

working for clean rivers



# Portland Watershed Report Cards

Portland City Council  
April 22, 2015

**Happy Earth Day!**



ENVIRONMENTAL SERVICES  
CITY OF PORTLAND

NICK FISH, COMMISSIONER  
JAMES HAGERMAN, INTERIM DIRECTOR



**Portland is rich with urban rivers and streams.**



**They provide us with  
places to work and play.**

**They provide places for nature in the city.**



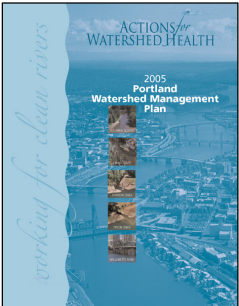


**Portland is committed to protecting and restoring watershed health.**



# Tools for improving watershed health

**2005**  
Portland Watershed  
Management Plan



**2009**  
Watershed  
Measures  
developed

**2013**  
Stormwater System  
planning started

**2015**  
Watershed  
Report Cards

**2008**  
Grey to Green  
begins

**2010**  
City-wide  
monitoring  
begins

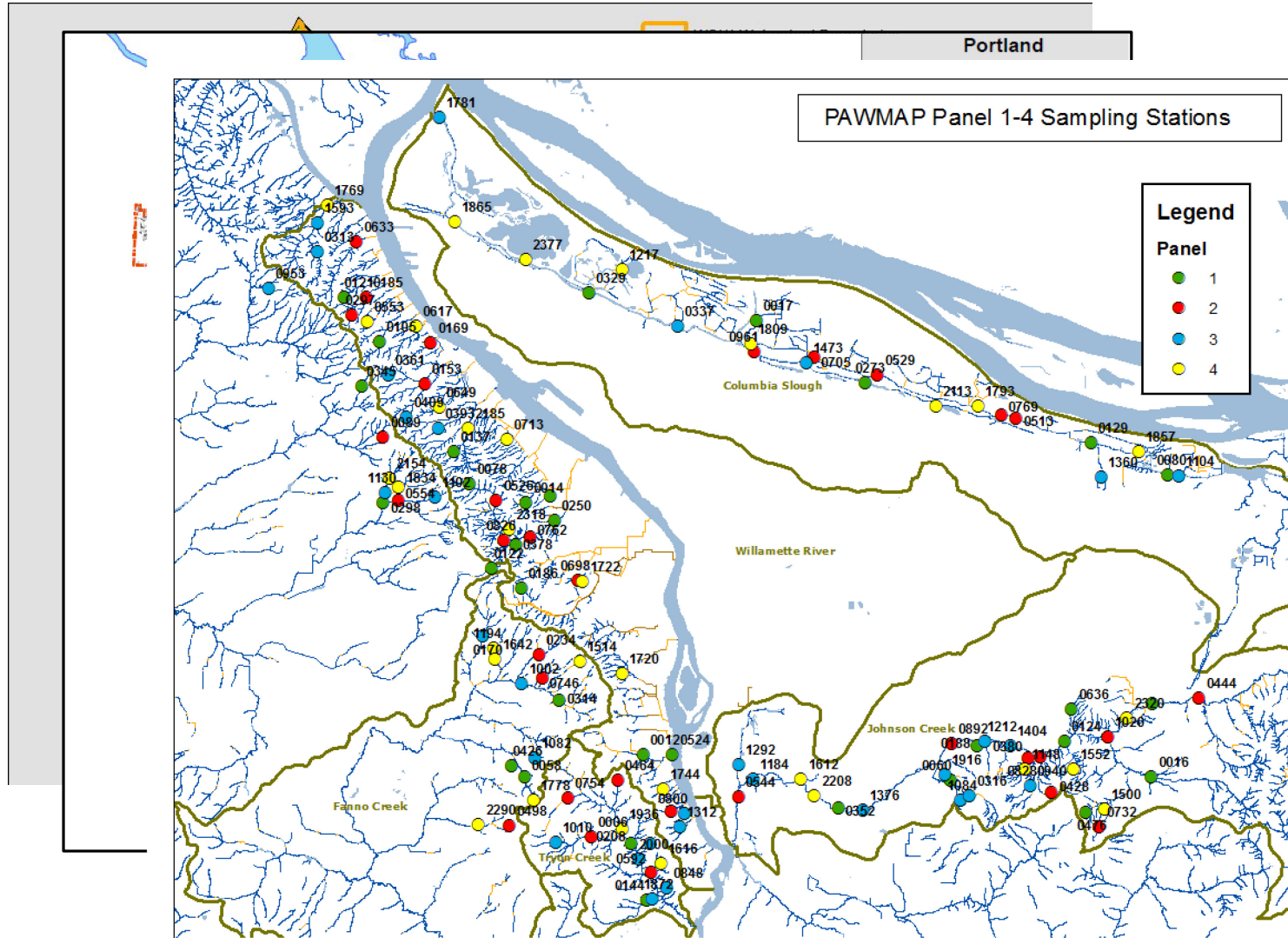
**2014**  
4 years  
of monitoring  
data = baseline

**2018**  
8 years of  
monitoring  
data =  
trend  
analysis

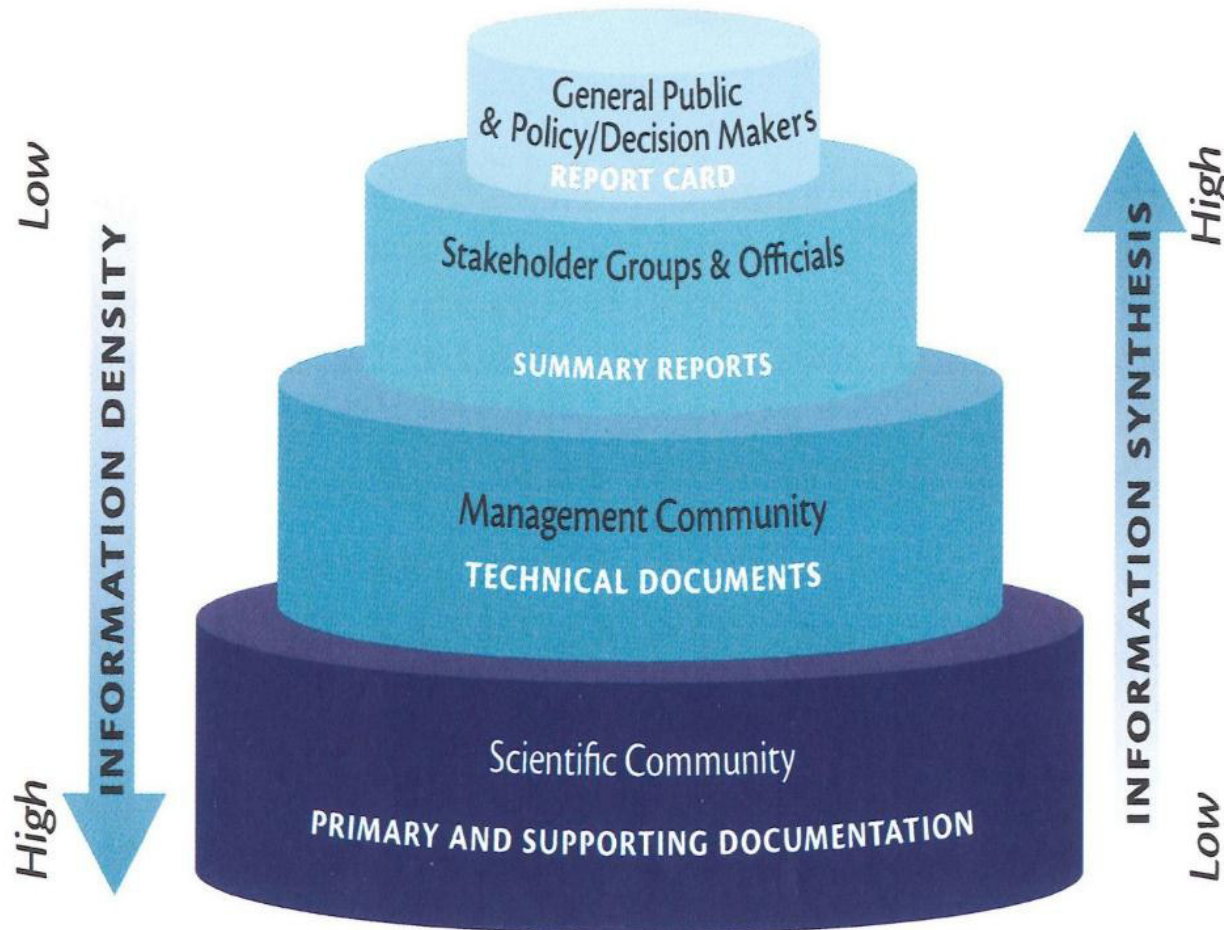
## GREY to GREEN



# We collect data



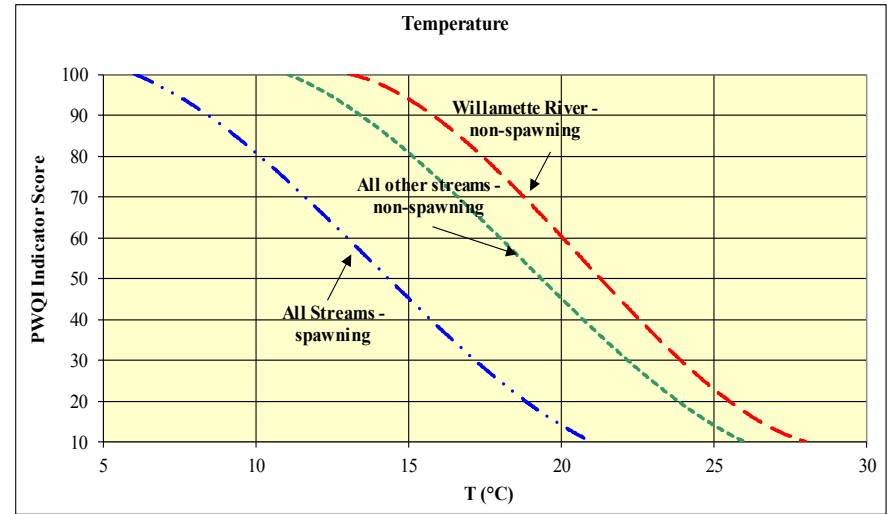
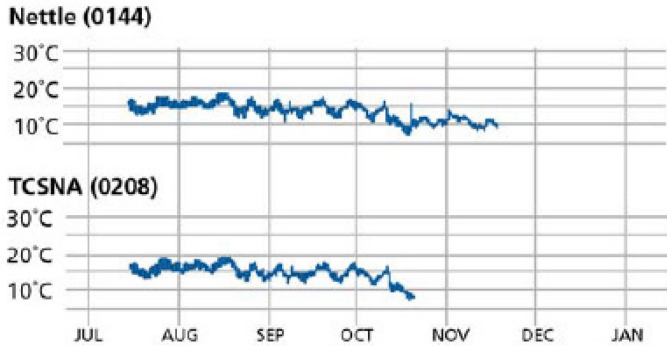
# Why we need to synthesize data





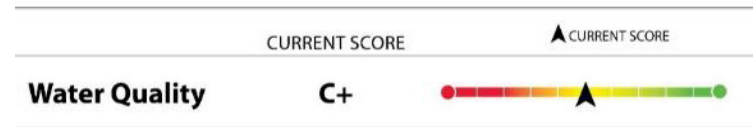
# Data analysis and translation to letter grade

Time series plot of monitoring temperature data



**WSHI Letter Grade Scale**

		RANGE		
Very good	A+	8.50	10.00	Properly functioning conditions
	A	8.00	<8.50	
	A-	7.50	<8.00	
Fair	B	6.00	<0.00	*benchmark for regulated water quality indicators
	B-	5.50	<6.00	
	C+	5.00	<5.50	
	C	4.50	<5.00	
	C-	4.00	<4.50	
	D+	3.50	<4.00	
Very poor	D	>3.00	<3.50	Not properly functioning conditions
	D-	2.50	3.00	
	F	0.00	<2.50	



**Watershed Report Cards**



# Portland Watershed Report Cards will allow the City to:

- Give Portlanders a bigger picture of Portland's environmental health
- Help frame policy and budget questions
- Highlight good news and persistent problems
- Connect projects and programs to environmental outcomes
- Communicate better with the community about our work
- Inspire people to stay involved and encourage them to take action

Johnson Creek		
<b>Hydrology</b>	<b>7.33</b>	<b>B+</b>
Effective Impervious Area	7.53	A-
Stream Connectivity	7.13	B+
<b>Water Quality</b>	<b>5.05</b>	<b>C+</b>
Dissolved Copper	6.90	B
Dissolved Oxygen	8.33	A
E. coli	3.96	D+
Total Mercury	1.40	F
Ammonia-Nitrogen	9.77	A+
Total Phosphorus	6.30	B
Total Suspended Solids	1.93	F
Temperature	1.85	F
<b>Habitat</b>	<b>4.80</b>	<b>C</b>
Tree Canopy	6.90	B
Floodplain Condition	6.00	B
Bank Condition (Hardening)	1.80	F
Stream Accessibility	4.08	C-
Riparian Integrity	5.60	B-
Large Wood	2.60	D-
Substrate Composition	6.60	B
<b>Biological Communities</b>	<b>3.65</b>	<b>D+</b>
Fish	2.49	F
Macroinvertebrates	4.30	C-
Avian	4.17	C-



# Johnson Creek

Maintaining healthy onsite surface drainage (Hydrology) in Johnson Creek. A community-wide solution.

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Fish	2.49	F
Macroinvertebrates	4.30	C-
Avian	4.17	C-



# Johnson Creek

Maintaining healthy onsite surface drainage (Hydrology)  
in Johnson Creek. A community-wide solution.



BES Community Watershed Grant, St. Mary Ethiopian Orthodox Church,  
Depave, and the Johnson Creek Watershed Council



# Enhancing, educating, and strengthening the community



# Mason Flats: Managing stormwater and improving habitat in the Columbia Slough

Columbia Slough		
<b>Hydrology</b>	<b>5.82</b>	<b>B-</b>
Effective Impervious Area	4.95	C
Stream Connectivity	6.69	B
<b>Water Quality</b>	<b>5.74</b>	<b>B-</b>
Dissolved Copper	7.00	B+
Dissolved Oxygen	5.88	B-
E. coli	7.62	A-
Total Mercury	4.00	C-
Ammonia-Nitrogen	9.14	A+
Total Phosphorus	5.88	B-
Total Suspended Solids	5.03	C+
Temperature	1.38	F
<b>Habitat</b>	<b>2.62</b>	<b>D-</b>
Tree Canopy	2.90	D-
Floodplain Condition	6.70	B
Bank Condition (Hardening)	0.00	F
Stream Accessibility	1.53	F
Riparian Integrity	2.60	D-
Large Wood	2.00	F
<b>Biological Communities</b>	<b>2.42</b>	<b>F</b>
Fish	0.91	F
Macroinvertebrates	N/A	
Avian	3.93	D+



# Improved Hydrology, Water Quality, and Habitat



- Restored wetlands and channels capture stormwater runoff from 600 acres of streets, residential and commercial area in NE Portland
- Reduces pollutants, provides more clean, cold water to the Slough
- Removed invasives, enhanced native trees and plants
- Provides 25 acres of habitat for native fish and wildlife (like turtles, migratory birds, pollinators)



# Index/Report Cards: Things to Remember

- It's a conversation starter
  - One tool in the toolbox: like GDP (not perfect!)
  - Not the level of detail we use internally for project decisions
- Not just about BES:
  - Some things we can impact
  - Other bureaus
  - Other jurisdictions upstream
  - Community-based action
- Not about quick changes (150 years...)

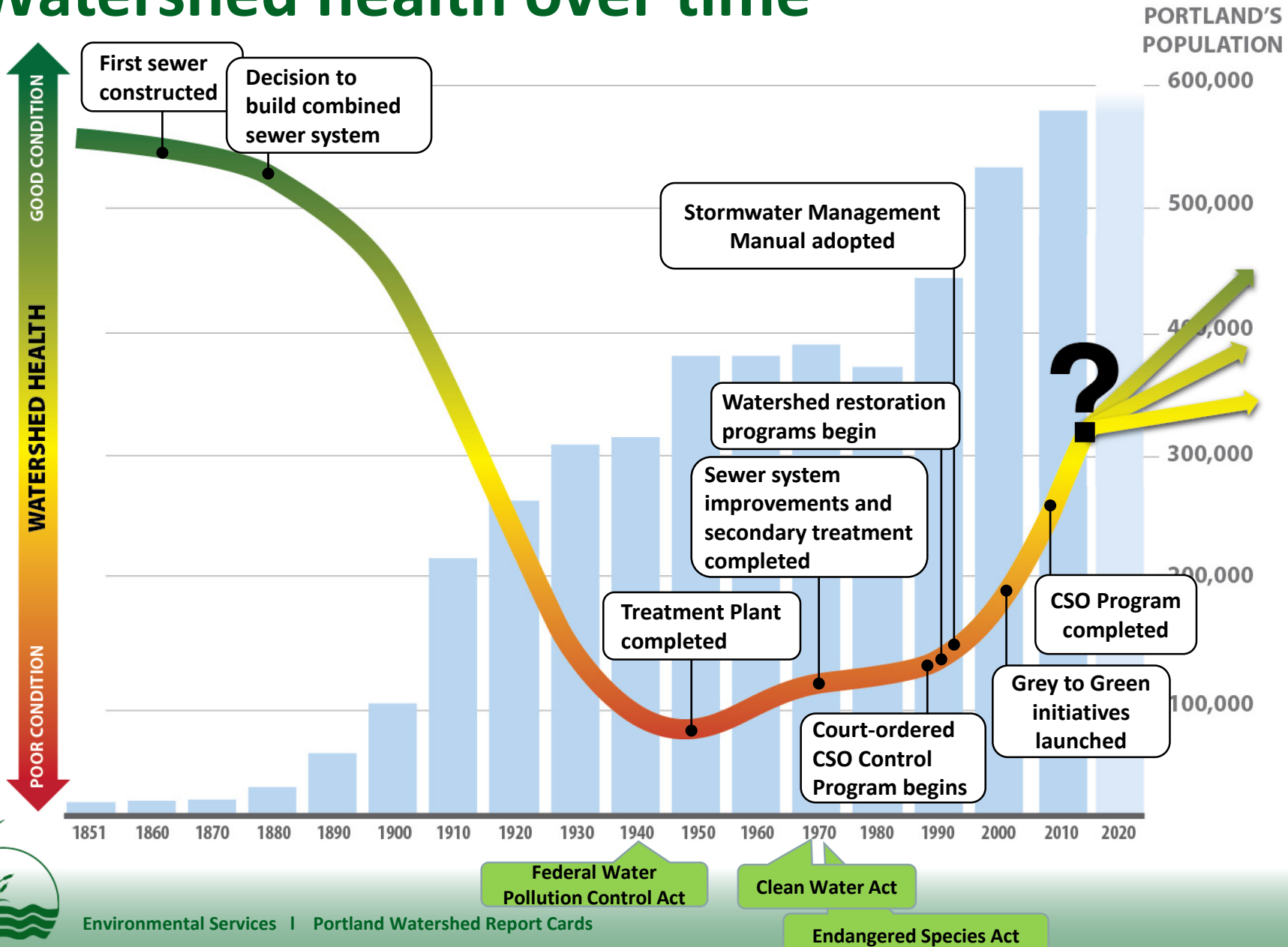




# Working with other Portland Bureaus



# Watershed health over time



# Coming Soon on the Web

The screenshot displays the City of Portland's website for Environmental Services. The header includes the city logo, navigation links for 'City Home', 'Government', and 'Bureaus & Offices of the City of Portland', and a search bar. The main navigation bar features 'What We Do', 'Customer Services', 'Programs', 'Library', and 'Employees'. The breadcrumb trail shows 'What We Do > Watershed Services > Portland Watershed Report Cards'. The page title is 'Portland Watershed Report Cards'. A sidebar on the left lists 'About Watershed Report Cards', 'Fish and Wildlife', 'Habitat', 'Hydrology', and 'Water Quality'. The main content area features a circular graphic divided into four segments: 'WATER QUALITY' (top, blue), 'HYDROLOGY' (left, orange), 'HABITAT' (right, green), and 'FISH AND WILDLIFE' (bottom, brown). Each segment contains a photograph: water quality testing, a waterfall, a beaver dam, and salmon in a stream. A central text block reads: 'Healthy rivers, streams, forests and wetlands help keep our homes and neighborhoods safe and livable. They help prevent flooding and protect the city's infrastructure. And, they provide a place for salmon and other wildlife to live and thrive in our city.'



# Coming soon on the Web

Portlanders all live in an urban watershed.

A watershed is an area of land where all rainfall drains into the same waterway. Portland is part of the Willamette River and Columbia Rivers watersheds. All Portlanders also live in the watershed of a smaller local stream or waterway. When rain falls onto our yards, rooftops, parking lots and streets, it runs into gutters, storm drains and pipes, and drains into streams, sloughs and the rivers.



Our urban watersheds provide many benefits, and face many challenges.

**A healthy urban watershed will...**

- Help create livable and sustainable neighborhoods
- Have places for people to access and enjoy nature
- Protect our infrastructure
- Have clean water
- Provide habitat
- Have naturally flowing streams

Benefits of a healthy urban watershed

**37**  
INCHES

Portland gets an average of 37 inches of rain each year.

**300** MILES


Portland has about 300 miles of rivers and streams within the city—enough to stretch from Portland to the California border!


**PORTLAND HAS**  
**WATERSHEDS 5**

Explore your watershed>>

## Willamette Tributaries Report Card

This is a summary of conditions in the Willamette Tributaries Watershed based on 2015 data from the Watershed Health Index. The scores are a snapshot of conditions across the entire watershed. Conditions can vary in smaller parts of the watershed.





**Learn more about what's behind the watershed scores.**


**HYDROLOGY**  
**D**

This watershed has a lot of streets and other hard surfaces that create stormwater runoff instead of letting rain soak into the ground. In many areas, stormwater washes pollutants from streets into pipes that drain directly to streams. Fast-moving runoff can erode stream beds and banks. Many of the streams that once flowed freely in the watershed today flow through underground pipes. The city is planning projects such as green street planters and neighborhood stormwater wetlands that will capture runoff and allow it to soak into the ground as soil and plants filter pollutants. [Better stormwater management](#) will improve these hydrology scores.

<b>Willamette Tributaries Hydrology Average Score</b>		<b>3.5</b>
Effective impervious area		3.8
Stream connectivity		3.2




# Coming Soon on the Web




**HYDROLOGY**  
D

The watershed has a poor score for effective impervious area because green streets and other surface facilities are not managing much of the **stormwater runoff** from areas in the southwest and northwest hills before it flows through pipes and discharges into streams. This doesn't allow stormwater to soak into the ground or for soil and plants to slow the flow and filter pollutants, which can have adverse impacts on streams. The city is planning projects to **improve stormwater management** in priority areas, such as the **Stephens Creek sub-watershed**, which will improve hydrology and water quality with the addition of green streets and neighborhood stormwater facilities.

The score for **stream connectivity** is also poor. Although many miles of surface streams flow freely through natural areas like Forest Park, many **historic streams like Tanner Creek** are in pipes under downtown and northwest neighborhoods. The overall percentage of streams that are channeled into pipes (24.3%) in this area is quite a bit higher than in other Portland watersheds.

Willamette Tributaries Hydrology Average Score			
F	A	A+	10
			
?	Effective impervious area		3.8
?	Stream connectivity		3.2





**WATER QUALITY**  
B

Most water quality indicators score fairly well. Actions Portland is taking to protect and improve streams, wetlands and forests in places like **Forest Park** and the **Riverview Natural Area** will help maintain clean water sources and improve water quality.

New **stormwater facilities** to treat runoff from roads and parking lots will also help protect and improve water quality, especially for total suspended solids and metals. Planned projects will integrate sewer improvements with vegetated stormwater facilities like green streets and rain gardens, similar to a past project at **SW Texas Street** and the public-private partnerships in the **Tabors to the River** program.

Mercury most likely has global atmospheric and local sources. More research is underway in Portland to understand the contribution of different sources and what we can do to reduce the input to our streams. Mercury is an issue for human health through fish consumption, so is a concern in waterways where people fish for food.


Willamette Tributaries Water Quality Average Score			
F	A	A+	10
			
?	Ammonia-nitrogen		9.9
?	Dissolved copper		5.6
?	Dissolved oxygen		8.7
?	E. coli		6.1
?	Temperature		5.6
?	Total mercury		1.7
?	Total phosphorus		6.6




**FISH & WILDLIFE**  
C-

Streams in Forest Park and other areas have populations of **resident fish**, like cutthroat trout. However, the watershed's fish score is very poor, largely related to the stream accessibility issue discussed above. High **tree canopy** and **protected natural areas** support fair scores for birds and macroinvertebrates (aquatic insects) in this watershed. More than **104 species of birds** have been identified in Forest Park, and its relatively healthy streams and riparian areas support the park's communities of insects, amphibians and other wildlife that contribute to our region's ecosystem.

The city's continued efforts to protect and improve **habitat buffers and connections** between Forest Park and other natural resource areas on the west side, as well as improvements in stormwater management, will help support incremental improvements in these fish and wildlife scores.

Willamette Tributaries Fish and Wildlife Average Score			
F	A	A+	10
			
?	Birds		5.4
?	Fish		1.3
?	Macroinvertebrates		5.9

For more information about what we measure and where these scores come from, visit the [About Watershed Report Cards](#) page.




**HABITAT**  
B

Scores for tree canopy, bank condition and riparian integrity are very good in many parts of the Willamette Tributaries watershed, leading to a relatively high average habitat score. These scores are good because of **large protected natural areas** and **forested neighborhoods** throughout southwest and northwest Portland. But habitat conditions are not the same across the whole area. Some sub-watersheds or neighborhoods have substandard conditions, making **riparian restoration** and ongoing efforts to **protect existing forests, wetlands and streams** very important.

**Invasive plants** are a significant threat to the existing tree canopy in this area and other Portland watersheds. Natural areas infested with invasive ivy, for example, are at risk of having the "last generation" of tree canopy. Efforts to manage invasive plants, such as **Protect the Best and Early Detection Rapid Response** are important to sustain and improve habitat functions.

Stream accessibility is the one very poor habitat score (related to the poor stream connectivity score above). This is due to the large number of **pipeds streams and culverts** that block fish passage. For example, long sections of pipes and culverts under Highway 30 block fish access between the Willamette River and Forest Park's relatively healthy streams.

Willamette Tributaries Habitat Average Score			
F	A	A+	10
			
?	Bank condition (Hardening)		10
?	Floodplain condition	Not applicable	
?	Large wood		4.8
?	Riparian integrity		8.1



**Web pages will go  
live on May 1, 2015.**

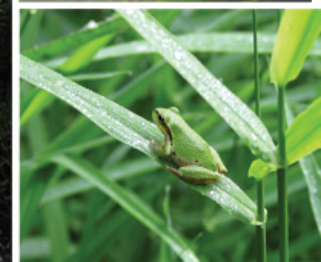


# Questions?

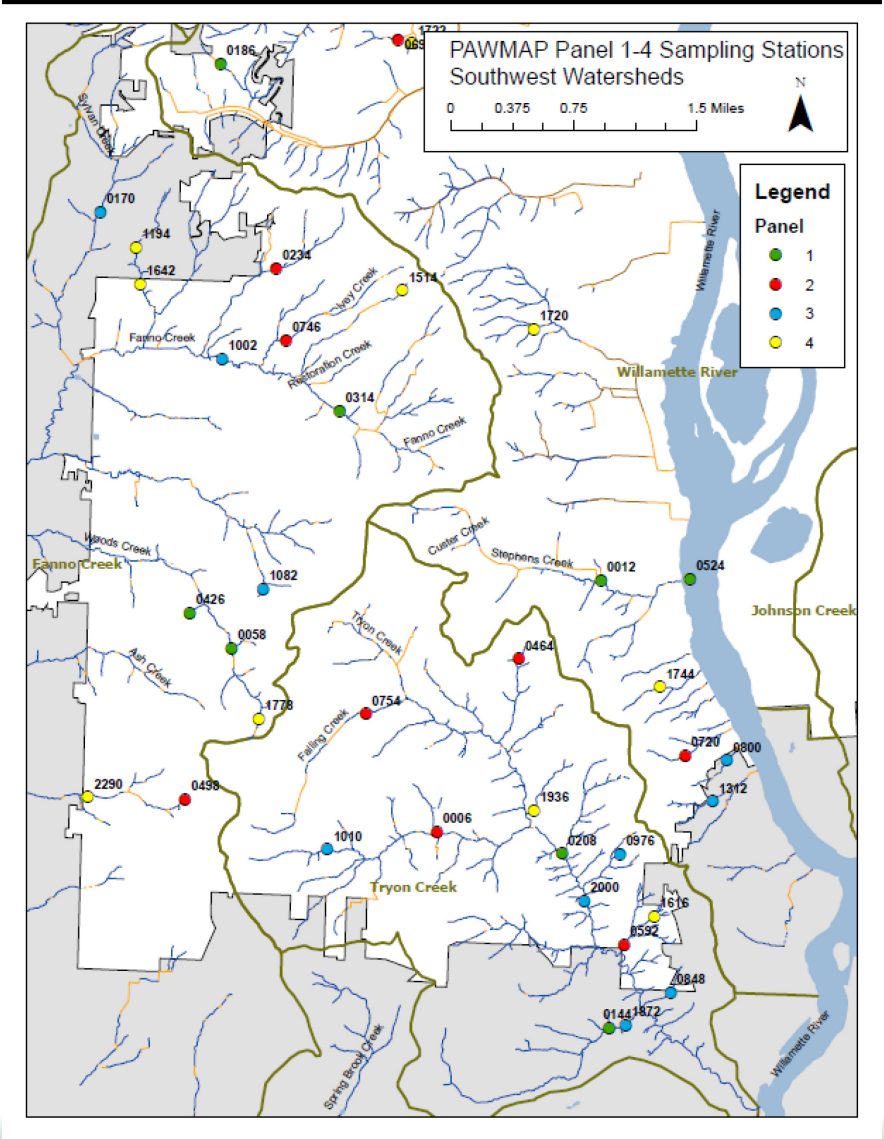


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# Sampling locations in SW subwatersheds



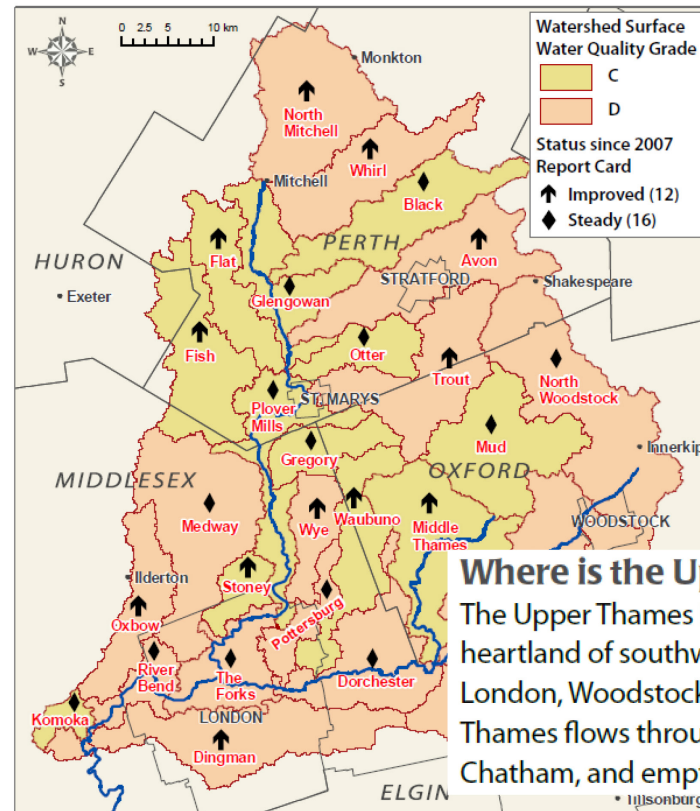




# Surface Water Quality

Surface water quality is graded using three indicators:

- total phosphorus (reflects nutrient sources such as fertilizer)
- *E. coli* bacteria (measure of pollution from human or animal waste)
- benthic invertebrates (measure of bugs living in stream sediments that indicate pollution levels and stream health)



## Where is the Upper Thames River Watershed?

The Upper Thames River watershed is located in the agricultural heartland of southwestern Ontario. Major urban centres include London, Woodstock and Stratford. Downstream of London, the Thames flows through the Lower Thames Valley watershed, past Chatham, and empties into Lake St. Clair.

Data sources (2006-2010): Ministry of the Environment, City of London, Health Units, UTRCA.

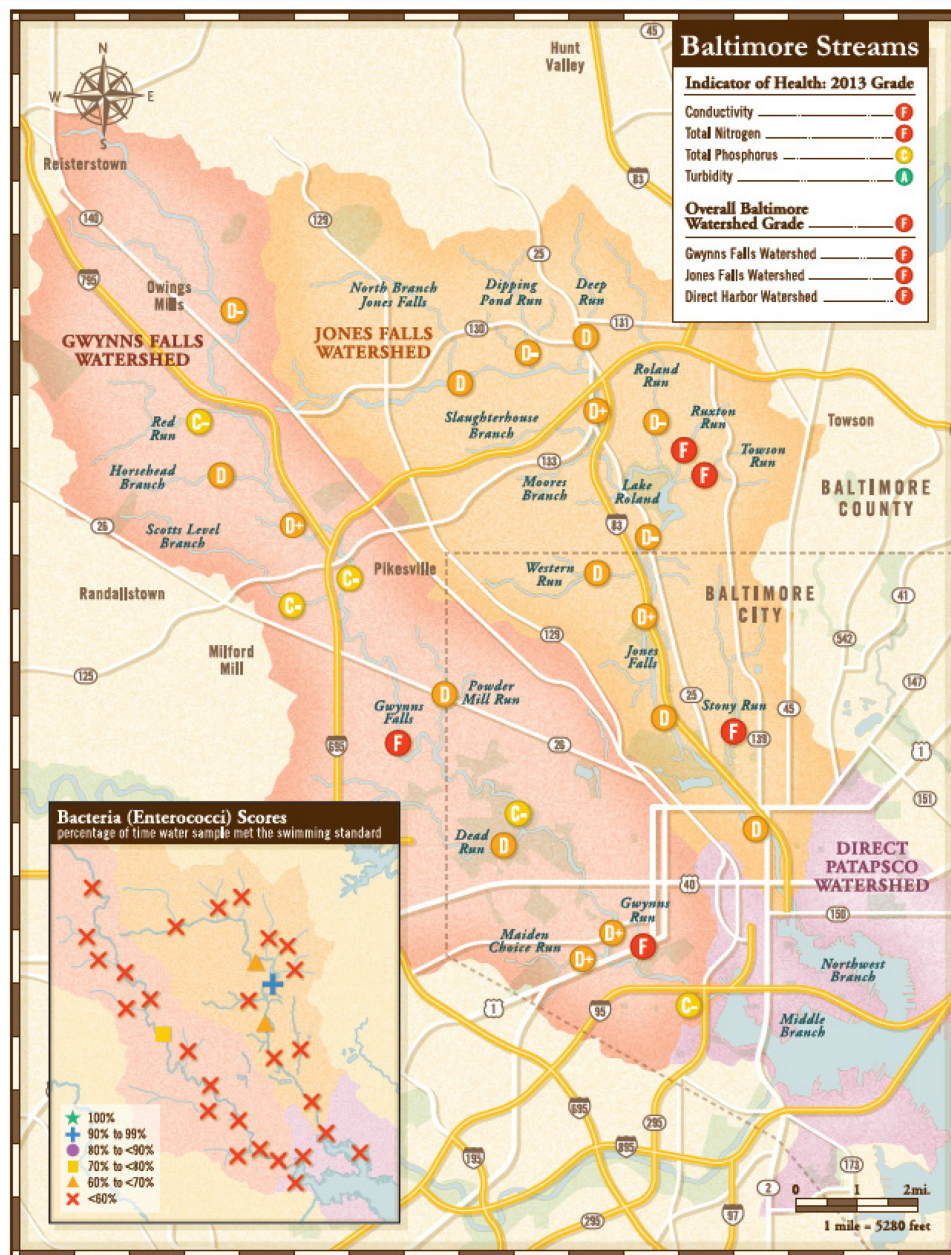


Baltimore's Annual  
**Healthy Harbor**  
**Report Card** 2013



Kayakers brave the trash-strewn Gwynns Falls stream in Baltimore City.





## 2014 ANACOSTIA RIVER REPORT CARD

	SCORE(%)*1	GRADE*2	TREND*3
WATER QUALITY INDICATORS			
Dissolved Oxygen	48	F	Improving
Fecal Bacteria	69	D+	Improving
Water Clarity	43	F	Static
Chlorophyll	61	D-	Improving
Submerged Aquatic Vegetation	0	F	Static
Stormwater Runoff Volume	49	F	Degrading
Toxics	14	F	Static
Trash	41	F	Improving
Overall Effort and Commitment		C-	Improving
<b>Grade for Entire Anacostia</b>	<b>40</b>	<b>F</b>	<b>Needs Improvement</b>

**COMMENTS:** *Despite its critical condition today, the Anacostia River can be made fishable and swimmable by 2025!*



# Watershed Health Index Measures

## Physical Habitat

- Flood Plain Condition (% vegetation cover)
- Bank Condition (% of banks hardened)
- Tree Canopy (% canopy cover)
- Shallow Water Refugia (% of channel < 20 ft.)
- Stream Accessibility (% of streams accessible)
- Riparian Integrity (% canopy)
- Large Wood (m<sup>3</sup>/100m)
- Substrate Composition (% fines and % gravel in riffles)

## Hydrology

- Effective Impervious Area (EIA)
- Stream Connectivity (% of stream piped)

## Water Quality

- Temperature
- Dissolved Oxygen
- TSS
- Dissolved and Total Metals (Cu, Hg, Pb, Zn)
- E.Coli
- Ammonia-N
- Total Phosphorus

## Biological Communities

- Benthic Macroinvertebrates
- Fish
- Birds

Blue = from PAWMAP monitoring  
Black = from other data sources

