

Middle Boise Creek Enhancement Update

October 23 2014

Department of Natural Resources and Parks



[Time Lapse Video of Middle
Boise-Evans Creek Project](#)

Purpose of Today's Presentation

Share information about recent King County studies and projects and gather landowner input to help create a joint understanding of the condition of Boise Creek

Agenda For Today's Meeting

- **Introductions**

- Stream Ecosystem (Mason)
- History and Observations (Gina)
- Agriculture (Pat)
- Salmon Habitat Projects (Josh)
- Q&A

- BREAK -

- Flood Modeling Results (Deborah)
- Improving Drainage & Habitat (Deborah)
- **Questions & Discussion**
- **Summarize meeting, next steps (Mason)**

Mason Bowles

What Makes Boise Creek Special?



Stream Ecosystem

- **Forested Watershed**
- **Abundant Water**
- **Clean Gravel**
- **Fish Food**
- **7 Species of Salmon and Trout**
- **3 “Threatened” Species**



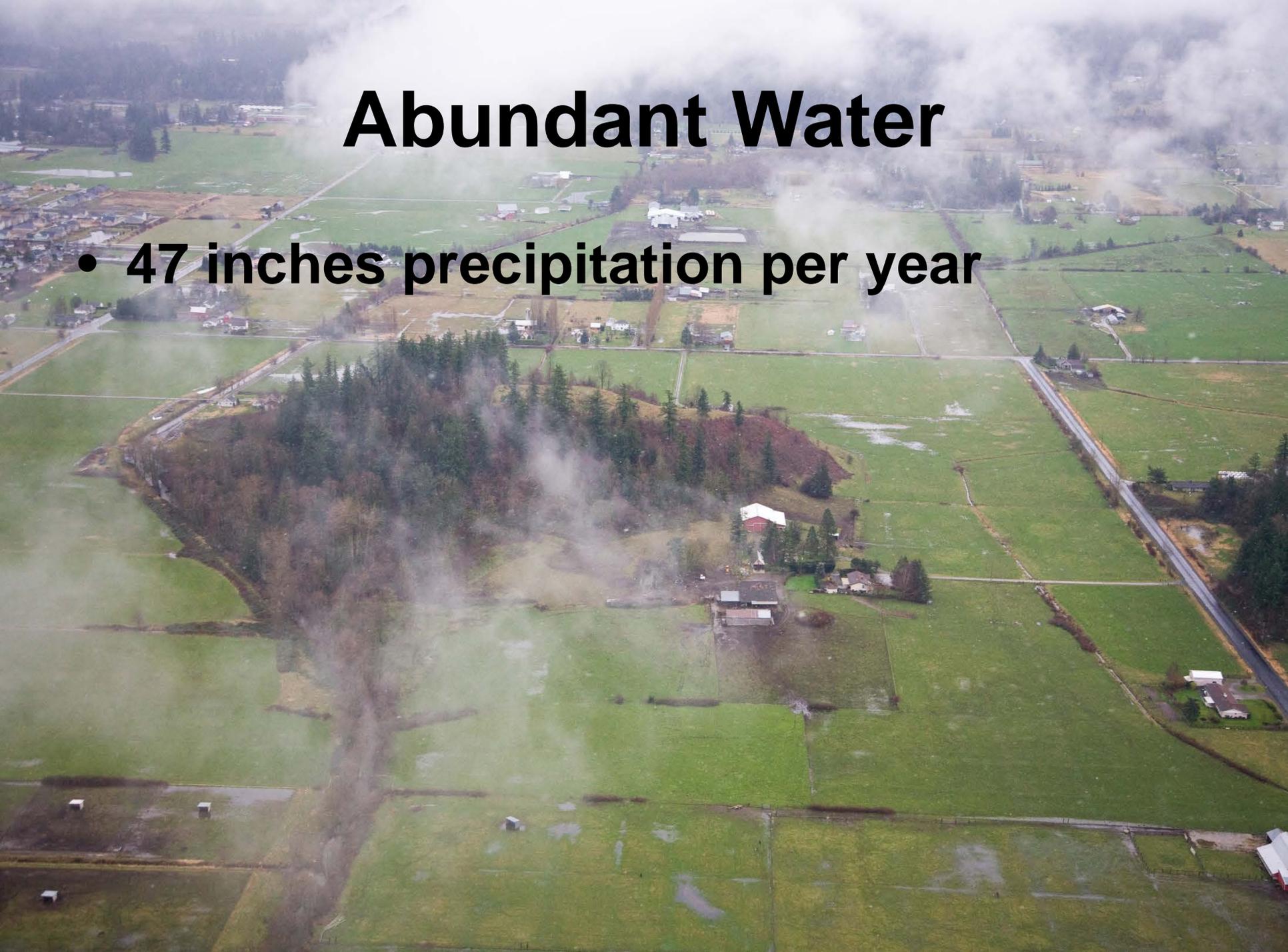
Forested Watershed

- Undeveloped
- 15.4 square miles / 9,861 acres

BOISE CREEK UPSTREAM FROM GOLF COURSE

Abundant Water

- 47 inches precipitation per year



Cold Water

An underwater photograph showing a large number of small, silvery fish swimming in a shallow, clear water environment. The water is filled with numerous thin, light-colored sticks and branches, some of which are partially submerged. The fish are scattered throughout the scene, with a higher concentration near the bottom. The overall lighting is somewhat dim, suggesting an underwater setting.

- **Below 15° C in spring**
- **Less than 20° C in the summer**

Clean Gravel

- **Supports fish food**
- **Used by salmon to build nests**
- **~ 500 cubic yards per year**





Mayfly nymph

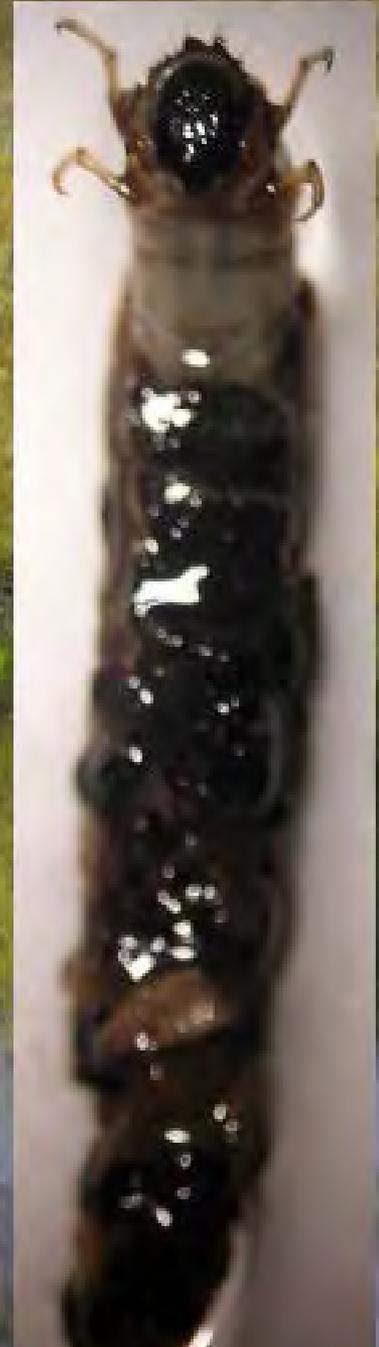


Caddisfly nymph

Fish Food



Stonefly nymph



Fish Food

Boise Creek Salmon & Trout – 7 species

Chinook (King)



Chum (Dog)



Pink (Humpy)



Coho (Silver)



Cutthroat



Steelhead/Rainbow



Bull Trout

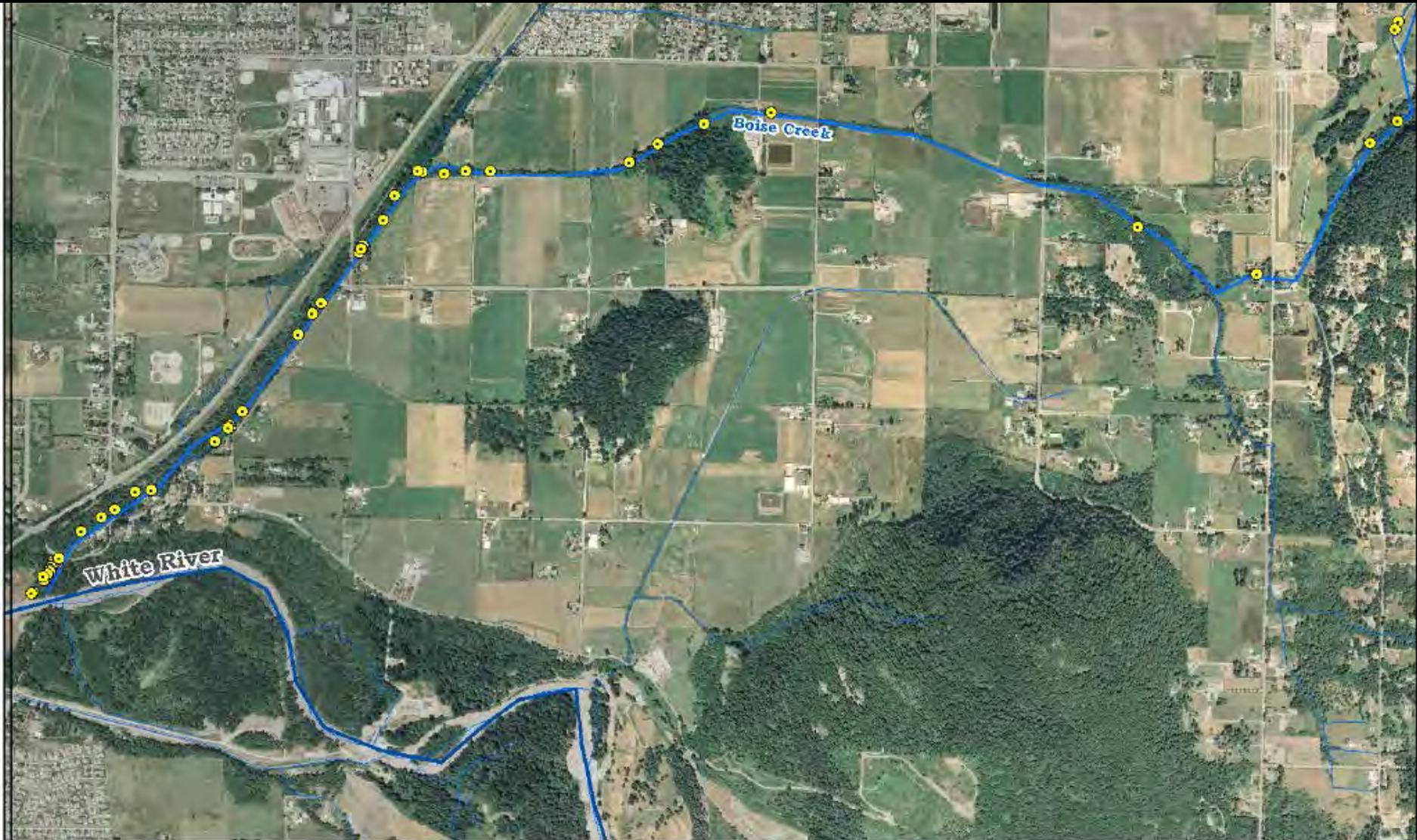


Threatened and Endangered Species

A large Chinook salmon is shown resting on a rocky riverbed. The fish is positioned horizontally, facing left, with its mouth slightly open. Its body is covered in numerous small, dark spots, and its scales have a silvery, iridescent sheen. The water above is clear and shallow, with ripples and reflections of light. The riverbed consists of various sized rocks and pebbles, some of which are covered in green moss or algae.

- **Spring Chinook**
 - Only run in King County
 - Only run in South Puget Sound
- **Fall Chinook**
- **Steelhead**
- **Bull Trout**

Where do Chinook spawn?



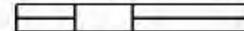
Puyallup
Tribal
Fisheries

**Boise Creek
Chinook Redd Locations (2012)**

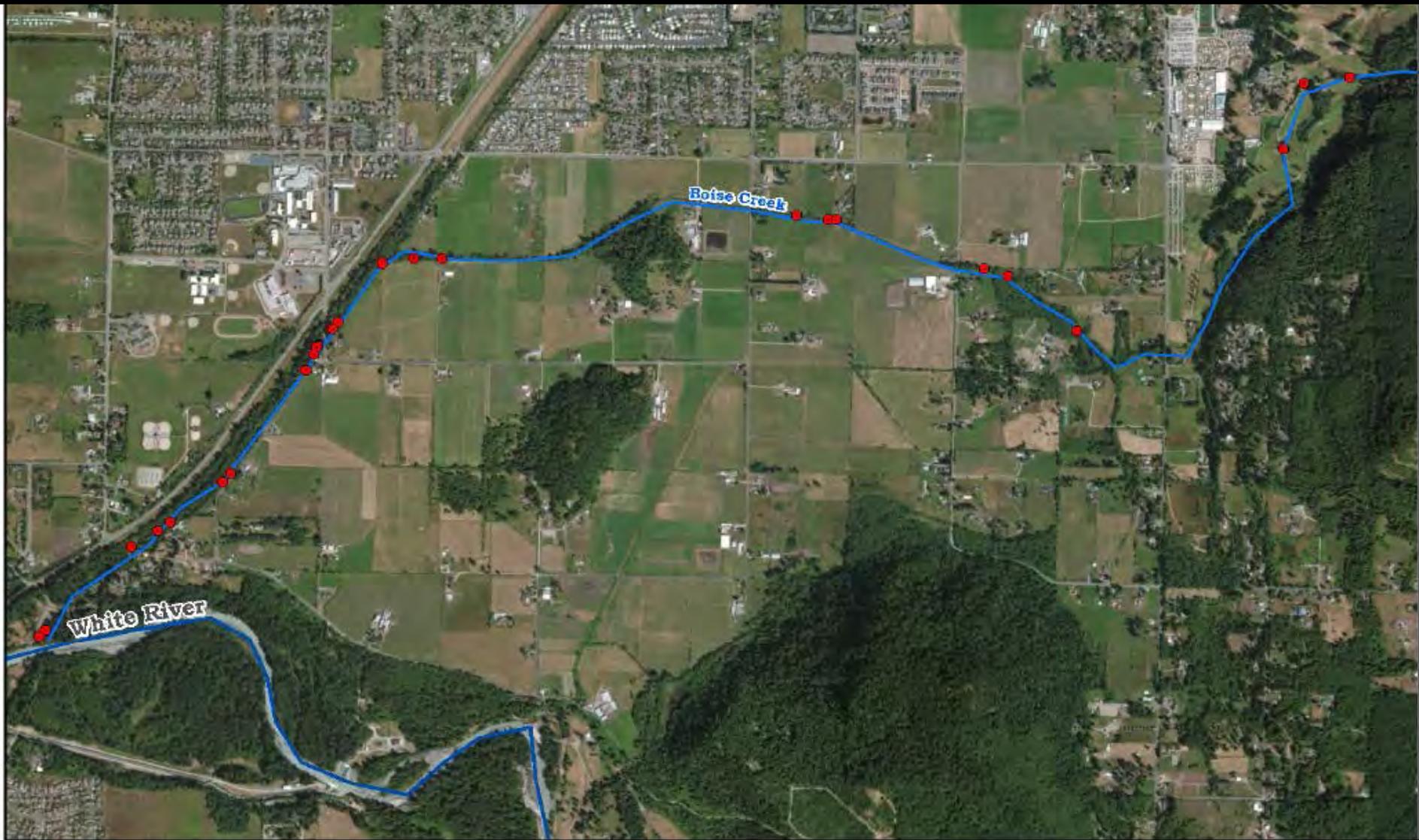
● Redd



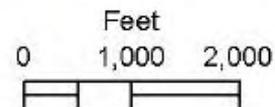
Feet
0 1,000 2,000



Where do Steelhead spawn?



Boise Creek
Steelhead Redd Locations (2013)



Gina Ames

Boise Creek

Some History and Observations



Boise Creek History

Enumclaw pioneer George Vanderbeck reminisces on his first impressions of Boise Creek...

"In the spring of 1870, I arrived in these regions and looked over the land around Boise Creek."



Boise Creek History

I was surprised and also much pleased with the beautiful stream called Boise Creek although the country was wild and heavily timbered I was fascinated with it.

I looked over much of the surrounding country, but could not erase from my mind the beauties of these parts.



Boise Creek History

In those days the camp of the Indian could be seen along the banks of the beautiful stream as well as the wild game that leaped up and took to flight at the approach of the white man.

I finally concluded to locate here".



From Nancy Irene Hall's book:

In the Shadow of the Mountain: A Pioneer History of Enumclaw
published in 1983.

Boise Creek History

The Sbalxqo'abc Indian village along Boise Creek was home to the Muckleshoot Indians who traveled Boise Creek and the White River.



Image from the Muckleshoot Indian Tribe Website at <http://www.muckleshoot.nsn.us>

From Nancy Irene Hall's book:
In the Shadow of the Mountain: A Pioneer History of Enumclaw
published in 1983.

Boise Creek History

The Vanderbecks, from Hanover Germany, were the first white family to settle in Enumclaw. Vanderbeck had 60 acres along Boise Creek near the White River near where the Enumclaw High School is located today.

The area was known as Boise.

From Nancy Irene Hall's book:
In the Shadow of the Mountain: A Pioneer History of Enumclaw
published in 1983.



The Vanderbeck home
at Boise Creek

The original White River
Bridge at the mouth of
Boise Creek. Circa 1889



Boise Creek History

Another Enumclaw pioneer was Niels Brons.



NIELS BRONS
Treasurer 1901 to 1935

In the late 1800's Niels and Ida Brons made their home on a 50-acre parcel of land.

The property is near today's corner of Warner Avenue and Blake Street.

Boise Creek History

Niels wrote about Boise Creek...

"The creek that ran right past our house and barn, Boise Creek, had year after year, overflowed its banks until the silt had built its bed so that it was higher than the surrounding country..."

From Niels Brons's personal memoirs,
Generously provided by his grandson,
Enumclaw resident Marvin Brons.

Boise Creek History

...When we came, we cleaned the bottom of mud, leaves and branches down to pure sand, so that it did not overflow its banks at our place, but everywhere else the flat country would be like a big lake when the snow melted in the mountains...

From Niels Brons's personal memoirs,
Generously provided by his grandson,
Enumclaw resident Marvin Brons.

Boise Creek History

...Some farmers thought this hurt their land, although in reality, it spread a layer of silt that made it more fertile.

They therefore, started a drainage district. A deep ditch was dug further south and diverted the water from our beautiful creek into the ditch...

From Niels Brons's personal memoirs,
Generously provided by his grandson,
Enumclaw resident Marvin Brons.

Boise Creek History

...We were sorry to lose our clear cold water, that we used for the cattle as well as for drinking water. I dug a well, but the water contained so much iron that we could not use it.

Now we had to try something else, so five of us farmers got permission from the Tacoma Waterworks to tap their 48 inch pipe that carried the water...

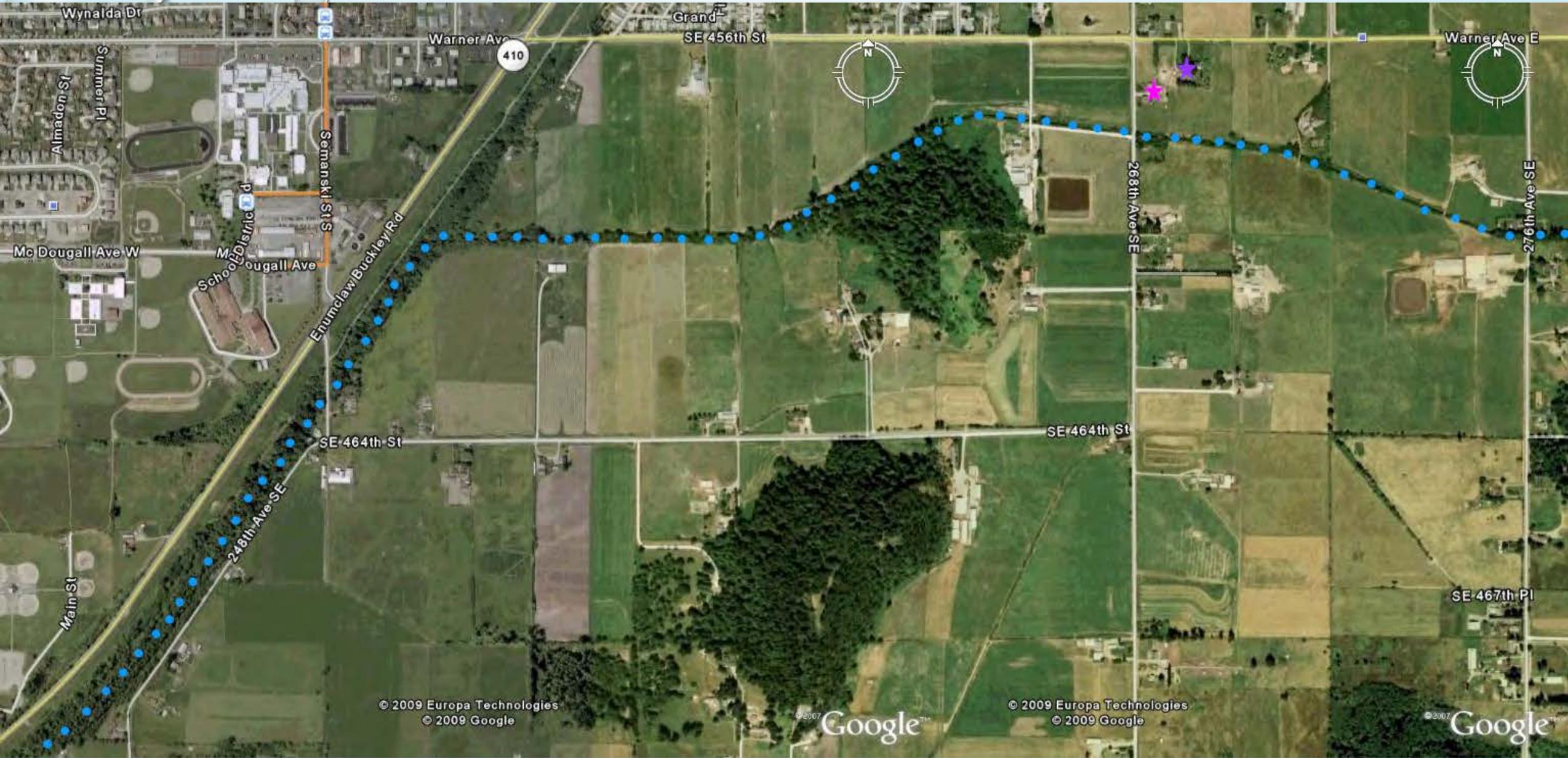
From Niels Brons's personal memoirs,
Generously provided by his grandson,
Enumclaw resident Marvin Brons.

Boise Creek History

... from Green River, 12 miles north of Enumclaw to Tacoma. This pipe runs parallel to the Northern Pacific Railroad tracks.

The point at which we tapped the pipe was about a mile from my corner, and it was quite expensive to lay a 2 inch pipe to the different farms, but after the first outlay, it was very cheap. Now we had good water.”

From Niels Brons's personal memoirs,
Generously provided by his grandson,
Enumclaw resident Marvin Brons.



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Wynalda Dr

Warner Ave
410

Grand SE 456th St

Warner Ave E

Almadon St
Summer Pl

School District
Mc Dougall Ave

Enumclaw Blvd
Buckley Rd

268th Ave SE

276th Ave SE

Mc Dougall Ave W

SE 464th St

SE 464th St

Main St

248th Ave SE

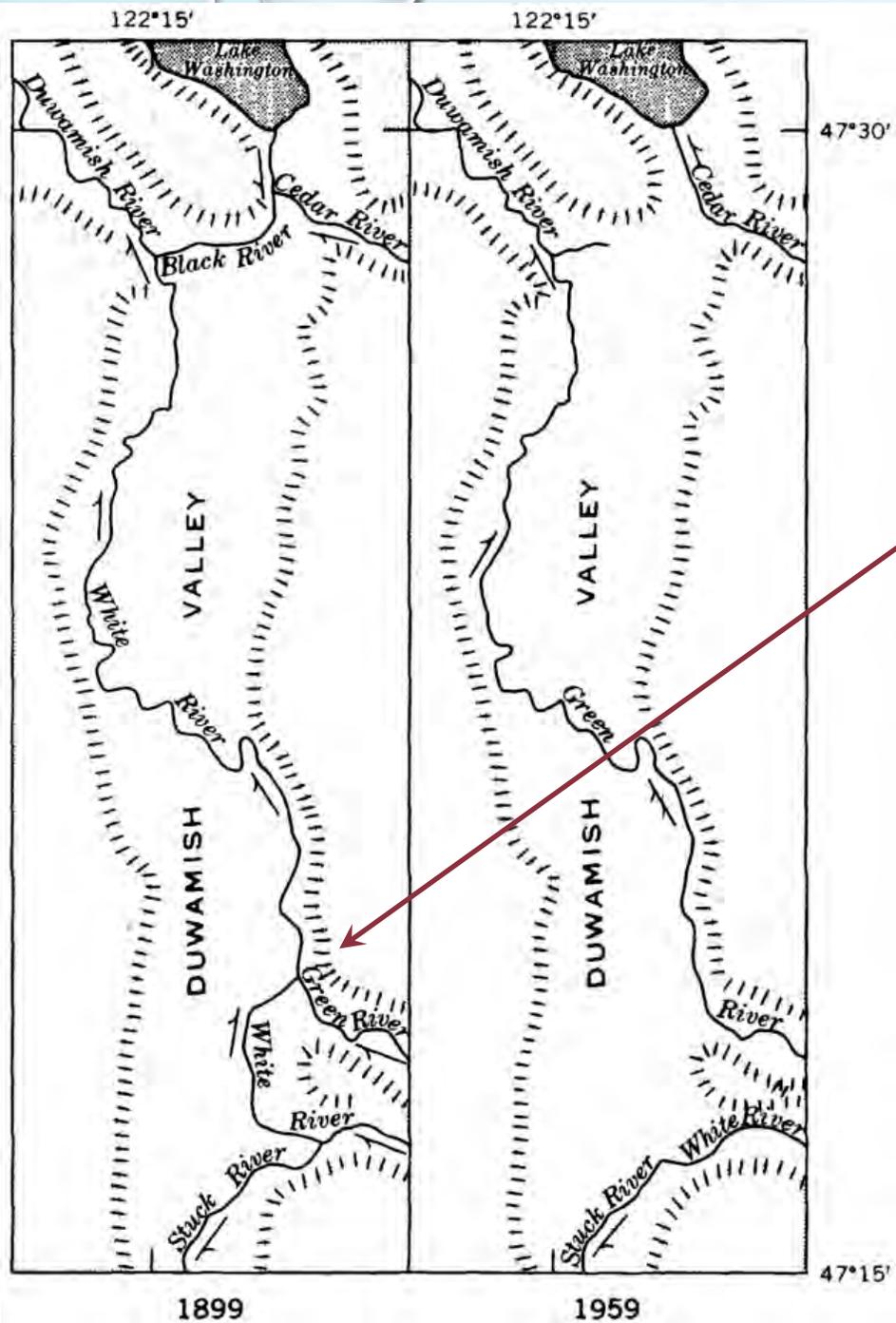
SE 467th Pl

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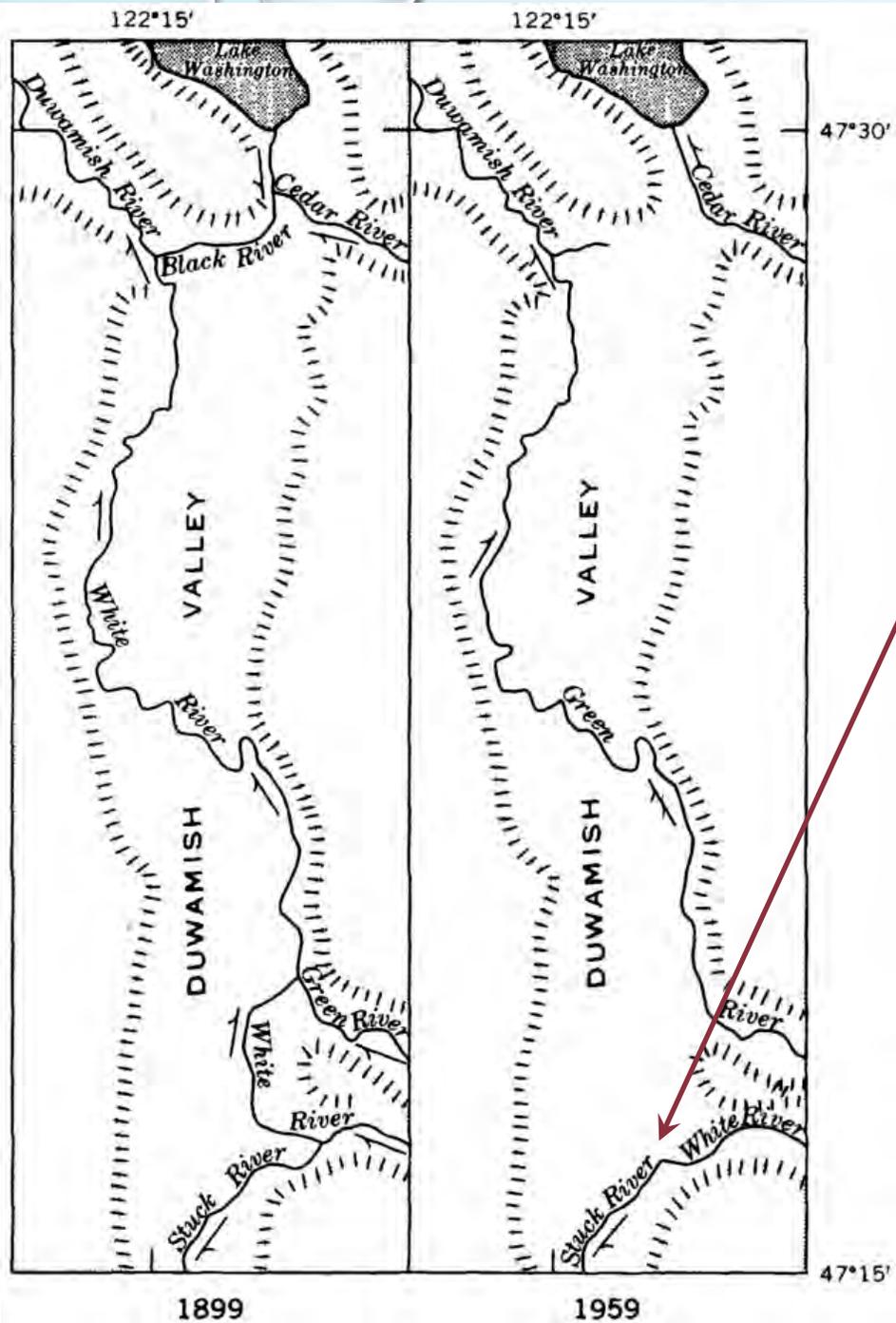
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White River History

Before 1906 the White River joined the Green River near Auburn, and the combined river (under the name "White") joined the Black River at Tukwila, forming the Duwamish River, which emptied into Elliott Bay at Seattle.



White River History

In 1906, a great flood coupled with a large log and debris jam diverted the White River southward into the Stuck River thence into the Puyallup River, which empties into Commencement Bay at Tacoma. The debris dam was replaced with a permanent diversion wall.

Some Observations

Boise Creek Farm is on the north side of the creek, just east of 268th (the county extension of Blake Street).



We have experienced several floods since 1998.

Some Observations

We've observed a lot of wildlife in or around the creek...

In odd years (2011, 2013, etc.) there are thousands of Pink (or Humpback) Salmon that come to spawn.



Humpback

Some Observations

Every year there are three salmon species that spawn:

the Chinook (or King) Salmon; the Coho (or Silver) Salmon; and the Chum (or Dog) Salmon.



King



Silver



Dog

Some Observations

Boise Creek also has three species of trout:



Rainbow; Steelhead; and Cutthroat.

Some Observations

Boise Creek also has:

- fresh water mussels and periwinkles
- Fresh water Crawdads
- And an odd fish called the Pacific Lamprey



Some Observations

We've seen:

- Coyotes
- Beaver and River Otter
- Brown Bats
- Black Bears
- Raccoons
- Bobcats
- Roosevelt Elk
- Deer
- and Possum





Some Observations

We've spotted 89 species of birds (so far!):

American Dipper; Brewer's and Red-winged Blackbirds; Mountain Bluebird; Lazuli Bunting; Bushtit; Black-capped Chickadee; Brown-headed Cowbird; American Crow; Eurasian Collared and Mourning Doves; Common Merganser, Hooded Merganser, Mallard, and Wigeon Ducks; Bald Eagle; Kestrel, Merlin, and Peregrine Falcons; American Goldfinch, House, and Purple Finches; Pacific Slope and Willow Flycatchers; Cackling, Canada, and Snow Geese; Greater Yellowlegs; Black-headed and Evening Grosbeaks; California and Herring Gulls; Cooper's, Northern Harrier, Red Tailed, and Rough-legged Hawks; Great Blue and Green Herons; Anna's and Rufous Hummingbirds; Scrub and Steller's Jays; Junco; Killdeer; Belted Kingfisher; Golden-crowned and Ruby-crowned Kinglets; Western Meadow Lark; Nuthatch; Bullock's Oriole; Osprey; Barn and Barred Owls; Western-Wood Peewee; Band-tailed Pigeon; Pine Siskin; Common Raven; Spotted and Western Sandpipers; Northern Shrike; Wilson's Snipe; Fox, Golden-crowned, Savannah, Song, House, and White-crowned Sparrows; European Starling; Barn, Tree, and Violet-Green Swallows; Trumpeter and Tundra Swans; Western Tanager; American Robin, Swainson's, and Varied Thrushes; Spotted Towhee; Turkey Vulture; Common Yellowthroat, MacGillivray's, Orange Crowned, Wilson's, and Yellow-rumped Warblers; Cedar Waxwing; Downy, Harry, Northern Flicker, Pileated, and Red-breasted Sapsucker Woodpeckers.

Conclusion

The Middle Boise Creek Natural Area was created in the summer of 2013. It has changed considerably since that time. We look forward to seeing how evolves.

Living near Boise Creek has greatly enriched our lives.

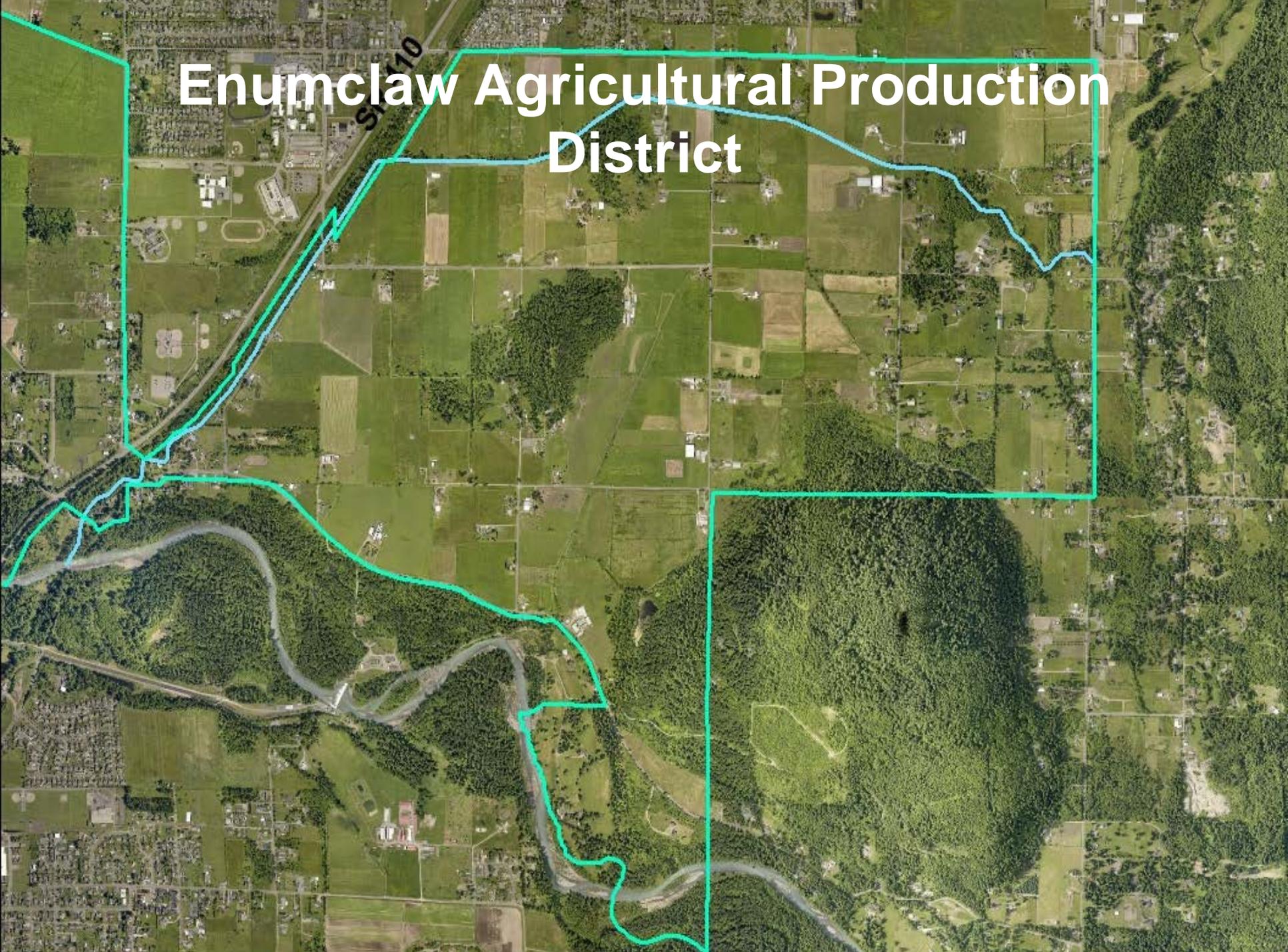
Thank you for your time!

Pat Traub

Boise Creek Ag

- Most of the Agriculture along the creek is pasture land for dairy and beef cattle, horses, goats, and hay.
- There have been crops like hops, berries, and corn grown next to the creek.
- KC Executive prompting Farm Fresh produce.

Enumclaw Agricultural Production District



Agriculture Resources

King County

Ag Commission (3 from area)

website: <http://www.kingcounty.gov/exec/rural/agforestry.aspx>

King Conservation District

Liz Clark (local)

Erin Ericson (Farm planner)

website: <http://kingcd.org/>

Josh Latterell

Lower Boise Creek Restoration Project



Construction Time-Lapse

June 2013

Video #1 (2 min) Chinook
Video #2 (1 min) Steelhead
Video #3 (2 min) Pinks

Chinook Salmon Spawning



	<u>Before</u>	<u>After</u>	
	2008	2010	2012
Percent of total	0%	3%	20%

Steelhead Spawning



	BEFORE			AFTER			
	2008	2009	2010	2011	2012	2013	2014
Percent of total	0%	0%	0%	14%	17%	6%	0%



04/04/2014 11:51

Middle Boise-Evans Restoration Project

BEFORE (2013)



AFTER (2014)



VIDEO 4 MONTHLY TIME-LAPSE

VIDEO 5 JUVENILE FISH IN MAY
VS. OCTOBER

Summary

- If you build it, they will come!
 - Fish use restoration sites
- We can do better!
 - Monitor for continuous improvement
- Show me the data!
 - Lower Boise report is available

Getting sleepy yet?

Whew! Take a break



Deborah Pessoa

What do we know about flooding on Boise Creek?

- How are floods measured?
- What's happened during recent floods?
- What contributes to flooding?
- What happens during small and big floods?
- What can we do about it?

How we measure floods

- Frequency = How often (in years) on average
- Magnitude = Size (in cubic feet per second)

Frequency	Peak flow (cfs)
1-year	126
2-year	355
5-year	567
10-year	748
100-year	1,400

January 21, 2011
268th looking south, some time after the peak



Flow peaked around 430 cfs
- (roughly a 3-year event)

January 21, 2011

**276th Ave SE & Warner Ave looking west, some time
after the peak**



**Flow peaked around 430 cfs
(roughly a 3-year event)**

January 21, 2011

**268th Ave SE Bridge looking northeast, some time
after the peak**



**Flow peaked around 430 cfs
- (roughly a 3-year event)**

January 29, 2009

268th Ave SE near bridge looking northeast



**Flow peaked around 1,360 cfs
(close to a 100-year event)**

Photo Bob Ames

January 29, 2009
Looking south on 268th Ave SE



Flow peaked around 1,360 cfs
(close to a 100-year event)

Photo Bob Ames

What contributes to flooding?

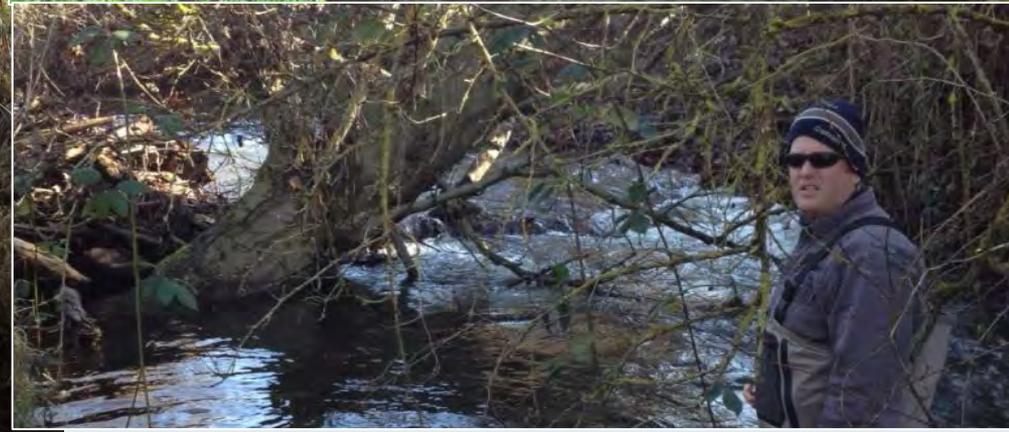
- **Natural factors**
 - Climate
 - Geology
 - Unconfined floodplain
 - Flat grade
 - Soils drain slowly
 - Natural obstructions

Rainier lahars
(black sand, silts, clays)



What contributes to flooding?

- **Human factors**
 - Channel modifications
 - Roads and bridges
 - Eroding banks



We can use a computer
simulation

— a ‘flood model’ —

to identify problem locations

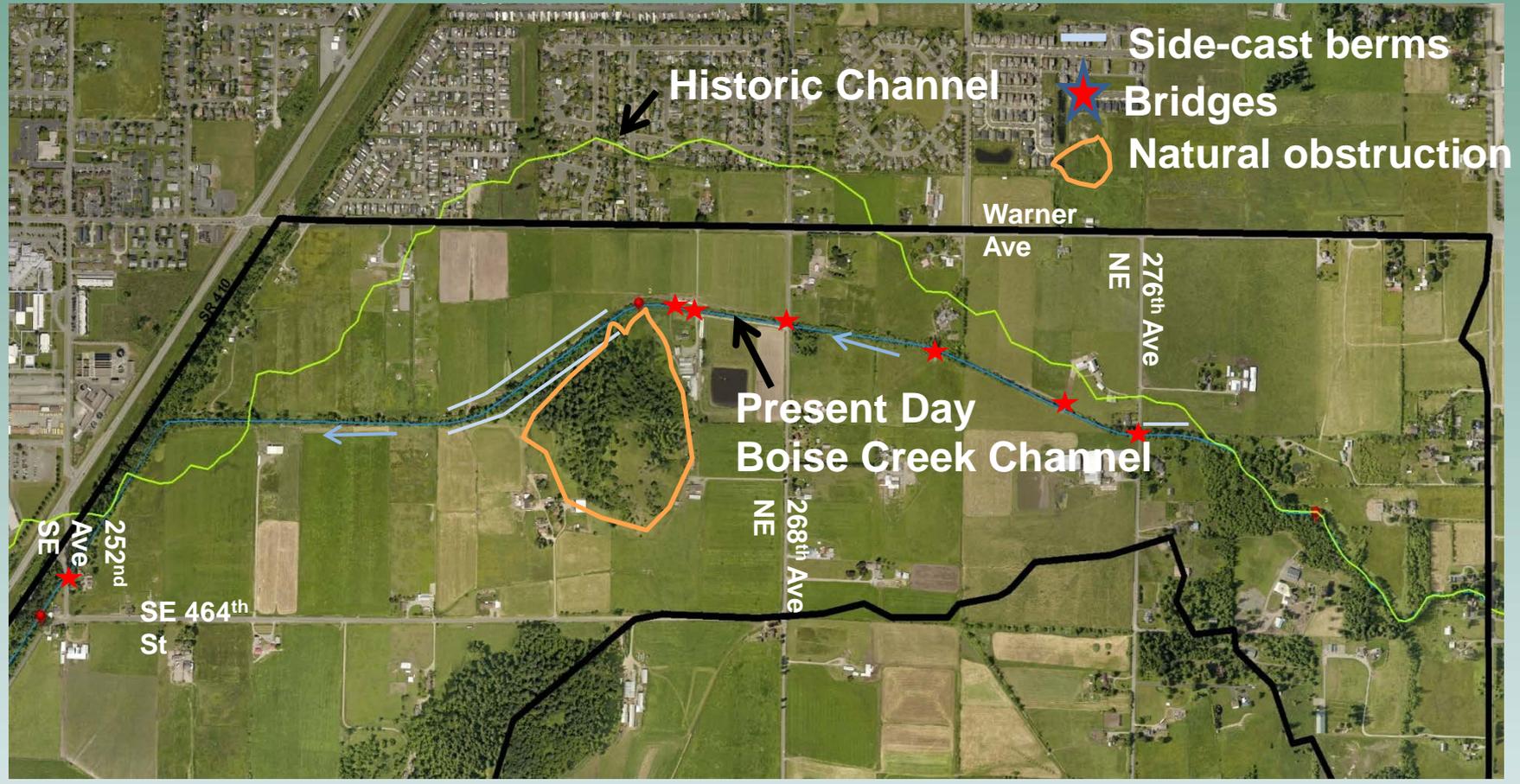
New Floodplain Computer Simulation

- What does it do?
 - Simulates flooding depth, pattern, and velocity
- What is it based on?
 - Detailed topography and hydraulic principles
 - Adjusted using high water marks (2009 flood)
- Which floods were simulated?
 - 2-yr (355 cfs) (SMALL FLOOD)
 - 100-yr flows (1,400 cfs) (BIG FLOOD)

Historic and Existing Boise Creek Alignment

- MiddleBoiseBasin
- Boise_GLO_Channel
- Boise_Creek
- One-mile markers along named rivers and streams

Area modeled



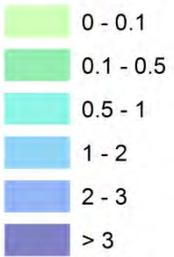
Sneak peek at the results

- The channel is too small
- The bridges are too small
- Bridges create 'shadow' and 'backwater' areas
- Side-cast berms inhibit drainage
- No simple fixes!

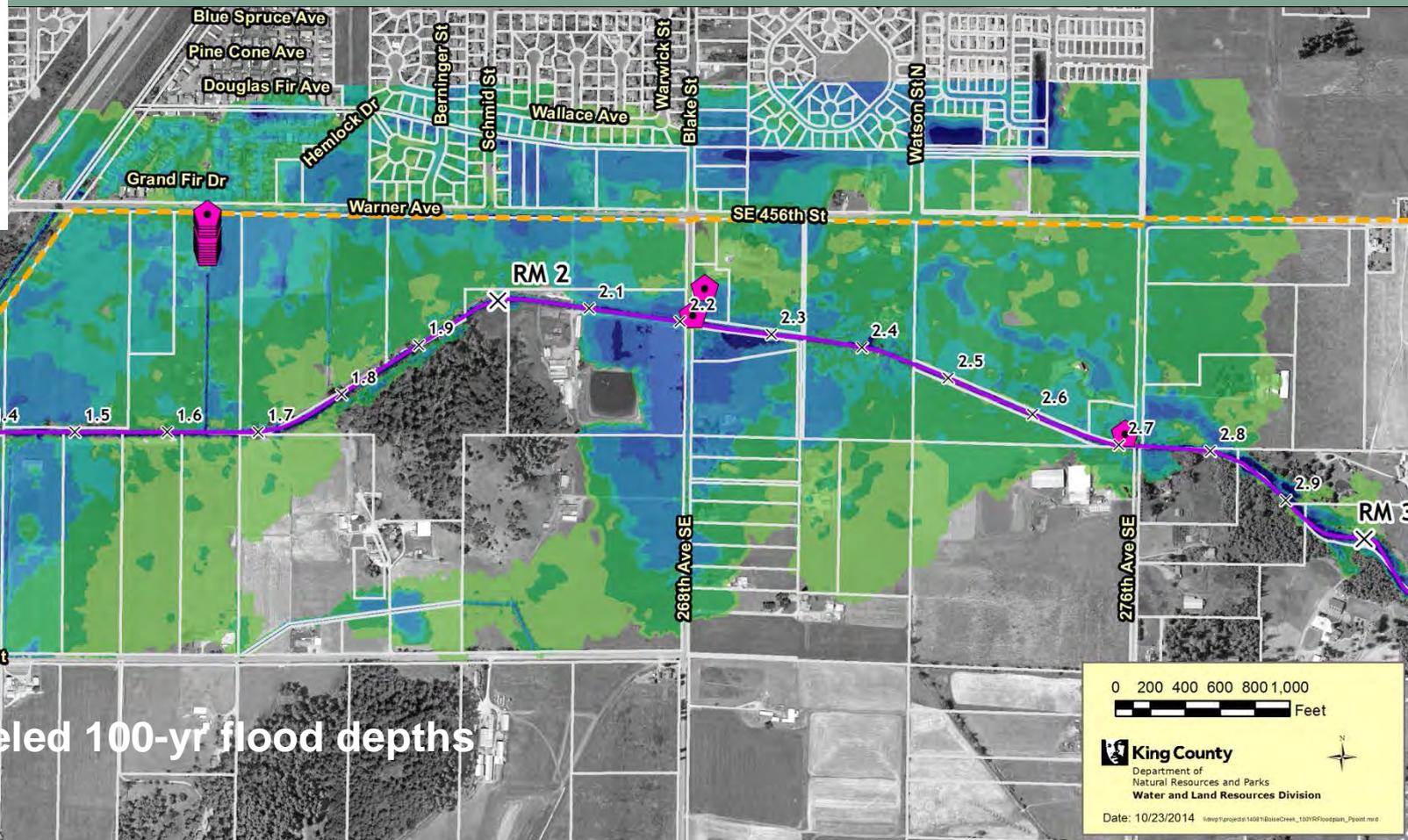
How deep is the floodwater?

How deep is the water during a big flood?

Existing Flood Depth (ft)



- High Water Marks
- Boise Creek
- River Miles
- River Mile Tenths
- City Boundaries
- Parcel Boundaries



DRAFT Modeled 100-yr flood depths

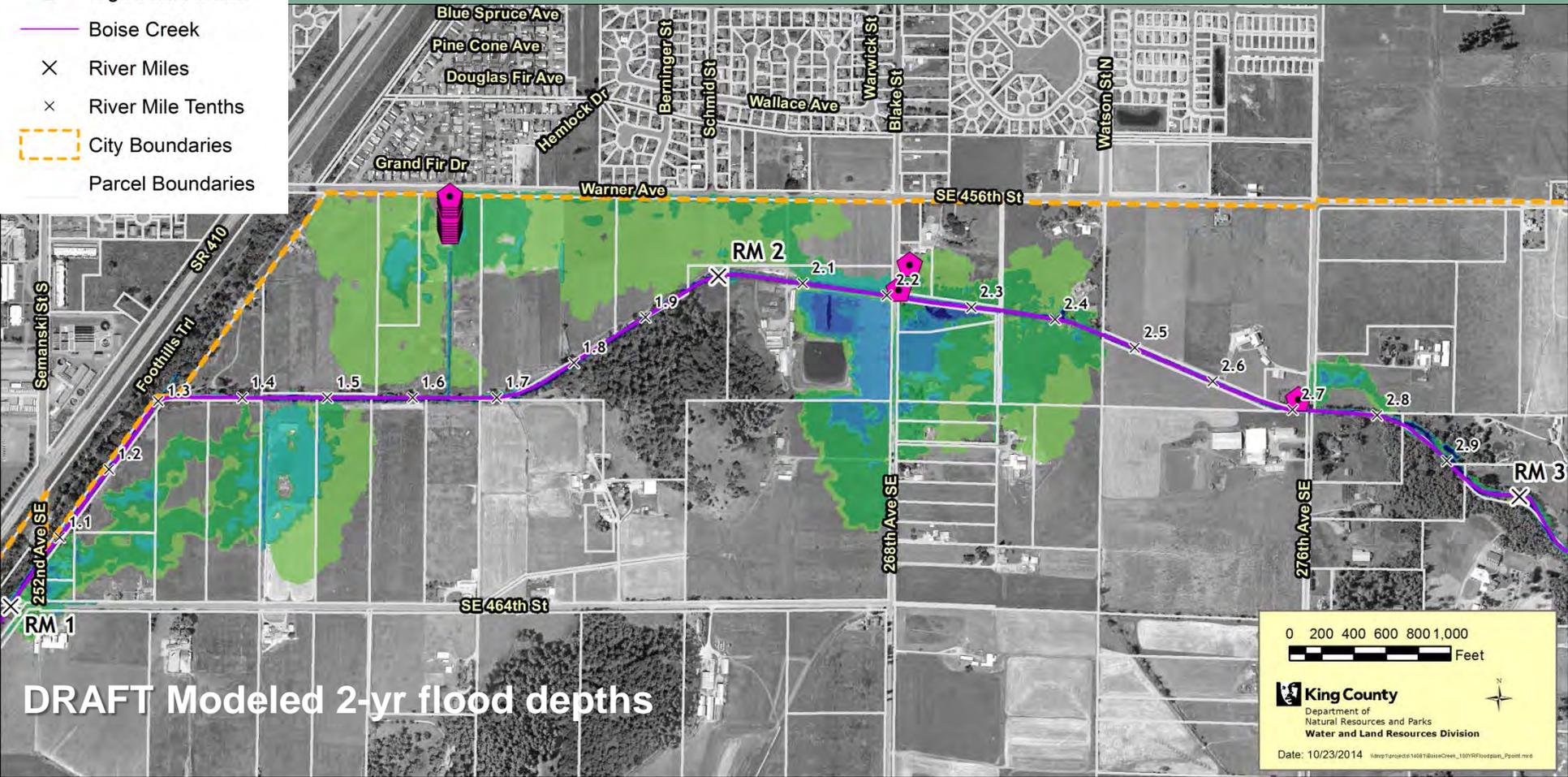
0 200 400 600 800 1,000 Feet

King County
Department of Natural Resources and Parks
Water and Land Resources Division

Date: 10/23/2014

How deep is the water during a small flood?

- Existing Flood Depth (ft)
- 0 - 0.1
 - 0.1 - 0.5
 - 0.5 - 1
 - 1 - 2
 - 2 - 3
 - > 3
- High Water Marks
 - Boise Creek
 - River Miles
 - River Mile Tenths
 - City Boundaries
 - Parcel Boundaries



DRAFT Modeled 2-yr flood depths

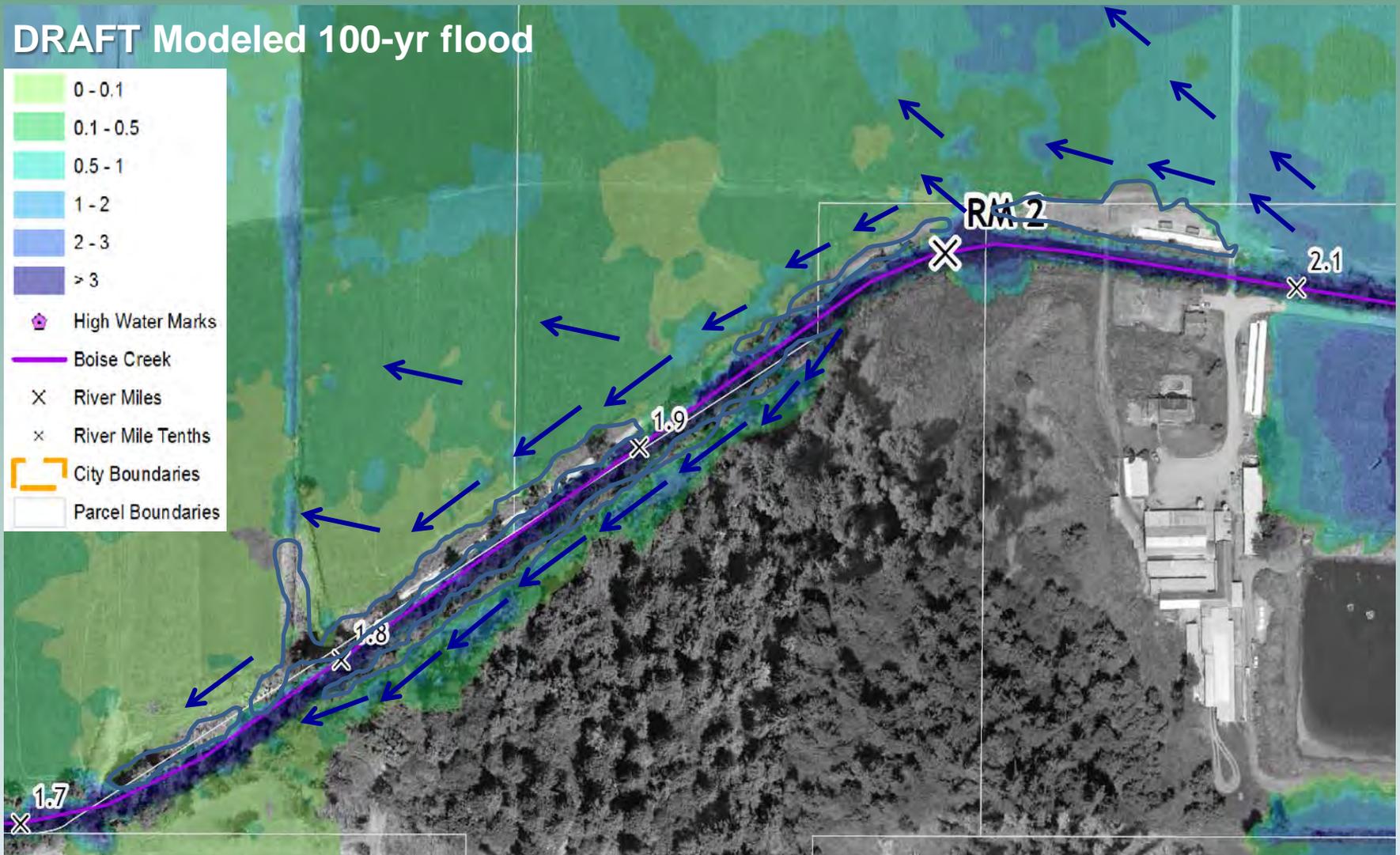
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 Feet

King County
 Department of
 Natural Resources and Parks
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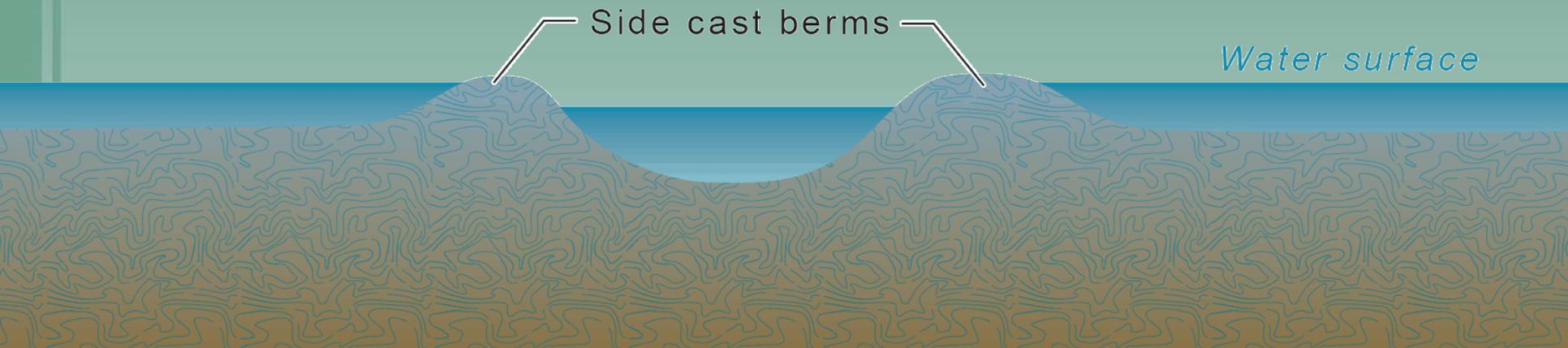
Date: 10/23/2014 \\snp1\proj\140811\BoiseCreek_100YRF\footprint_Ppoint.mxd

How do berms and
bridges affect flooding?

How do side-cast berms affect flooding?



Berms can increase flooding of fields



How do bridges affect flooding?

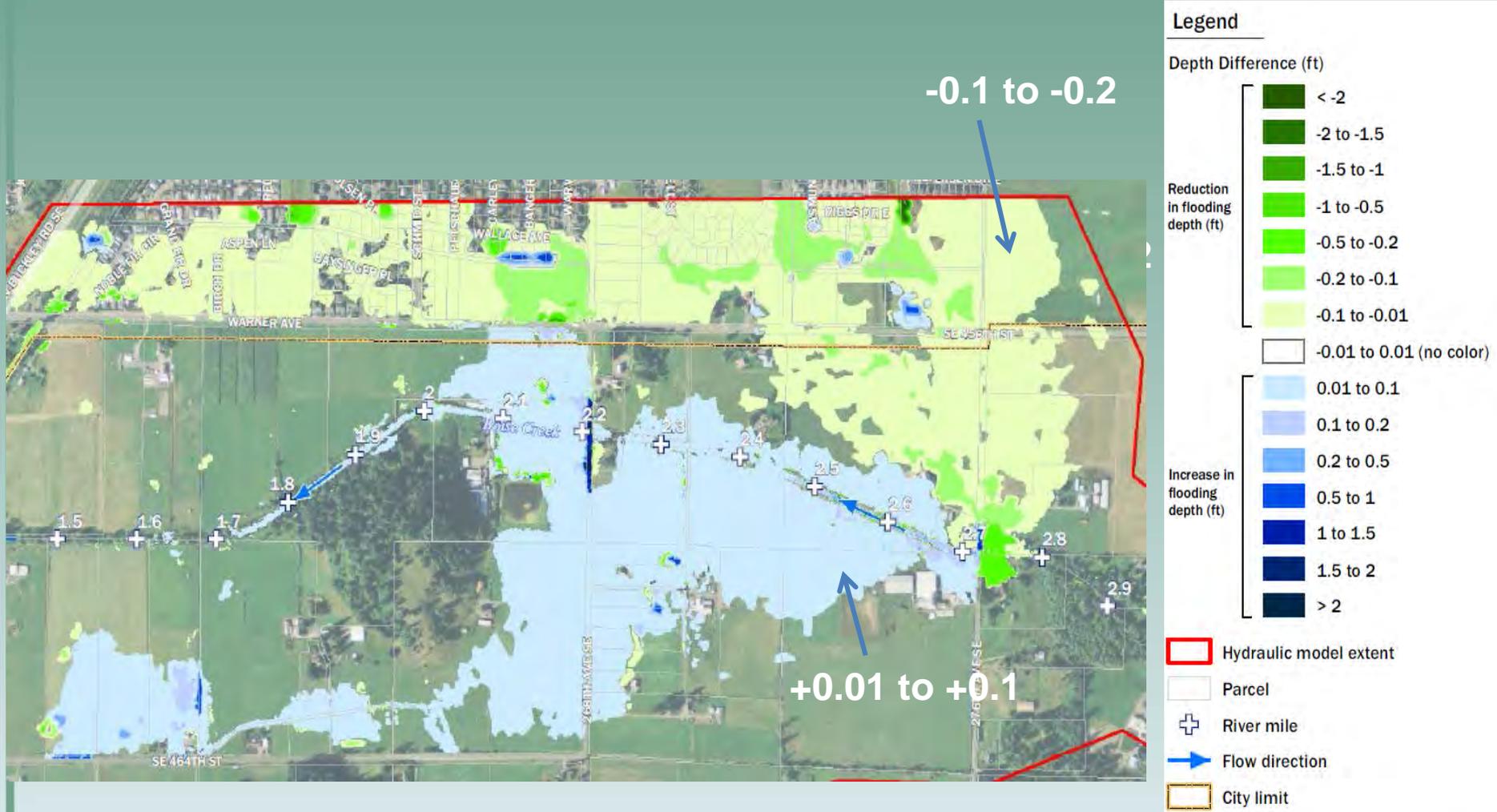
- **Simulation 1**

- Removed both bridges 268th & 276th
- Removed raised road approaches

- **Simulation 2**

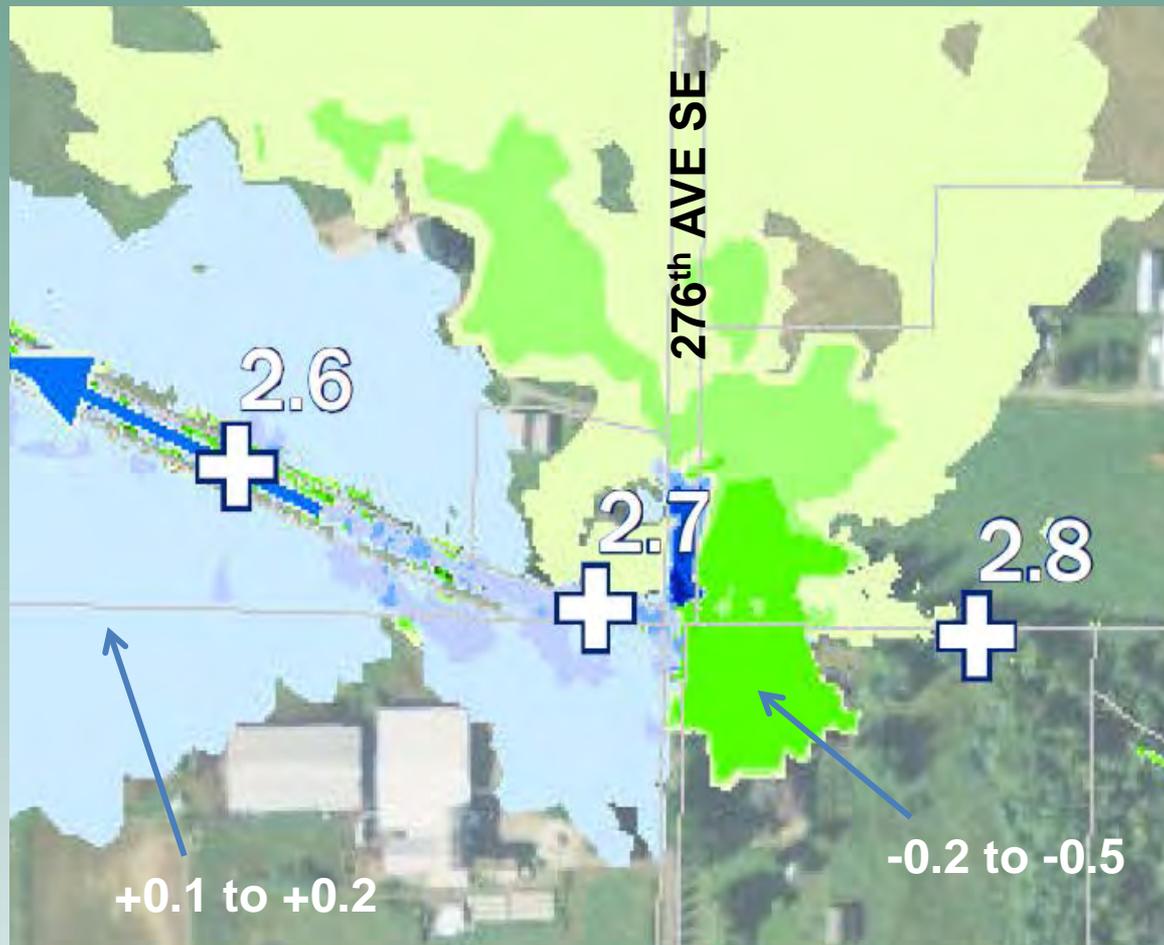
- Removed only 268th Ave SE and its approaches

If we remove BOTH bridges, how does that change water depth during a big flood?



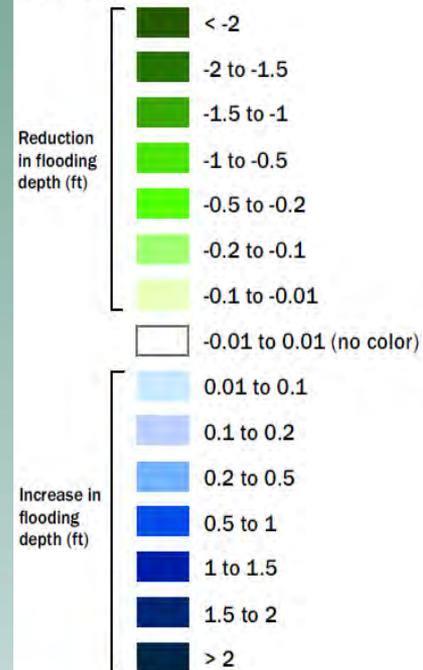
Note: Model results reflect potential conceptual bridge modification alternatives and are for illustration only.

Zooming in on 276th Ave Bridge



Legend

Depth Difference (ft)



Hydraulic model extent

Parcel

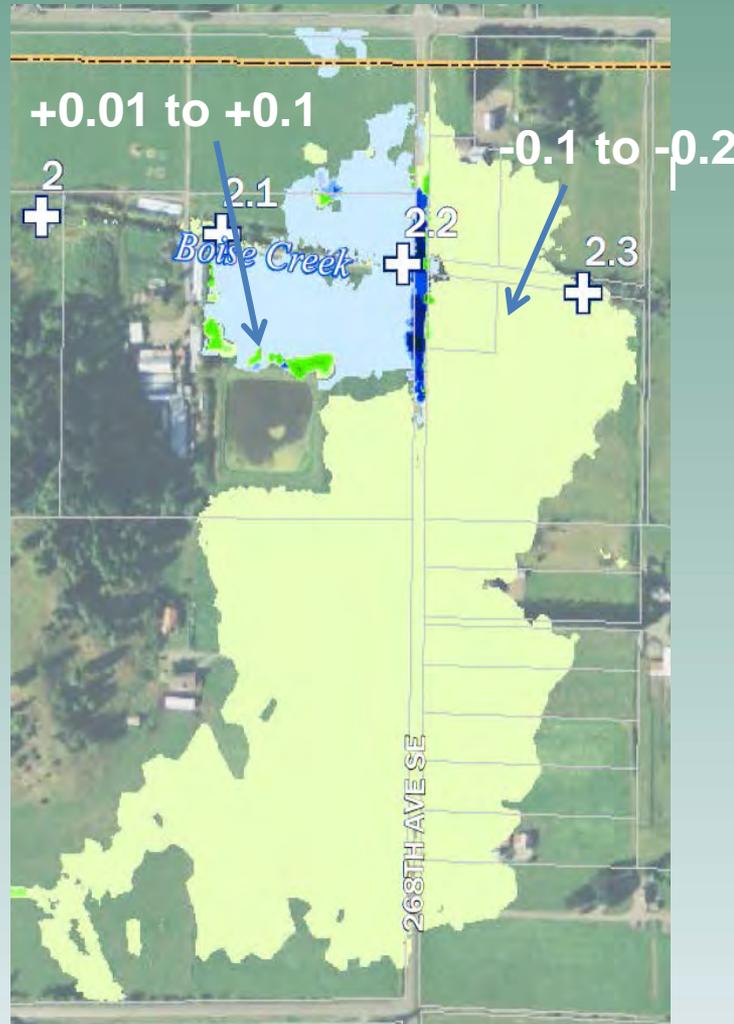
River mile

Flow direction

City limit

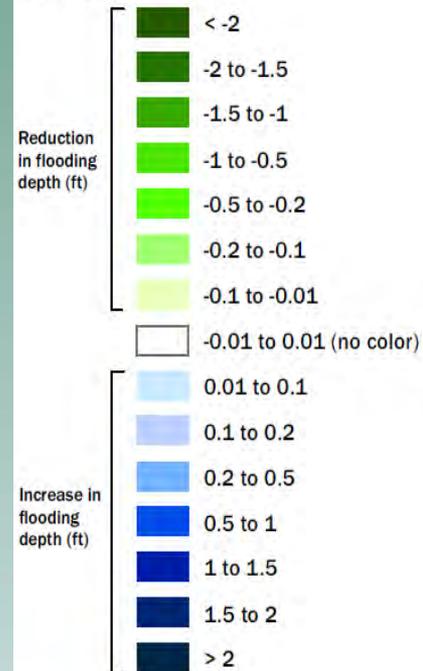
Note: Model results reflect potential conceptual bridge modification alternatives and are for illustration only.

If we remove ONLY 268th Ave SE bridge, how does that change water depth during a big flood?



Legend

Depth Difference (ft)



Hydraulic model extent

Parcel

River mile

Flow direction

City limit

Note: Model results reflect potential conceptual bridge modification alternatives and are for illustration only.

What did we learn from the study?

- The channel is too small
- The bridges are too small
- Bridges create 'shadow' and 'backwater' areas
- Side-cast berms inhibit drainage
- It's complicated!
 - Overly simple strategies may backfire
- Having a flood model allows us to test different options

What are some possible solutions?

How can we improve both drainage AND habitat?

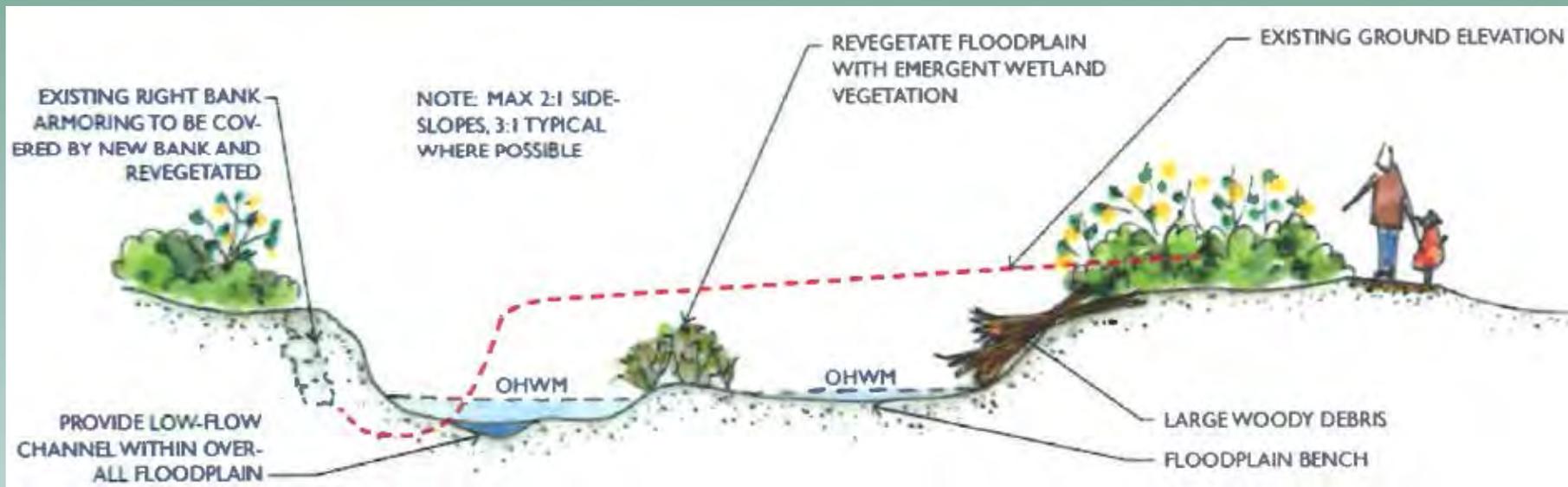
- **Drainage/Flooding**
 - Widen bridge openings and adjust approaches
 - Widen channel (helps with habitat)
 - Elevate ground surface



How can we improve both drainage AND habitat?

- **Habitat**
 - **Widen channel**
 - **Add wood**
 - **Plant vegetated buffers**
 - **Create pools**

Examples of channel widening and restoration actions



Questions about the flood
modeling?

LET'S TALK!

Surprises?

Concerns?

What did we miss?

**What would you like to know
more about?**