



**Green River System-Wide
Improvement Framework
Current Conditions Symposium
April 16, 2014**



**10:40AM – 11:20AM
Current Conditions Report Overview
Community and Economy
Vegetation and Habitat**



OUTCOMES

Symposium attendees will learn about:

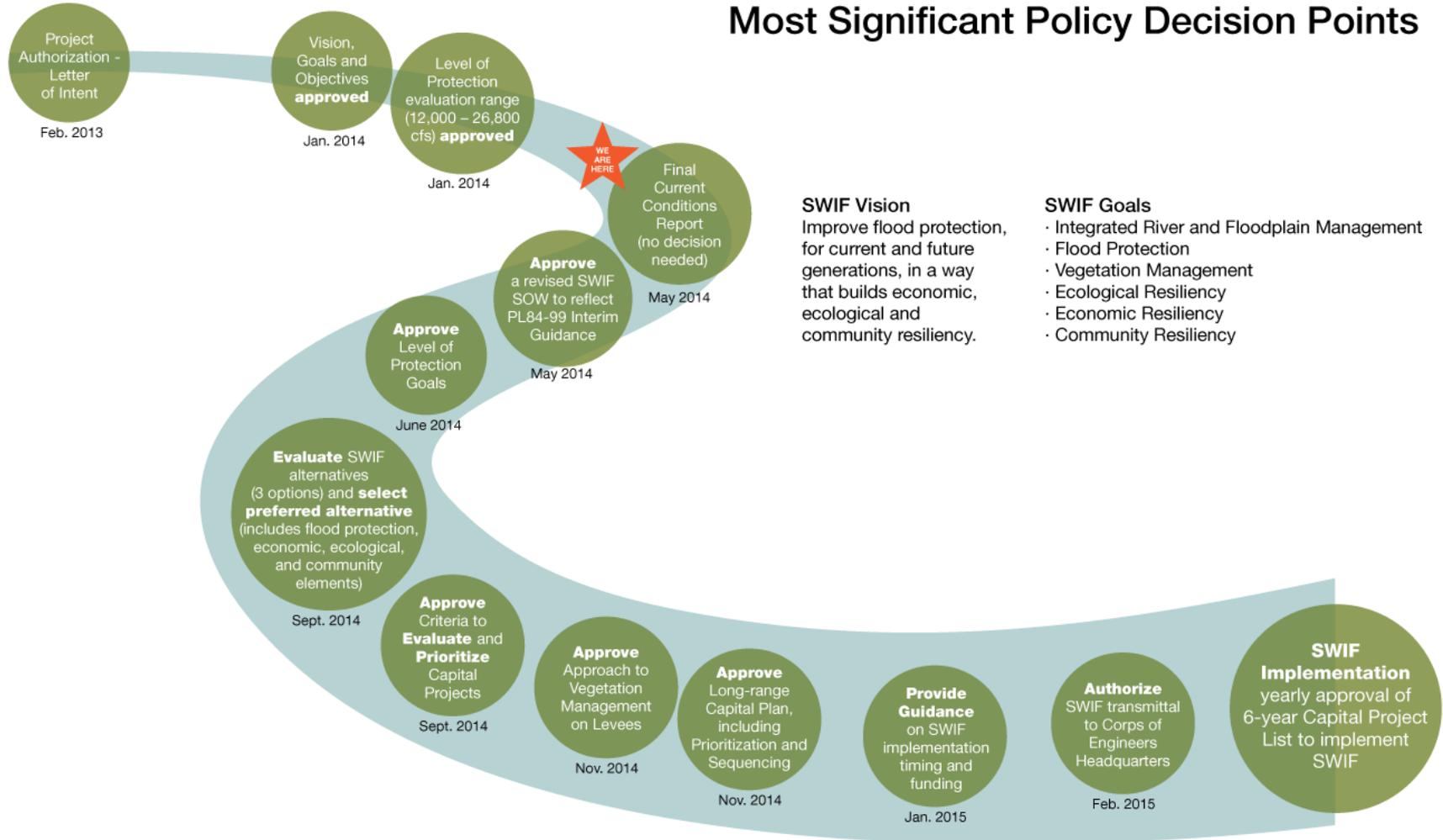
- Key findings from the Green River SWIF Current Conditions Report
- How these findings and products will inform the SWIF
- Timeline and process for report completion
- Effects of the PL84-99 Interim Guidance to the Green River SWIF



Green River SWIF: Timeline and Decisions

Green River System-Wide Improvement Framework (SWIF)

Most Significant Policy Decision Points



Green River SWIF Current Conditions Report

Focal Geography: RM 5.5 to RM 32

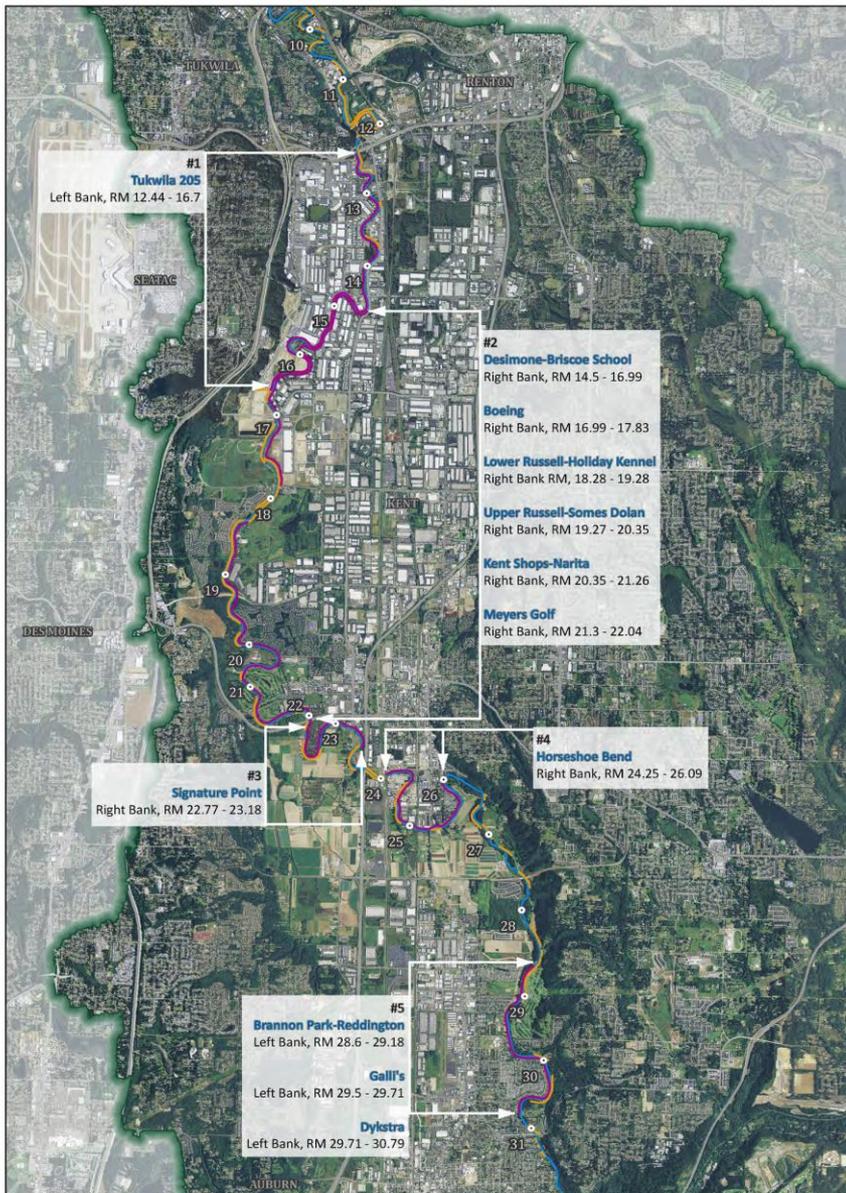


Figure X.X (DRAFT)

Green River SWIF

Green River

Flood Protection

Infrastructure



-  USACE-SWIF Levee Systems
 -  Levees and Revetments (Non-SWIF)
 -  Green River
 -  Watershed Boundary
 -  River Miles
- Data Sources: King County-2014, USDA - 2014

PL84-99 Interim Guidance

- In March 2014, USACE released its Interim Guidance for PL84-99 eligibility
- Revised policy promotes broader, comprehensive approaches to flood risk management
- Vegetation is no longer a PL84-99 program eligibility criterion

Effects to Green River SWIF:

1. King County will continue the Green River SWIF
2. Maintain February 2015 completion timeline
3. Evaluate SWIF scope of work with respect to revised PL84-99 eligibility criteria – consult with USACE
4. Approve a revised Green River SWIF scope of work by May 2014



Green River SWIF Current Conditions Report

Current Conditions Report:

- Background and overview
- Geographic scope
- SWIF vision and goals
- Current conditions (narrative, maps, figures, and charts)
 - Human dimensions: community resources, land uses, legal mandates and jurisdictional authorities
 - Vegetation and habitat resources
 - Flood risk assessment

Five technical memoranda (included as appendices):

1. Aquatic, Floodplain and Riparian Vegetation and Habitat Assessment
2. Geomorphology Assessment
3. Geotechnical Assessment
4. Hydraulic Assessment
5. Economic Analysis

Authors: consultant team and King County staff



Community, Economy and Land Use

Human dimensions information and geo-data compiled into support SWIF products and analyses:

- Cities and jurisdictions
- Current land use and zoning
- Census block level data
- Assessors data
- Transportation corridors
- Publicly owned lands (parks, trails, open spaces)
- Regional and local economic drivers
- Recreation – parks/trails
- Agricultural production district (King County) and crop types

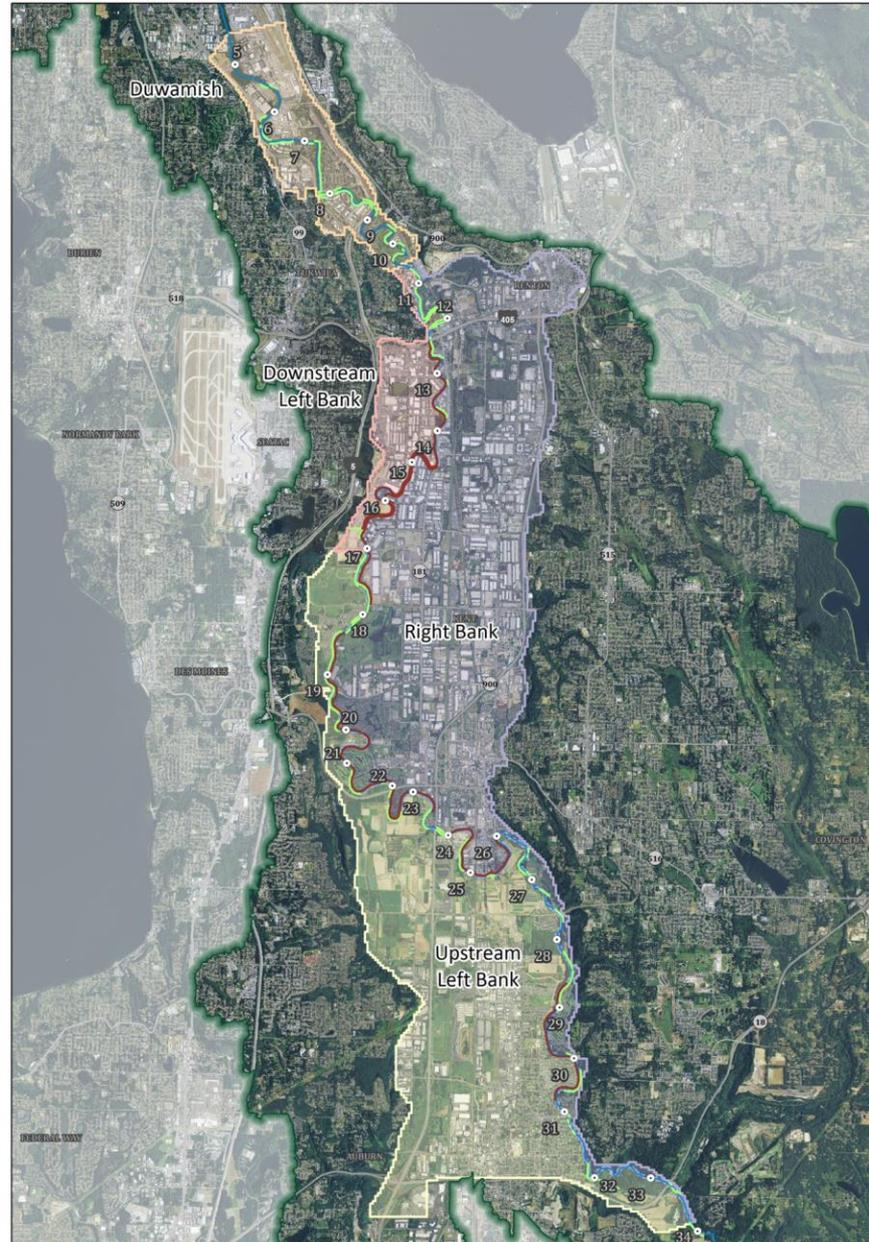
No stand-alone technical memorandum



Community, Economy and Land Use

Analysis Unit	Number of Structures by Type			
	Residential	Commercial	Industrial	Other*
Auburn (Upstream Left Bank: RM 17 – RM34)	3,484	873	74	72
Tukwila (Downstream Left Bank: RM10.5 – RM17)	30	273	13	3
Kent/Renton (Right Bank: RM10.5 to RM34)	1,266	1,769	178	44
Duwamish (Downstream: RM4.5 to RM10.5)	591	196	36	6
Sub-Total	5,371	3,111	301	125
TOTAL	8,908			

* Agricultural, public, and religious structures



Green River SWIF
Hydraulic/Economic
Modeling Area
(DRAFT)

Data Sources: King County-2014
USDA - 2014



King County
March 2014

Vegetation and Habitat Resources

Vegetation and habitat information and geo-data compiled into support SWIF products and analyses:

- Key vegetation and habitat characterization products:
 - 2013 vegetation and land cover GIS maps for a 200' zone along the Lower Green (RM 11 to RM 32)
 - Floodplain/valley land cover change analysis, 1800s to 2013
 - Aquatic habitat GIS maps, updated to reflect 2013 field work/study
 - Shoreline/riparian zone habitat features analyzed, using 2013 veg and land cover maps
 - Height of existing trees and large woody vegetation in the shoreline/riparian zone
 - New GIS model that evaluates the 'potential shade to the river cast by existing (and future) trees
- Collaboration between King County, WRIA 9 , Muckleshoot Tribe and consultant team
- Vegetation and Habitat Resources Technical Memorandum will be provided as part of the Current Conditions Report



Key Findings: Vegetation and Habitat

Riparian/Shoreline:

- Impervious surfaces, grasses and non-native shrub cover dominate the Lower Green shoreline zone (200' shoreline mapping)
- A shade limited system, with some larger trees in upstream portions of the Lower Green (RM26 to RM34)
- Existing trees and large woody vegetation cast 'poor' or 'fair' shade throughout most of the Lower Green, per GIS shade modeling results

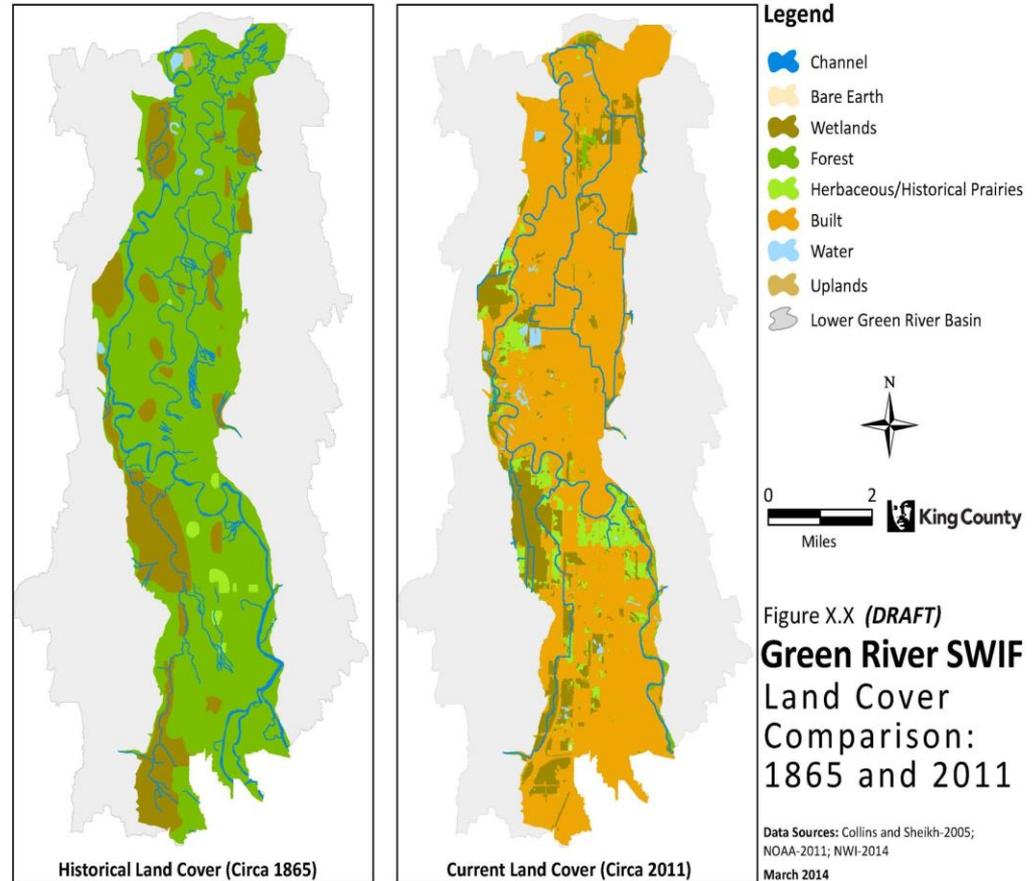
Aquatic:

- Low diversity, low quality and substantially modified from historical conditions
- Dominated by glides throughout the study area
- Riffles are limited downstream of RM 24
- Shade modeling of existing vegetation indicates:
- Limited aquatic habitat features: pools; LWD; hiding and thermal cover; connections of the main stem to existing and restored floodplain habitat features, such as off-channel sloughs and wetlands; low-velocity shallow water edge habitat; and riparian forest cover

Lower Green River: Land Cover and Vegetation Change Over Time

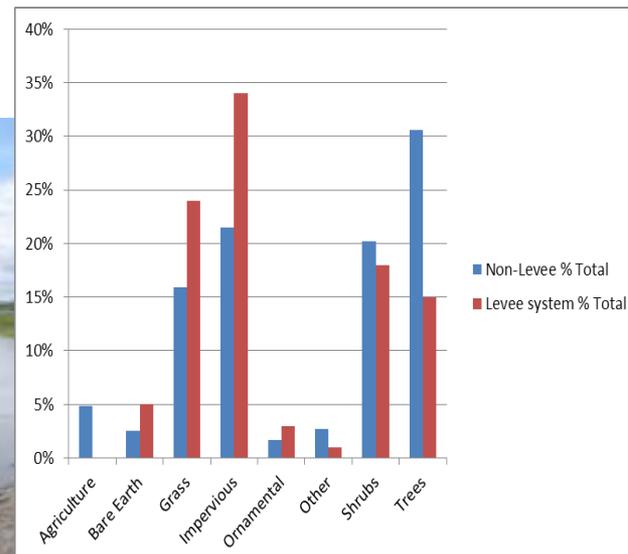
- 1865: ~ 75% of the floodplain was forested
- 2014: ~75% is developed and only 8% of the floodplain is forested
- 40% reduction in main stem Lower Green River channel
- 30% reduction in wetlands
- 75% reduction in lakes/ponds

A highly manipulated and human dominated system



Vegetation and Land Cover Status: Lower Green River Shoreline/Riparian Zone

- Existing land cover and vegetation were mapped within a 200' zone, from the water's edge (RM 11 to RM 32):
 - Agriculture
 - Bare Earth
 - Grass
 - Impervious
 - Ornamental
 - Other
 - Shrub
 - Trees
- Data sources: 2009/2011 orthophotos; 2013 LIDAR; and field validation
- Product: GIS maps and database



Shoreline/Riparian Vegetation Mapping

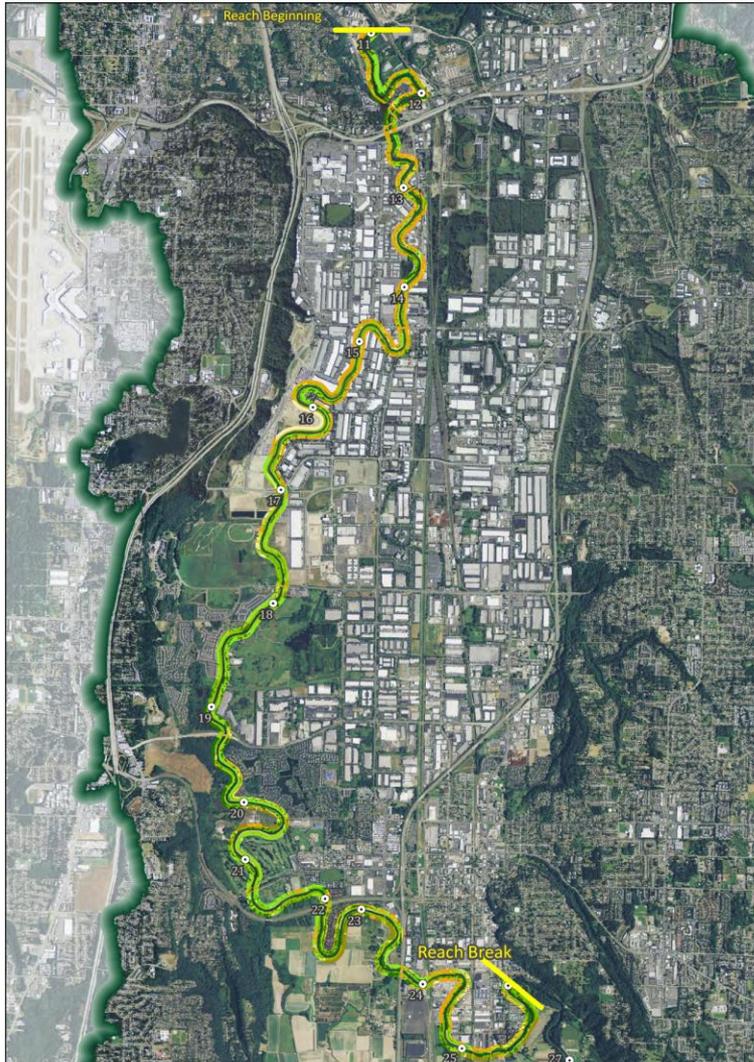


Figure X.X (DRAFT)
Green River SWIF
 Vegetation of
 the Second Reach



- | | | | |
|--|--------------|--|------------|
| | Agricultural | | Ornamental |
| | Bare Ground | | Other |
| | Grass | | Shrubs |
| | Impervious | | Trees |

Data Sources: King County-2014; USDA-2014

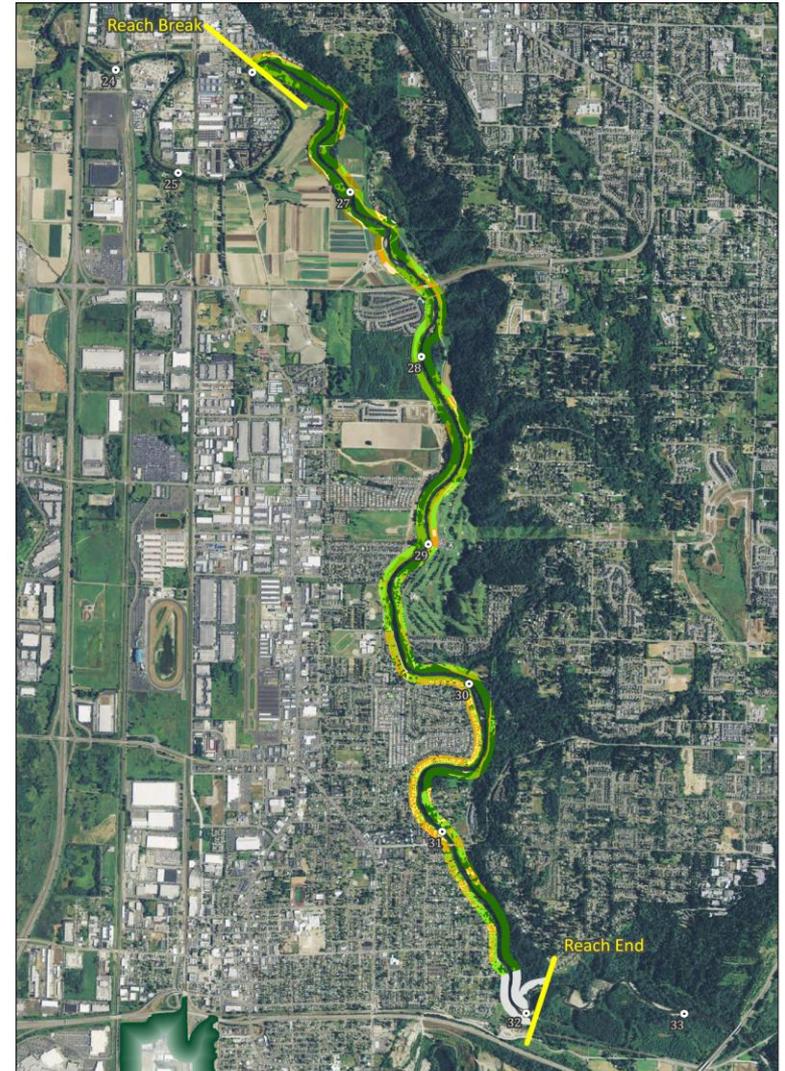


Figure X.X (DRAFT)
Green River SWIF
 Vegetation of
 the Third Reach

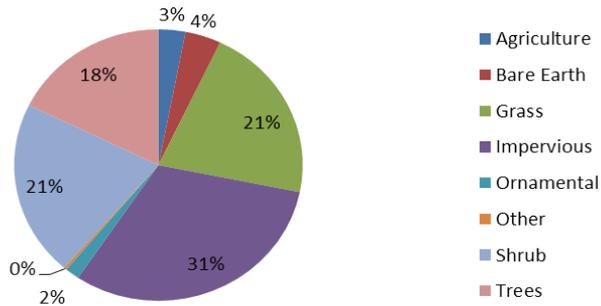


- | | | | |
|--|--------------|--|------------|
| | Agricultural | | Ornamental |
| | Bare Ground | | Other |
| | Grass | | Shrubs |
| | Impervious | | Trees |

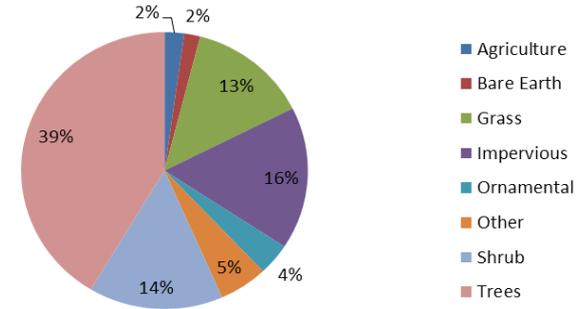
Data Sources: King County-2014; USDA-2014

Vegetation and Land Cover by Lower Green Study Reach

Reach 2 Riparian Vegetation Cover Types



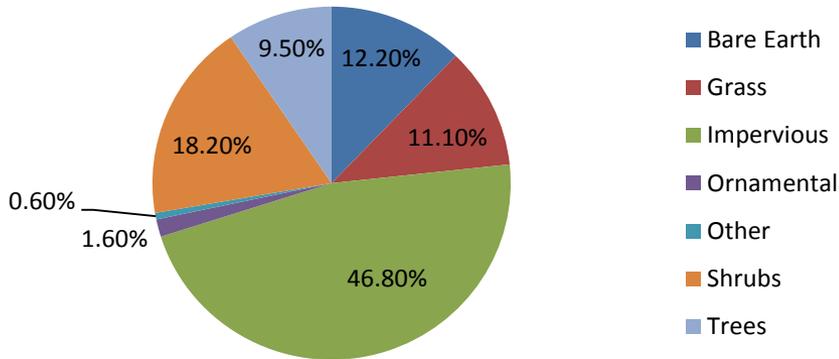
Reach 3 Riparian Vegetation Cover Types



Land Cover Type	Reach 2 (acres) (RM 11 to 26)	Percent of Reach 2	Reach 3 (acres) (RM 26 to 32)	Percent of Reach 3
Agriculture	23.5	3%	6.4	2%
Bare Earth	32.1	4%	5.2	2%
Grass	153.9	21%	39.8	13%
Impervious	222.1	31%	48.7	16%
Ornamental	11.4	2%	10.9	4%
Other	2.2	0%	16.1	5%
Shrub	151.5	21%	44.5	14%
Trees	128.2	18%	121.1	39%
Totals	724.9	100%	292.7	100%

Vegetation and Land Cover, PL84-99 Levee System #1

**Tukwila 205
(Levee System #1) Vegetation and
Land Cover**



Riparian Cover Type	PL84-99 Levee System 1 (acres)	% of Levee Area
Agriculture	-	-
Bare Earth	12.6	12%
Grass	11.4	11%
Impervious	48.1	47%
Ornamental	1.6	2%
Other	0.6	1%
Shrub	18.8	18%
Trees	9.8	10%
Totals	102.9	100%

**Similar summaries completed for all five, Lower Green River PL84-99 levee systems

Habitat Resources

Habitat questions answered by the SWIF Current Conditions report:

1. What were the river system's historical fish populations, aquatic and floodplain habitat features?
2. What fish populations are currently present?
3. What are the characteristics of the current aquatic and floodplain habitat?
4. What shade is provided by large vegetation/trees to the river?



Habitat Characterization

Data sources: SWIF's shoreline vegetation maps; existing and recently completed habitat studies; WRIA 9 and Muckleshoot Tribe technical work; 2013 LIDAR

- Status of habitat features within the river and its floodplain:
 - Aquatic
 - Large wood
 - Pools
 - Spawning gravels
 - Slow water edge
 - Floodplain
 - Riparian forest (within 200' shoreline zone)
 - Wetlands
 - Ponds
 - Forested floodplain (outside of 200' zone)



Lower Green River Aquatic Habitat

Findings

- Three aquatic habitat study reaches
- Low diversity, quality and substantially modified from historical conditions
- Habitat is dominated by glides
- Riffles are limited downstream of RM 24
- Downstream of RM 11: recent creation of shallow water and pocket estuary habitat, along with placement of large wood, has enhanced aquatic habitat
- Lower Green River is a temperature impaired water body (TMDL), with lethal conditions for salmonids in the summer and fall months

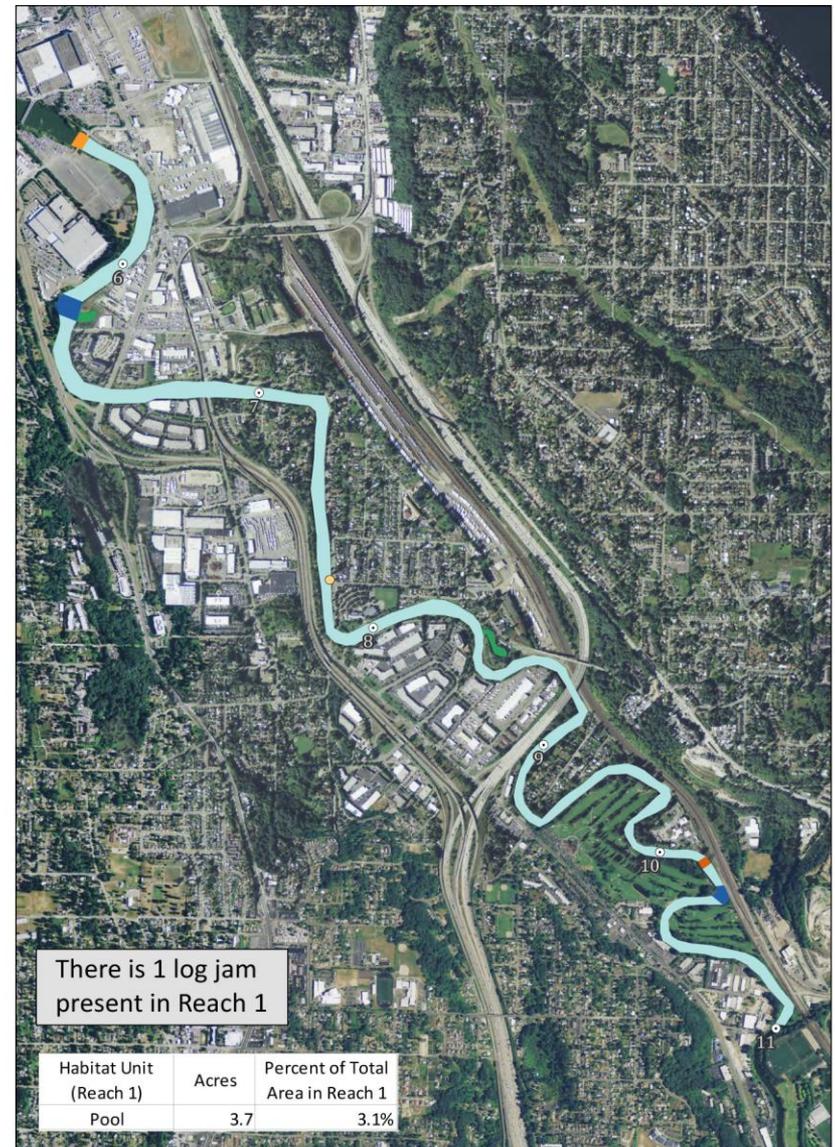
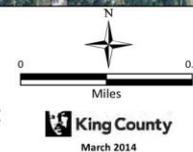


Figure X.X (DRAFT)

Green River SWIF
In Stream Salmon
Habitat Description:
Reach One



- Pool
- Riffle
- Run
- Glide
- Pocket Estuary
- Tidal Glide
- Log Jams



March 2014

Data Sources: R2-2013; USDA-2014

Lower Green River Aquatic Habitat

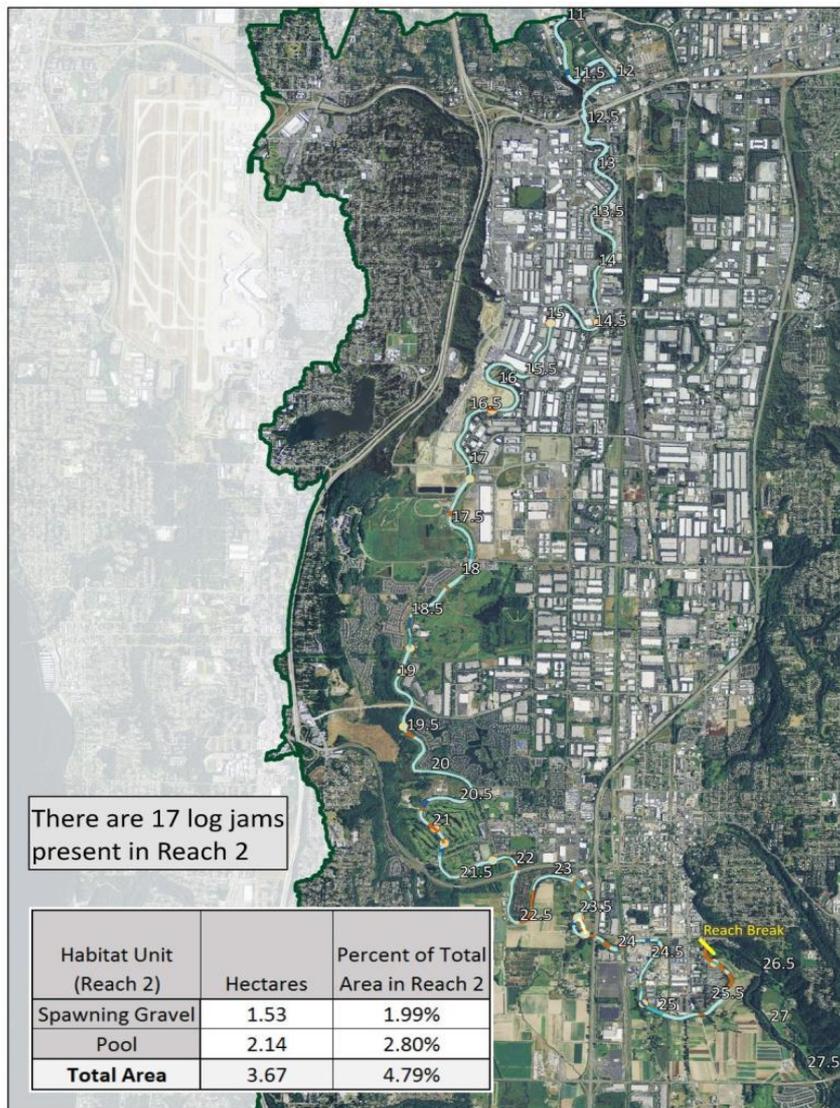


Figure X.X (DRAFT)

Green River SWIF In Stream Salmon Habitat Description: Reach Two



Created: 3/5/2014
Data Sources: King County-2014; NOAA-2011

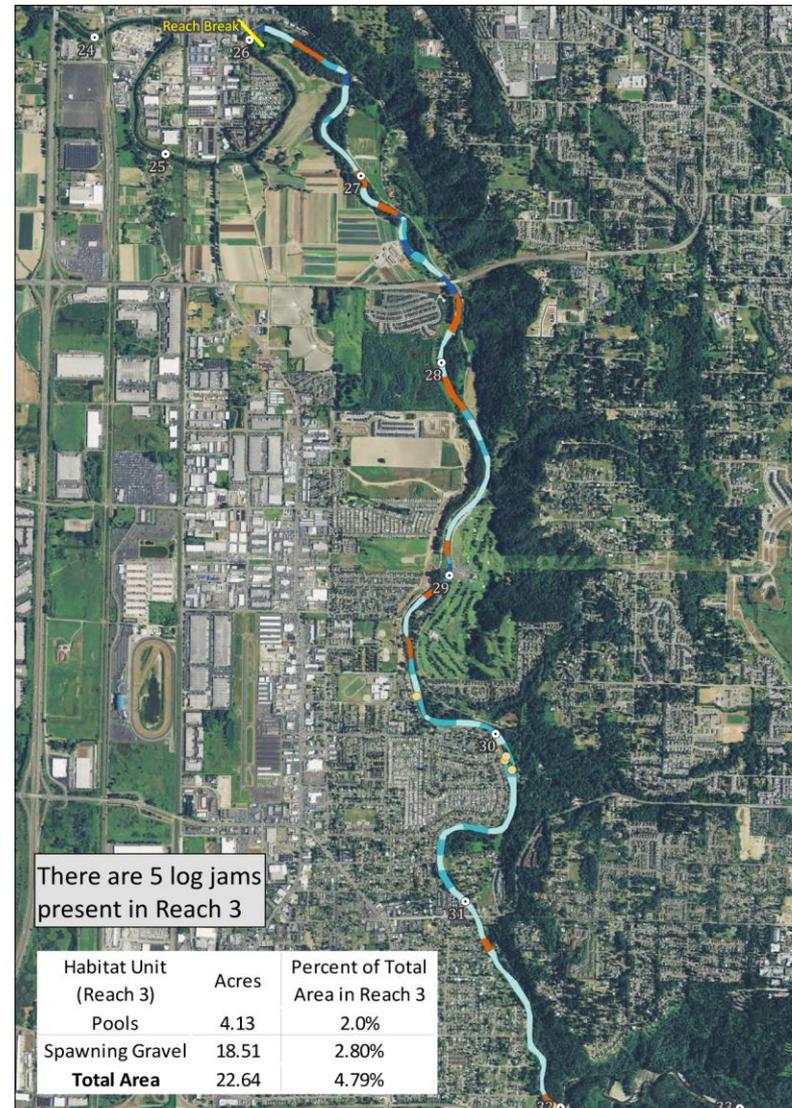


Figure X.X (DRAFT)

Green River SWIF In Stream Salmon Habitat Description: Reach Three



Data Sources: R2-2013; USDA 2014

Habitat Resources: Riparian/Shoreline Shade

What shade is provided by large vegetation/trees to the river?

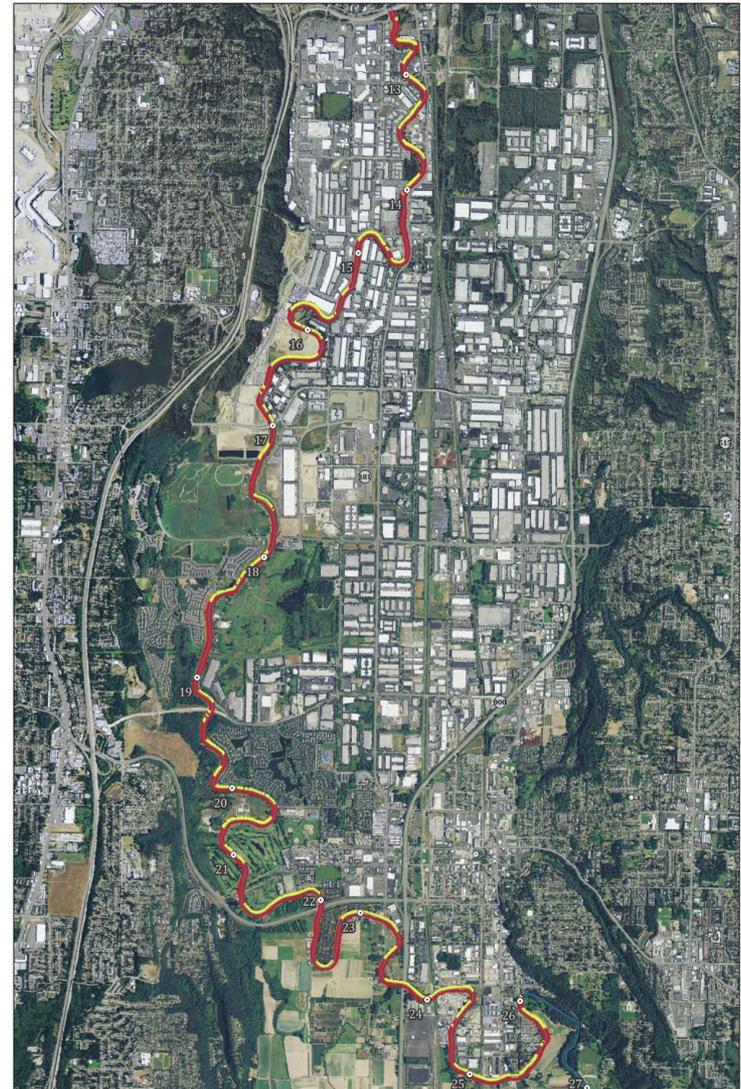
- Muckleshoot Tribe's 'Sun Map' was the SWIF starting point to further evaluate the shade provided to the river by existing trees
- New GIS model, developed in support of the SWIF: Potential Shade Model
 - A GIS model that analyzes potential shade cast by trees within a 150' shoreline zone during daylight hours on August 1st
 - Analysis reflects recently completed TMDL work for Green River
 - Model output summarizes potential for various shade scenarios to reduce ("cool") river temperatures. Categorized as: **Poor**, **Fair**, **Good** or **Very Good** potential shade condition



Habitat Resources: Riparian/Shoreline Shade

Riparian Aspect Mapping aka 'Sun Map' (produced by Muckleshoot staff)

- GIS model that evaluates shoreline location, with respect to position of the sun, to identify priority locations for trees for the purpose of increasing shade to the river
- **High potential shade:** shoreline locations where trees are more likely to cast significant shade
- **Low potential shade:** shoreline locations where tree are less likely to cast significant shade
- This map served as a starting point for SWIF shade modeling



Green River SWIF (DRAFT)

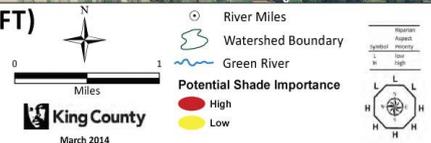
Riparian Aspect Priority:

Relative Potential

Shade Importance - Reach Two

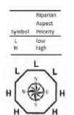
(MIT "Sun Map")

Data Sources: King County-2014; USDA-2014; MIT 2013



King County

March 2014



Habitat Resources: Riparian/Shoreline Shade

Potential Shade GIS Model

- Tool to evaluate the 'potential shade' to the river, to be cast from existing trees and large woody vegetation within a 150' shoreline zone
- Tool can be used to model the effects of future conditions

Shade Category	Percent of Maximum Potential Shade (from TMDL)	Actual Percent Potential Shade	Study Area Reach 2 (Acres)	Study Area (Reach 2)	Study Area Reach 3 (Acres)	Study Area (Reach 3)
Very Good	80-100%	61-75%	0.1	<1%	1.2	<1%
Good	61-80%	46-60%	6.5	4%	22.9	24%
Fair	41-60%	31-45%	52.6	33%	52.3	56%
Poor	20-40%	15-30%	98.7	63%	17.7	19%
Totals Per Reach:			157.9	100%	94.1	100%

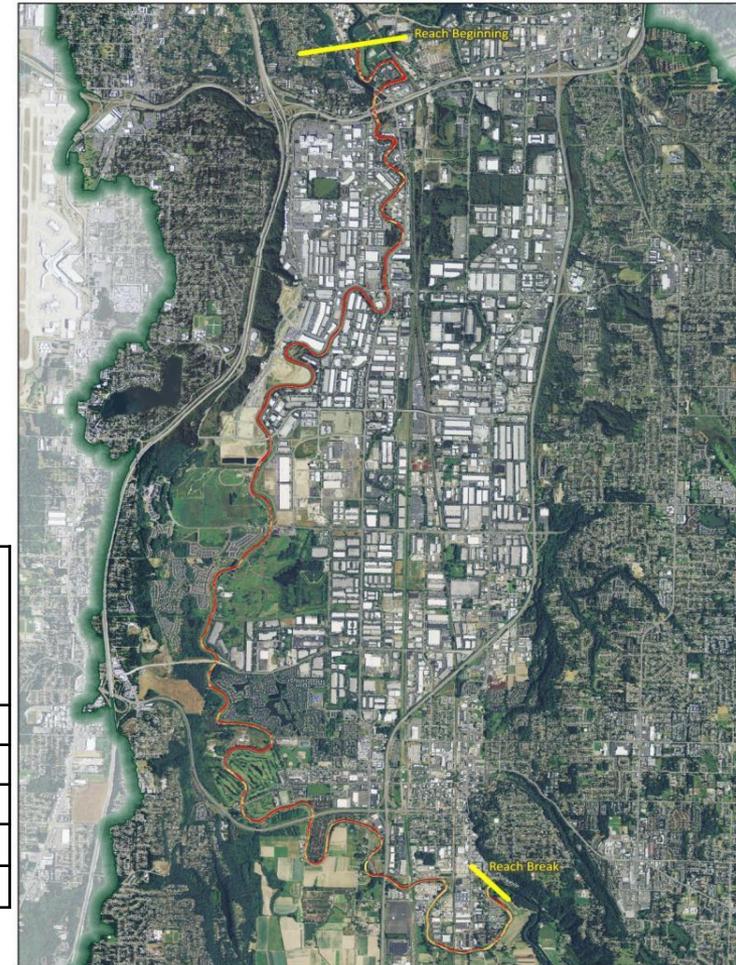


Figure X.X (DRAFT)
Green River SWIF
 Potential Shade
 Description:
 Second Reach



Created: 3/10/2014 Data Sources: King County 2014; NOAA-2011

Questions?