Green River System Wide Improvement Framework (SWIF)

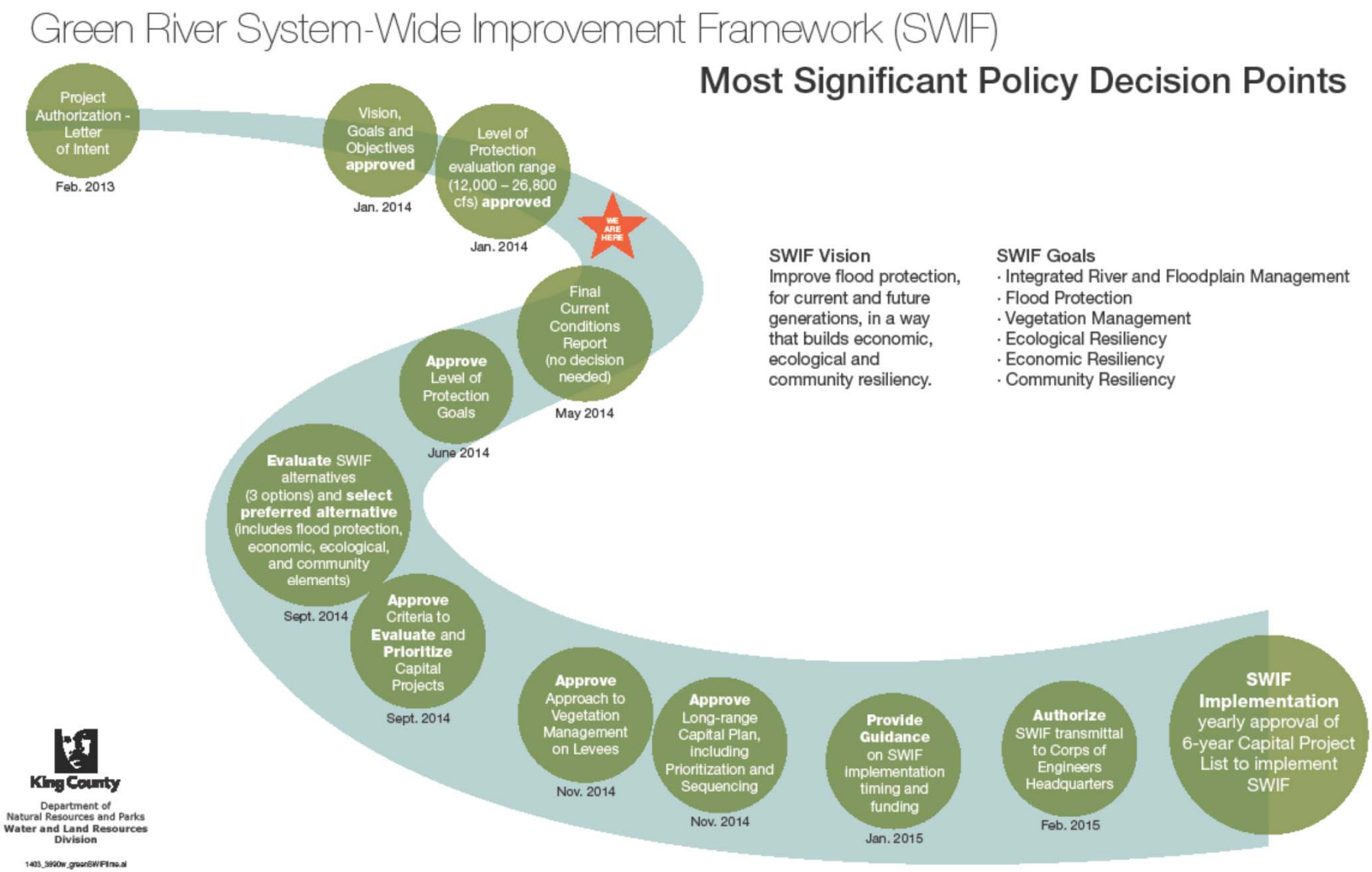
Current Conditions Report Overview

Presentation to:

Green River SWIF Technical Advisory Committee

March 19, 2014

SWIF Timeline and Decisions



PRESENTATION OUTCOMES

- Overview of the Green River SWIF Current Conditions Report
- How report will inform completion and implementation of the Green River SWIF
- Timeline and process for completing, including TAC review

Property of White River Valley Museum, Auburn

Green River SWIF Current Conditions Report

- Audience: technical and non-technical
- Synthesis of SWIF work completed to date, including:
  - SWIF vision/goals (informed by advisors and approved by FCD)
  - Geographic scope (informed by advisors and approved by FCD)
  - Current Condition Topics:
    - Community, Economy and Land Use
    - Shoreline Vegetation
    - Aquatic, Shoreline and Floodplain Habitat
    - Existing Flood Risks and Vulnerabilities
- Authors: consultant team and King County staff

Community, Economy and Land Use

- Tribal treaty fishing
- Cities and jurisdictions
- Land uses
- Primary transportation corridors
- Public/private lands
- Regional and local economic drivers
- Recreation – parks/trails
- Agriculture

Green River SWIF Current Conditions:
Vegetation and Habitat

Green River SWIF Current Conditions: Vegetation and Habitat

- Large woody vegetation/trees located in the vicinity of PL84-99 levees is a primary SWIF issue to resolve
- Vegetation provides multiple ecological and social benefits to the Lower Green River system, yet the USACE PL84-99 levee eligibility policy favors removing large vegetation near levees, for structural stability purposes
- SWIF projects and vegetation management recommendations will resolve PL84-99 vegetation issues

Current Conditions Report

Vegetation

Vegetation questions answered by the SWIF:

1. What was the river system's historical vegetative condition?
2. What are the locations and characteristics of current shoreline vegetation throughout the Lower Green?
3. What is the current state of King County levees/revetments that were repaired using bio-engineered approaches, in the Lower and Middle Green River?
4. What have others, outside of the region, learned about the structural impacts of large woody vegetation located proximate to levees, including PL84-99 levees?

Current Conditions Report

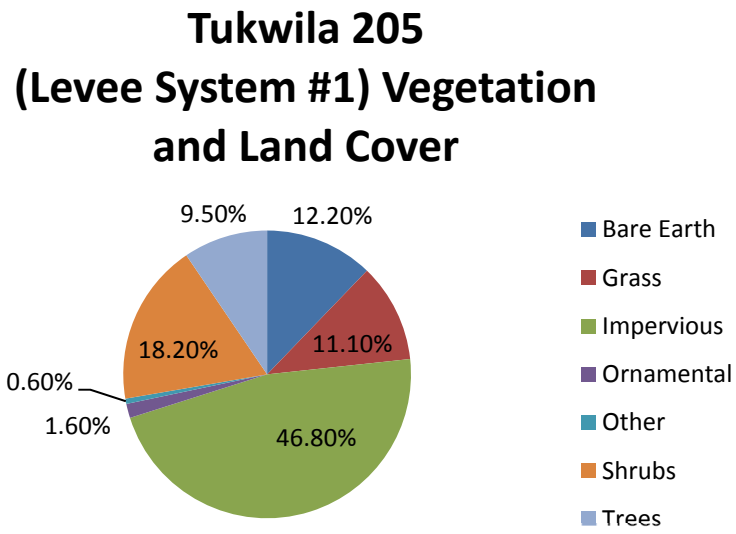
Vegetation

- GIS maps: current locations and characteristics of land cover and vegetation were mapped within a 200’ shoreline zone
  - Data sources: 2009/2011 aerial orthophotos; 2013 LIDAR; and field validation

- Vegetation and land cover map categories:
  - Impervious surface
  - Bare ground
  - Grass
  - Ornamentals
  - Agriculture
  - Shrubs (invasive; native)
  - Trees

Current Conditions Report

Vegetation on PL84-99 Levees



Vegetation + Land Cover Category	Tukwila 205 Levee System 1 (ha)	Levee %
Agriculture	-	-
Bare Earth	5.09	12.2%
Grass	4.6	11.1%
Impervious	19.48	46.8%
Ornamental	0.65	1.6%
Other	0.23	0.6%
Shrubs	7.59	18.2%
Trees	3.95	9.5%
Totals	41.6	10.1%

Current Conditions Report

Habitat

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?

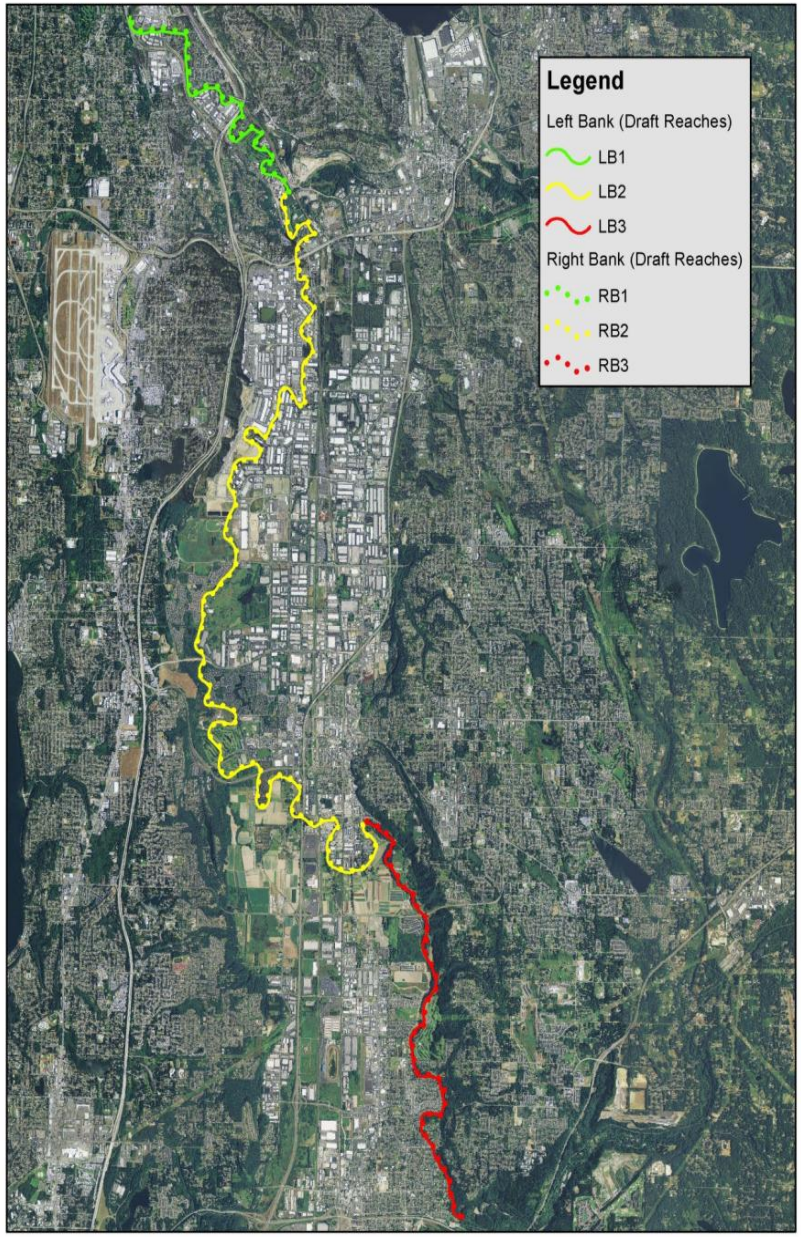
Current Conditions Report

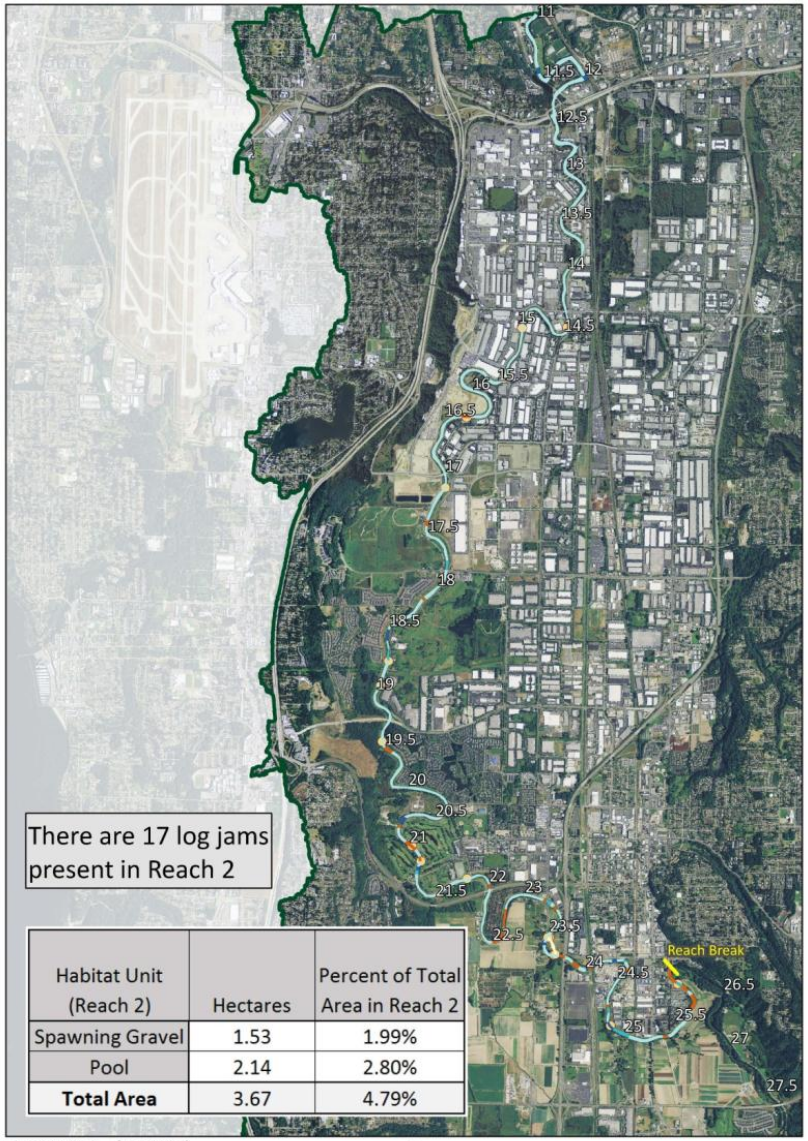
Habitat

What are the characteristics of aquatic and floodplain habitat features in the Lower Green River system?

- Data sources: SWIF's shoreline vegetation maps; existing and recently completed habitat studies; WRIA 9 and Muckleshoot Tribe technical work; 2013 LIDAR
- Habitat features characterized using maps, tables and narrative:
  - Aquatic
    - Large wood
    - Pools
    - Spawning gravels
    - Slow water edge
  - Floodplain
    - Riparian forest (within 200' shoreline zone)
    - Wetlands
    - Ponds
    - Forested floodplain

Current Conditions Report: Aquatic Habitat Map Example





Habitat Unit (Reach 2)	Hectares	Percent of Total Area in Reach 2
Spawning Gravel	1.53	1.99%
Pool	2.14	2.80%
Total Area	3.67	4.79%

Figure X.X *(DRAFT)*

Green River SWIF

In Stream Salmon Habitat Description: Reach Two

N

0 0.5 1 Miles

King County

Pool
Riffle
Run
Glide
side channel
Log Jams
River Miles

Created: 3/5/2014

Data Sources: King County-2014; NOAA-2011

Current Conditions Report

Habitat

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

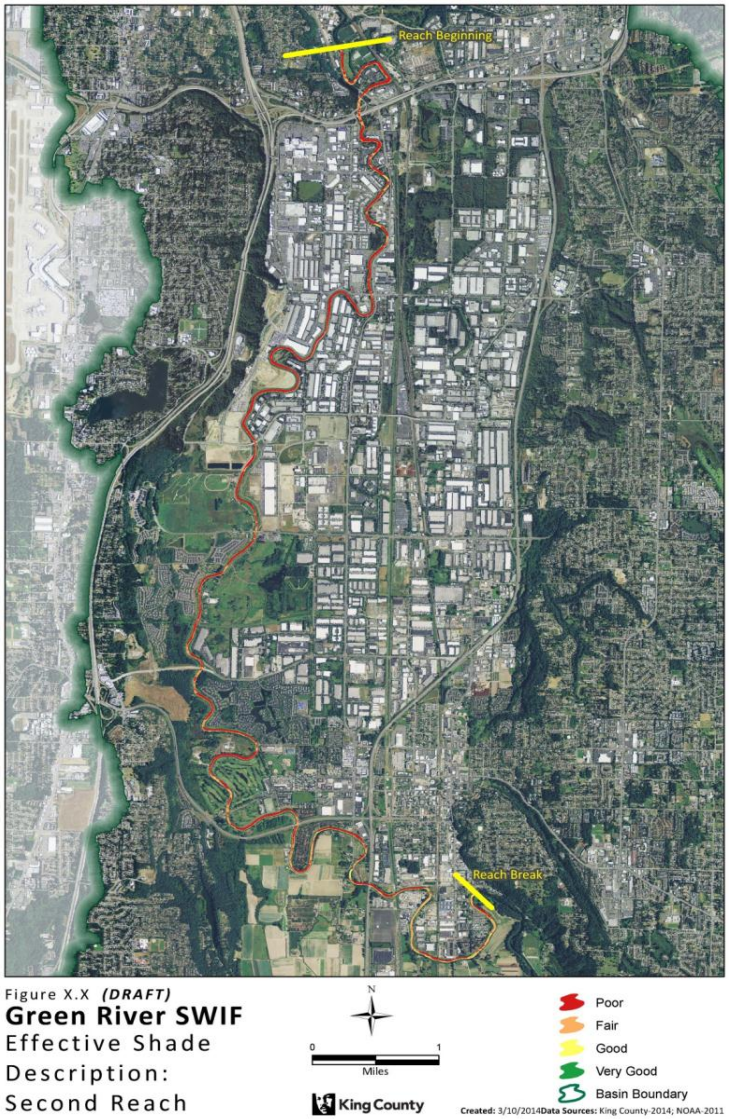
- Shade Model
  - A GIS model that analyzes potential shade cast by trees within a 150' shoreline zone during daylight hours on August 1st
  - Analysis reflects recently completed TMDL work for Green River
  - Model output summarizes potential for various shade scenarios to reduce ("cool") river temperatures. Categorized as: **Poor, Fair, Good** or **Very Good** potential shade condition

Current Conditions Report: Habitat

Lower Green River: Reach 2

DRAFT Potential Shade from existing vegetation

Shade Category	Index Range	Percent of Maximum	Actual Percent Effective Shade	River Area Reach 2 (Ha)	Percent Area (Reach 2)
Very Good	0.751-0.98	78-100%	61-75%	0.04	0.1%
Good	0.51-0.75	53-77%	46-60%	2.61	4.1%
Fair	0.251-0.5	28-52%	31-45%	21.29	33.3%
Poor	0.02-0.25	2-27%	15-30%	39.96	62.5%
Totals Per Reach:				63.9	100.0%



Current Conditions Report: Habitat

Lower Green River: Reach 3

DRAFT Potential Shade from existing vegetation

Shade Category	Index Range	Percent of Maximum	Actual Percent Effective Shade	River Area Reach 3 (Ha)	Percent Area (Reach 3)
Very Good	0.75-0.98	78-100%	61-75%	0.48	1.3%
Good	0.51-0.75	53-77%	46-60%	9.27	24.3%
Fair	0.25-0.5	28-52%	31-45%	21.18	55.6%
Poor	0.02-0.25	2-27%	15-30%	7.18	18.9%
Totals Per Reach:				38.1	100.0%

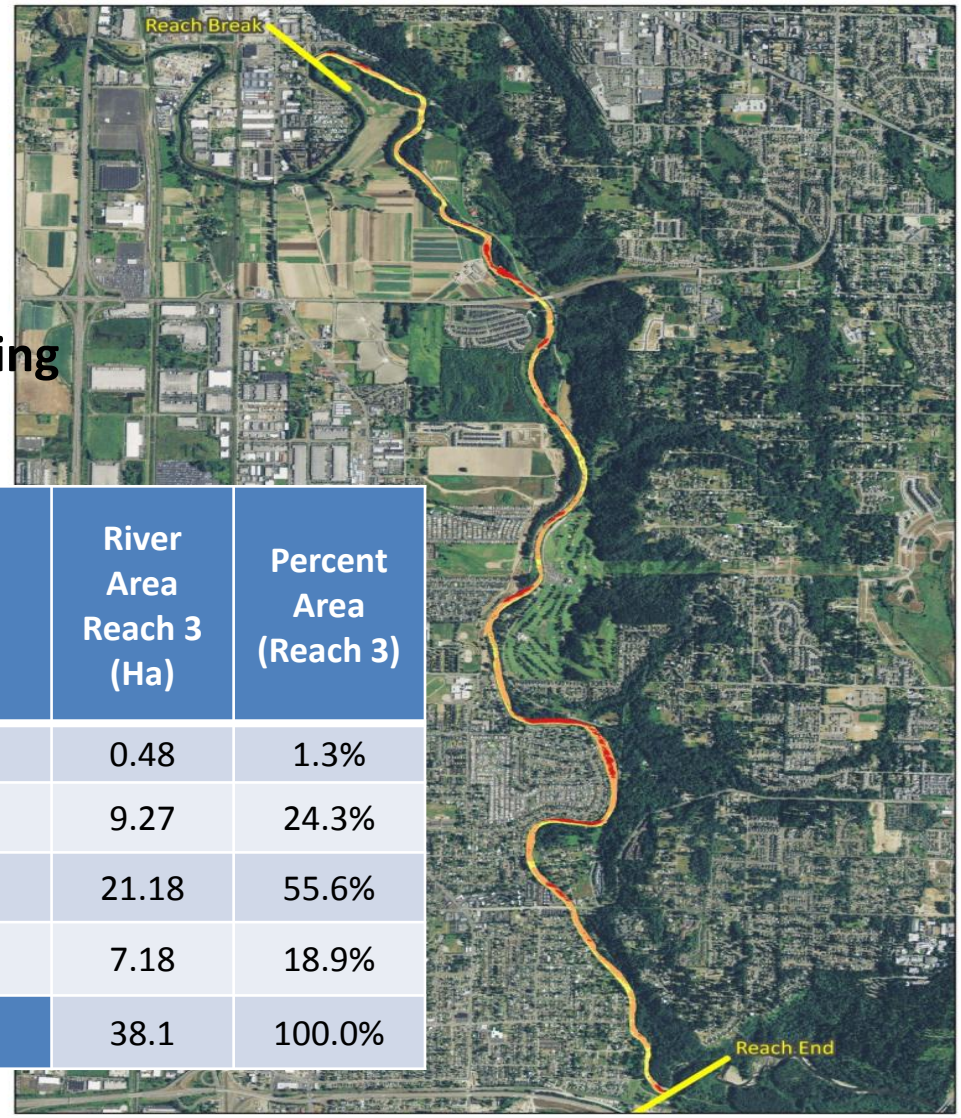


Figure X.X *(DRAFT)*
Green River SWIF
Effective Shade
Description:
Third Reach

N
0 0.5
Miles
King County

Poor
Fair
Good
Very Good

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

Current Conditions Report

Vegetation and Habitat

How will vegetation and habitat info be used in the SWIF?

- Inform identification of SWIF alternatives
- Vegetation management action planning, including resolution of USACE PL84-99 issues
- Inform conceptual design of priority capital projects
- Inform river corridor habitat goals, multi-benefit project priorities, and future WRIA9 plan updates

Green River SWIF:
Existing Flood Risks and Vulnerabilities

Current Conditions Report

Flood Risk

- What are the system-wide existing levee system flood risks and vulnerabilities?
- At what peak flow rate is there a risk of levee failure (breaching or overtopping followed by breaching)?
- What is the extent of flood inundation in the valley if the existing levee systems overtop and/or breach?
- What are the economic damages associated with different levels of inundation?

Analysis will serve as a baseline for future system-level alternatives development.

Current Conditions Report

Flood Risk

Purpose of Existing Condition Levee System Analysis is to characterize existing flood risks and vulnerabilities

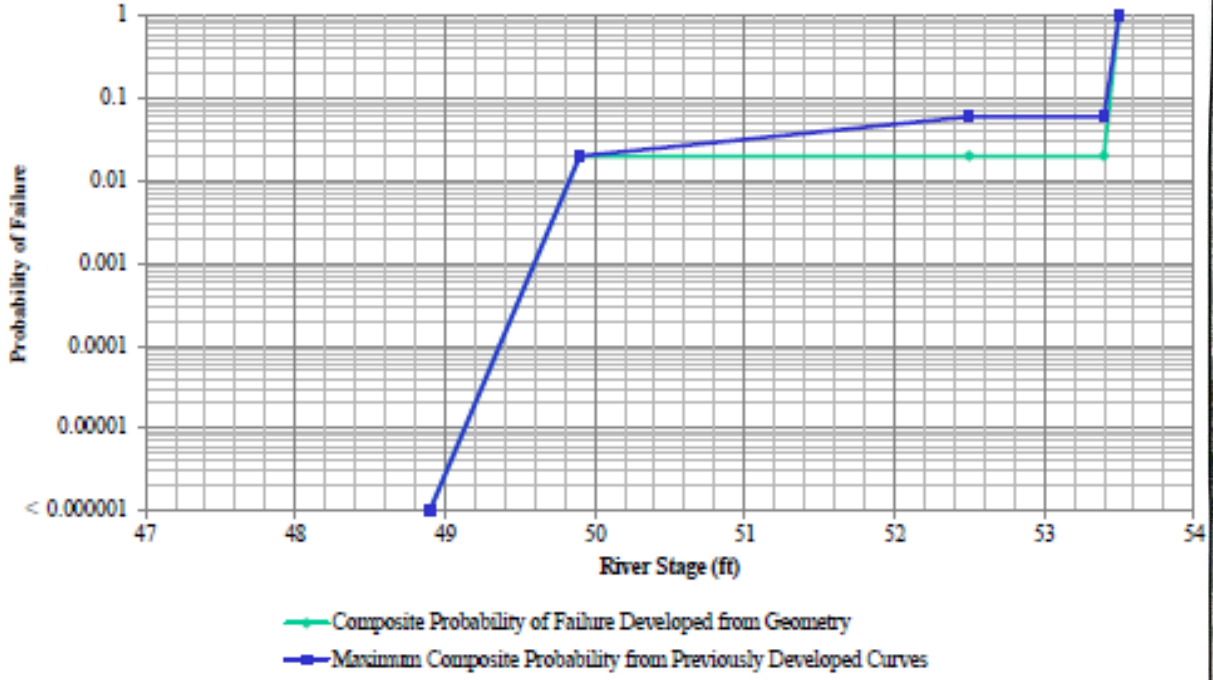
There are four components of the analysis:

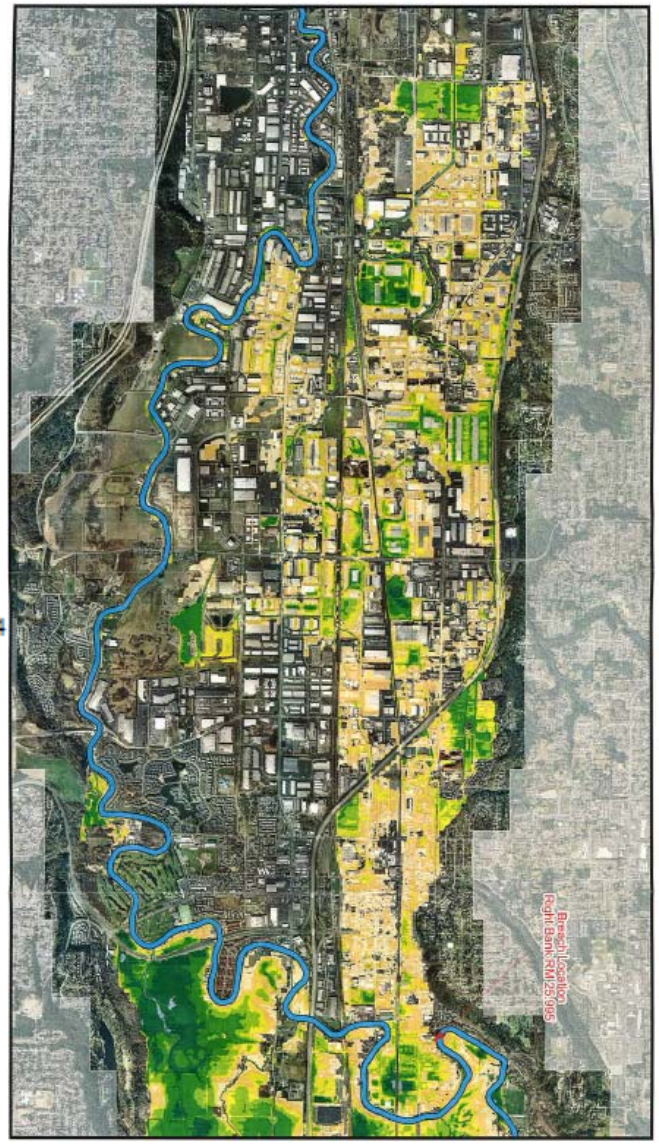
- Geomorphic assessment – lateral and vertical channel changes (e.g., channel migration, bed scour), sediment transport
- Geotechnical assessment – levee stability and probability of failure analysis (breach locations); levee fragility curves
- Hydraulic analysis and flood risk analysis – HEC-RAS and FLO-2D modeling to examine possible inundation over range of flood events: 12,000 up to 26,800 cfs
- Economic evaluation of flood risk – two economic models (HEC-FDA for physical damages and losses, and IMPLAN to assess regional economic and income impacts of flooding

Current Conditions Report: Flood Risk

Horseshoe Bend RM 25.5 Right Bank

Stage Probability of Failure and Breach Progression Mapping





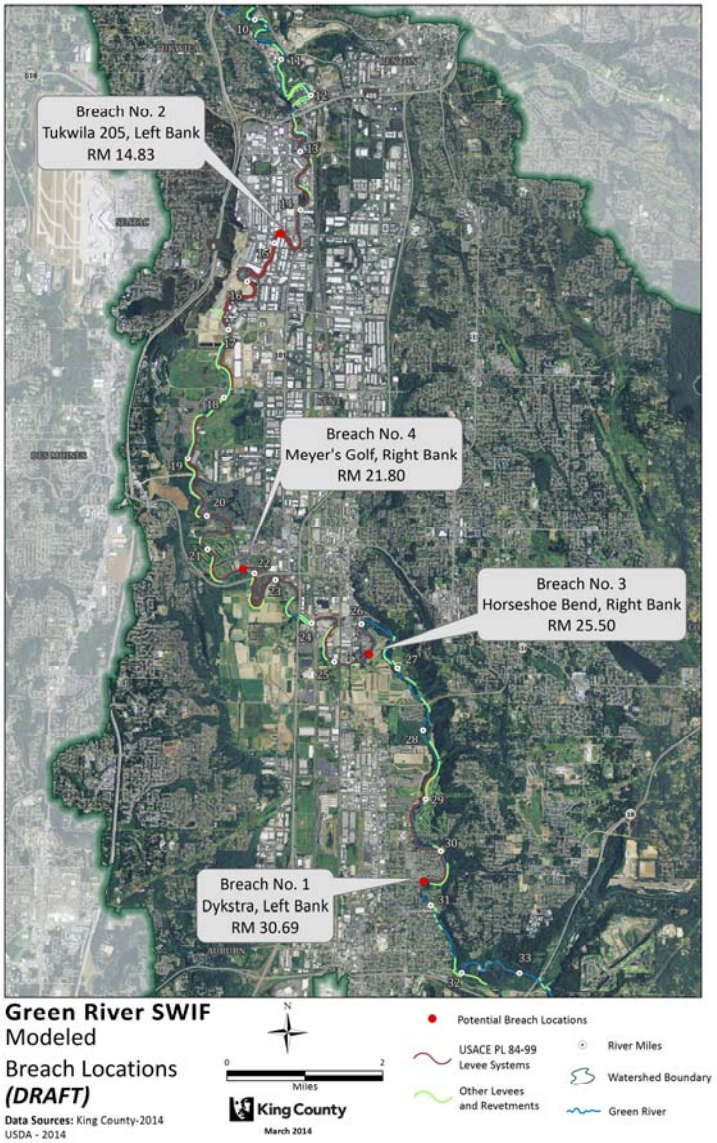
Breach Progression Mapping (NHC, 2010)

Current Conditions Report

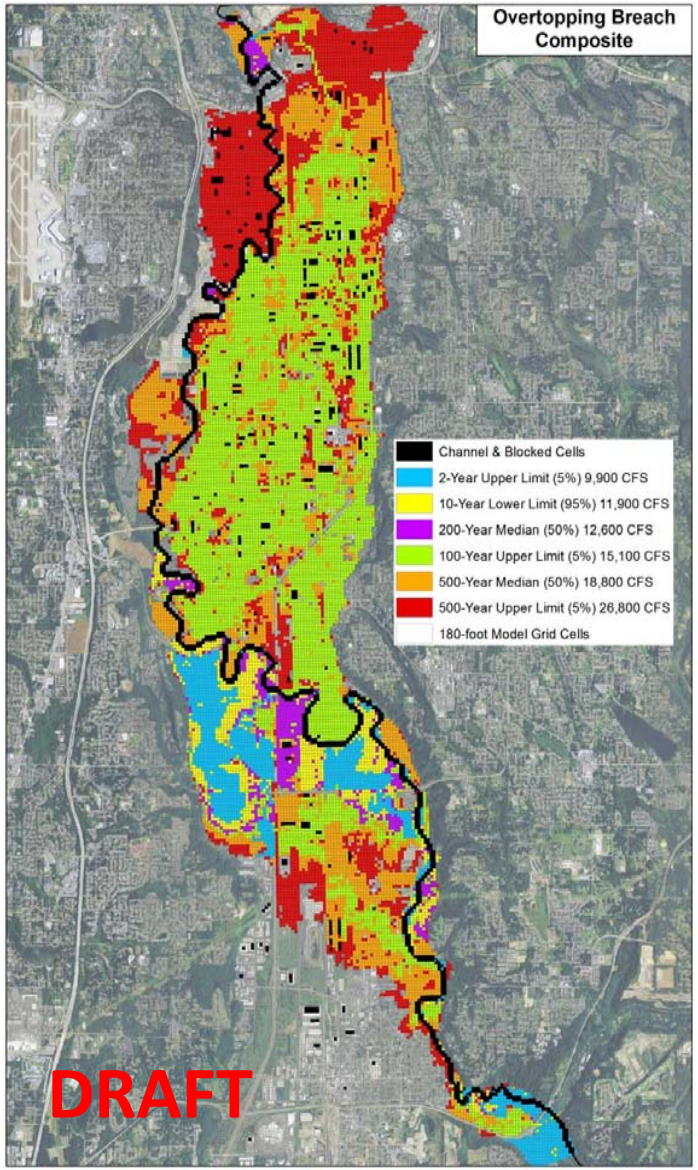
Flood Risk

- Hydraulic model has included new 2012 USACE Design Flood Hydrographs, 2013 LiDAR and recently constructed and planned projects
- Four levee failure scenarios analyzed:
  - Overtopping/breach failure composite
  - Dykstra/Tukwila left bank breach scenario
  - Horseshoe Bend breach scenario
  - Meyer's Golf breach scenario
- Economic damage categories:
  - Structure and content damage, Vehicle damage, structure cleanup costs, utility infrastructure damage
  - Lost recreation value, crop losses, rail and traffic detour & delay
  - Regional economic impacts

Current Conditions Report: Flood Risk



Modeled Breach Locations



Overtopping/Breach Failure Composite

Current Conditions Report

Flood Risk

- The economic evaluation includes assessment of flood impacts over a range of flood events and multiple scenarios
- Estimate system-wide expected annual damages (EAD) over a period of analysis (e.g., 50-100 years)
- Data on expected annual damages and net present values (Example: 50-year, 3.5% discount rate) will be presented in April

Green River SWIF Current Conditions Report

Schedule for Completion

Task	Date
✓ SWIF TAC meeting #3: Current Conditions Report Overview	March 19, 2014
Current Conditions Symposium for TAC and AC, including flood risk assessment results	April 16, 2014
DRAFT Current Condition Report available for review by TAC	April 24, 2014
TAC comments due to SWIF PM (Jennifer Knauer)	May 1, 2014
Current Conditions Report finalized	mid-May 2014

Questions?