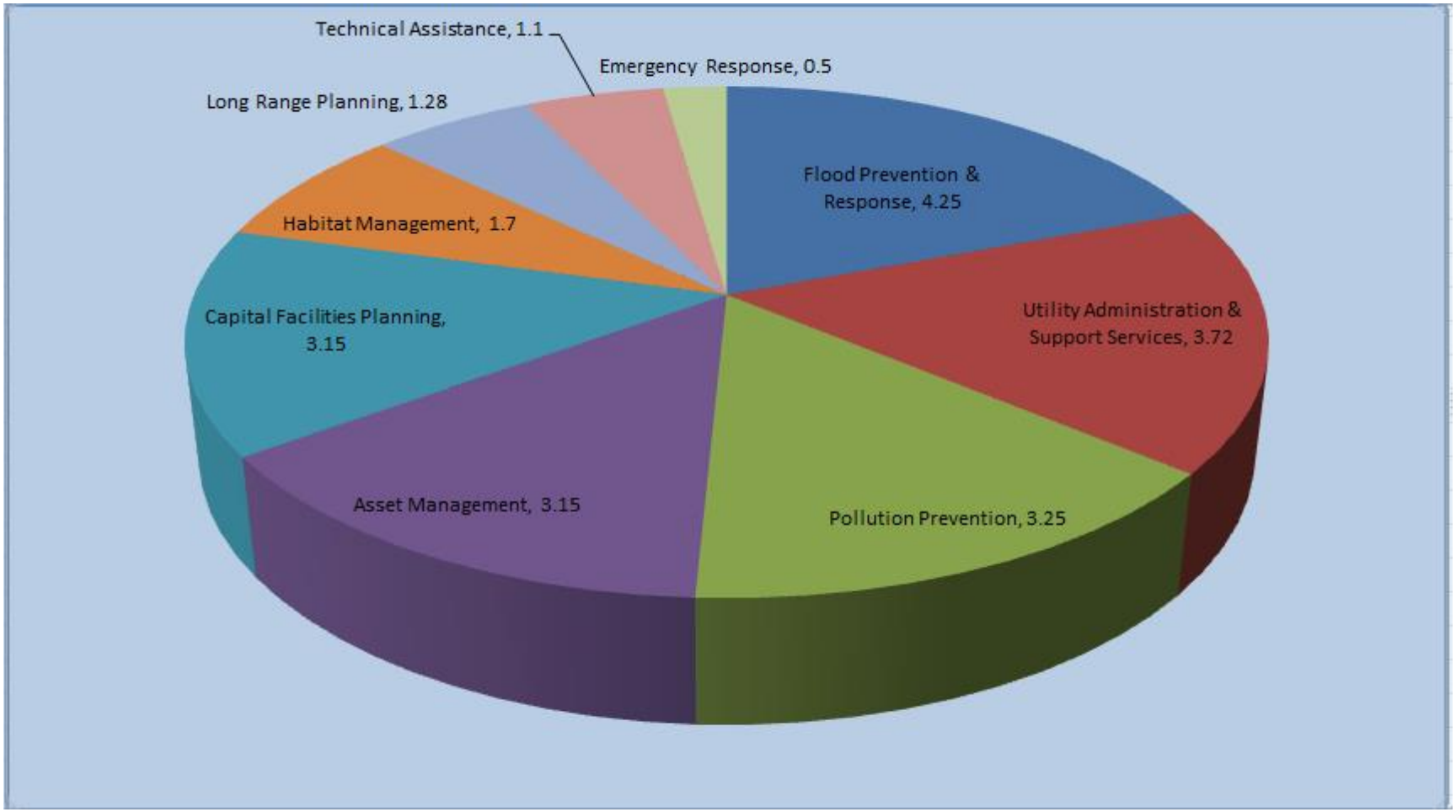
- Stormwater management and treatment is a key aspect of protecting, maintaining and improving aquatic habitat health in an urban environment.
- Aquatic habitats (streams, riparian corridors, shorelines and wetlands) serve as connectivity corridors for many species allowing movement, feeding, access to water and refuge areas within an urban landscape.
- Healthy, complex riparian areas protect water quality and provide key habitat features for many species. Riparian areas within the City would benefit from active management to remove invasive species and increase forest and stream complexity (structural, species diversity, and presence of large downed wood and snags).

How Are We Addressing Responsibilities?

Utility's 9 Core Services

1) Utility Administration and Support Services
2) Technical Review and Support
3) Asset Management
4) Capital Facility Program
5) Long Range Planning
6) Pollution Prevention
7) Habitat Management
8) Flood Prevention and Response
9) Emergency Response

Core Services



Next Steps

Finalizing our strategies

- Based on our analysis of data and key challenges
- City of Olympia Comprehensive Plan provides policy guidance
- Considering policy direction from UAC (May 2014)
- Considering input from survey and habitat stakeholder meeting

Creating our financial strategy

UAC review of strategies and financial strategy

Questions and Discussion

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