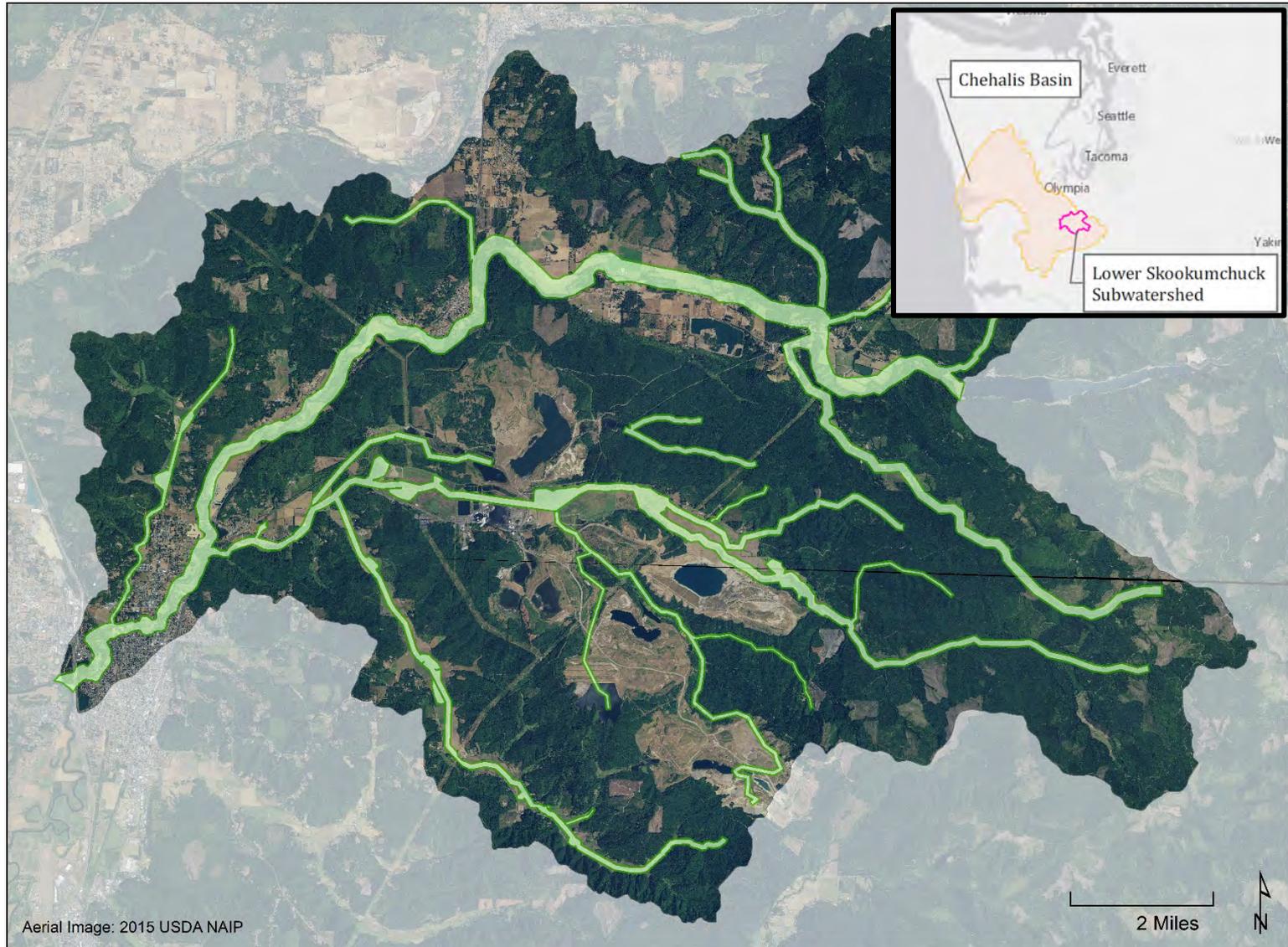


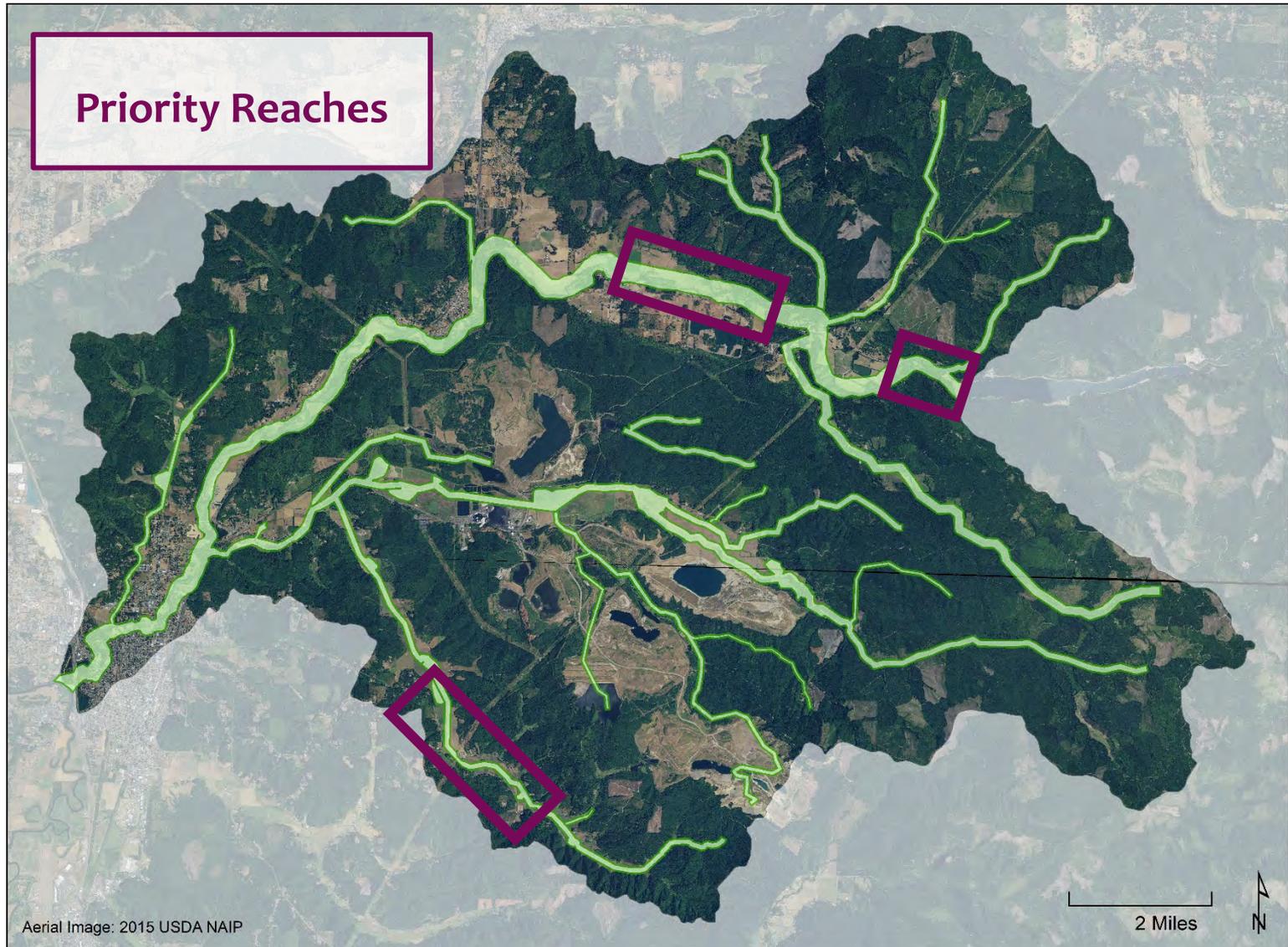
# Quantitative tools to assess current and historic floodplain connectivity in the Skookumchuck watershed

Susan Dickerson-Lange, Tim Abbe, Cynthia Carlstad, Robert Dohrn, Kevin Fetherston, Julia Jay, Shawn Higgins, Jen O'Neal, Kenna Patrick, Colin Riordan, and Maggie Stepp

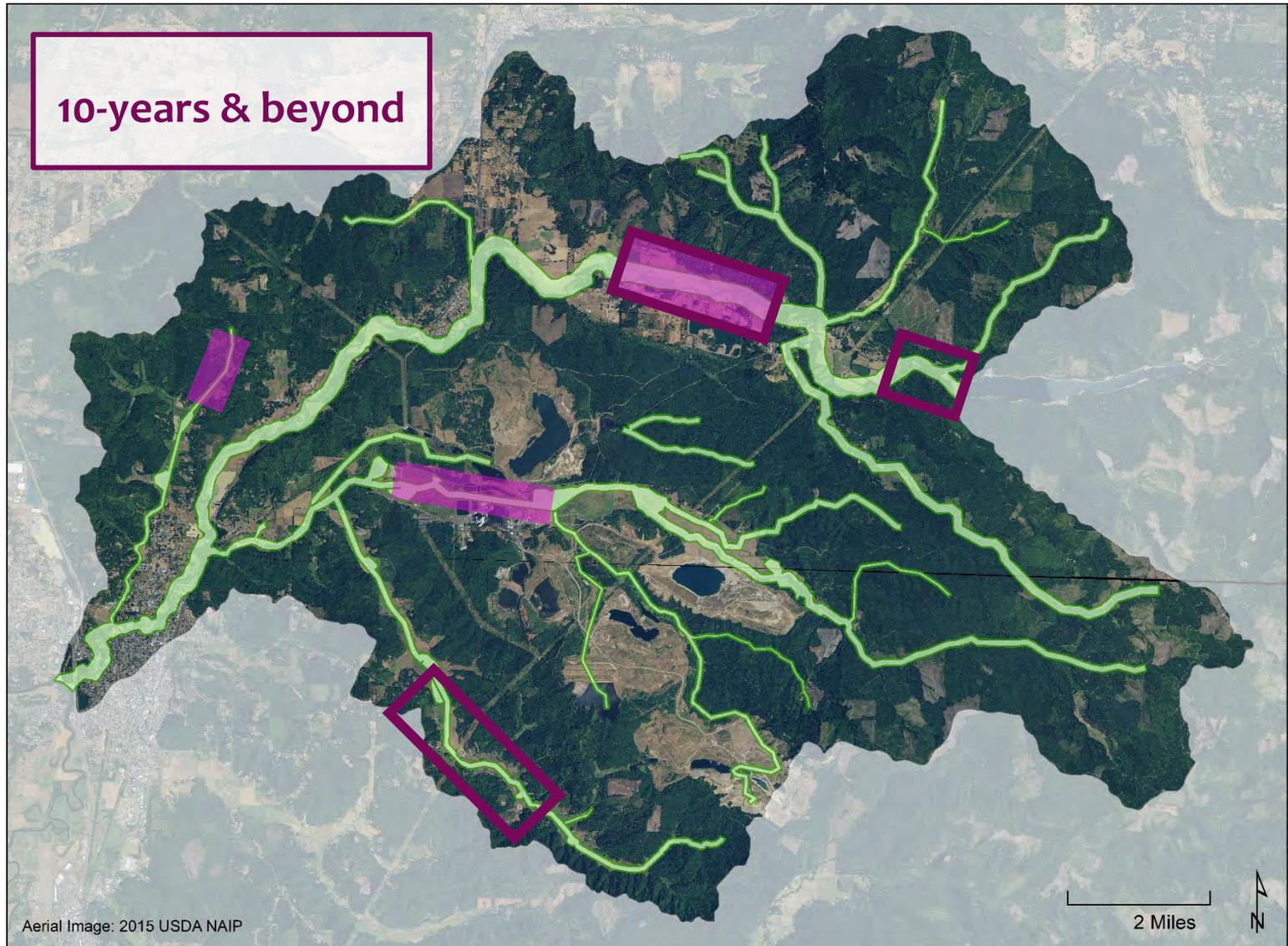
# Overview: Ecological Corridor Concept



# Overview

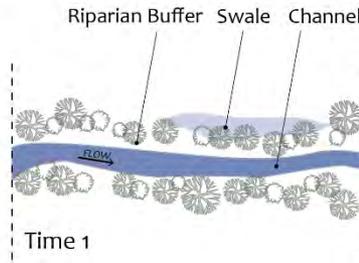


# Overview

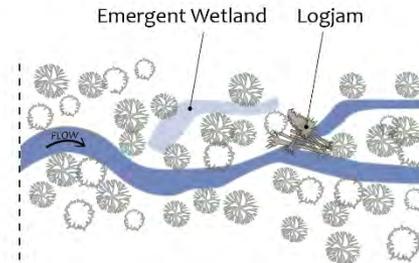


# Why? Concept

SIMPLE CHANNEL



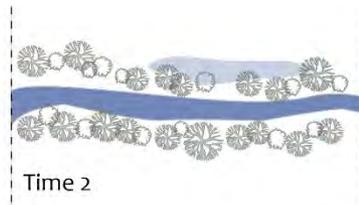
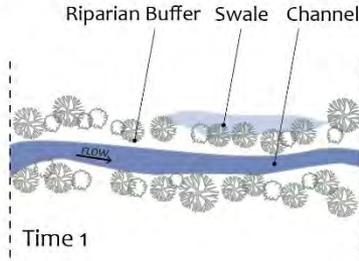
COMPLEX CHANNEL



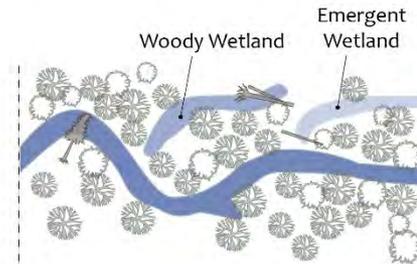
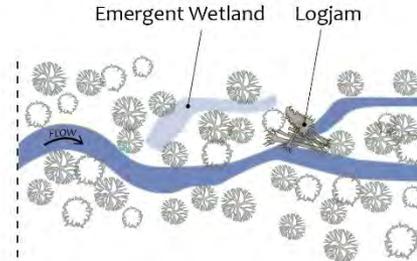
Time 1

# Why? Concept

SIMPLE CHANNEL



COMPLEX CHANNEL

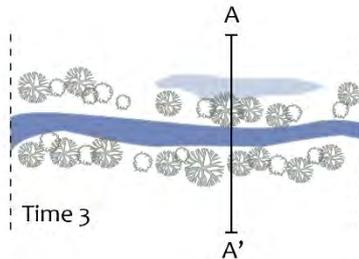
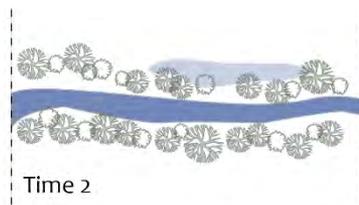
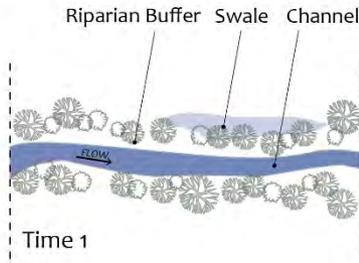


Time 1

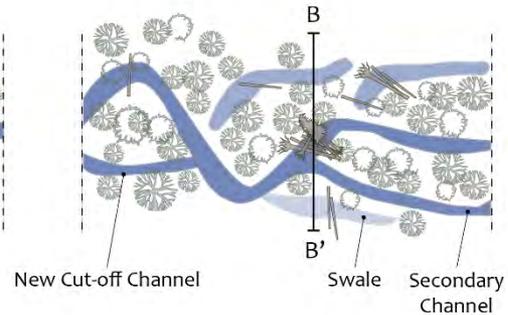
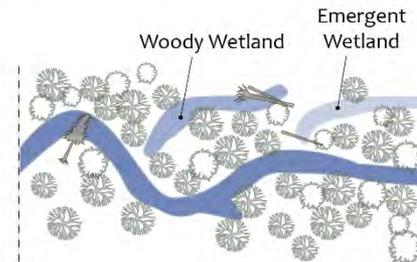
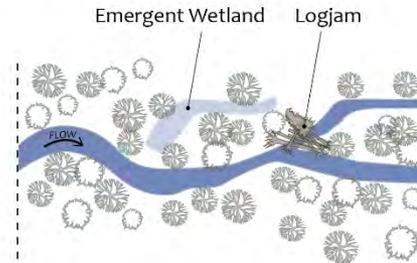
Time 2

# Why? Concept

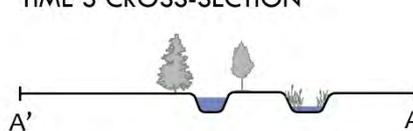
SIMPLE CHANNEL



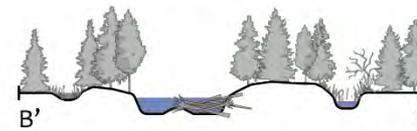
COMPLEX CHANNEL



TIME 3 CROSS-SECTION



Simplified topography.



Complex topography and inundation areas.

Time 1

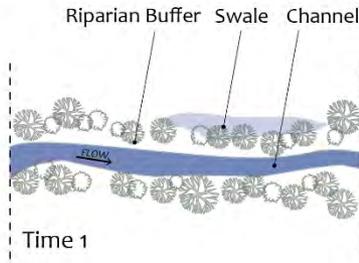
Time 2

Time 3

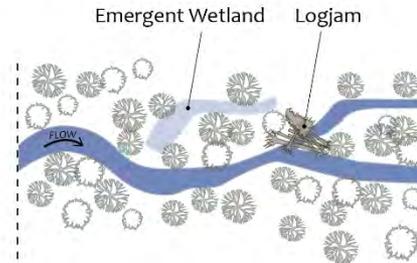
Time 3

# Why? Concept

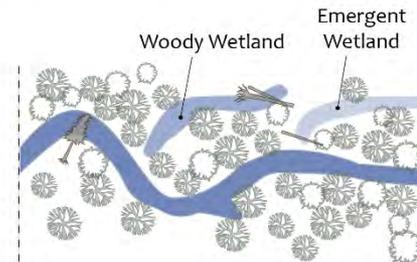
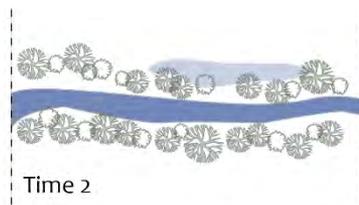
SIMPLE CHANNEL



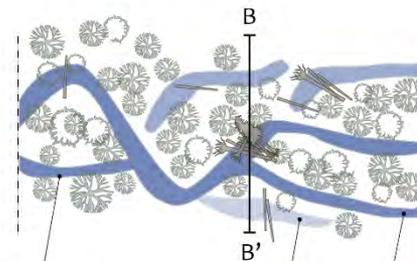
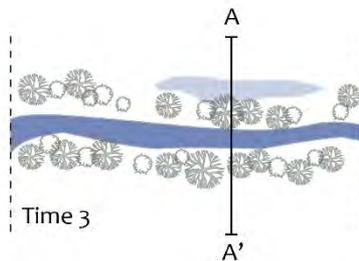
COMPLEX CHANNEL



Time 1



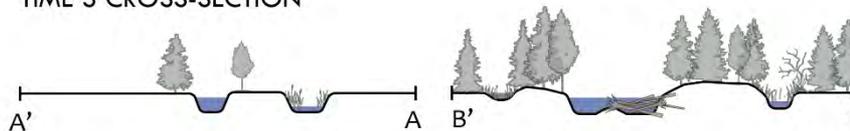
Time 2



Time 3

New Cut-off Channel Swale Secondary Channel

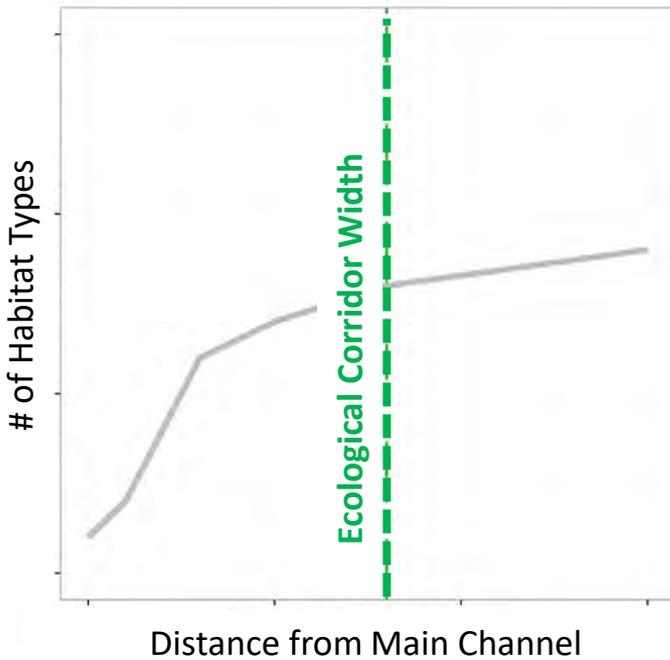
TIME 3 CROSS-SECTION



Time 3

Simplified topography.

Complex topography and inundation areas.

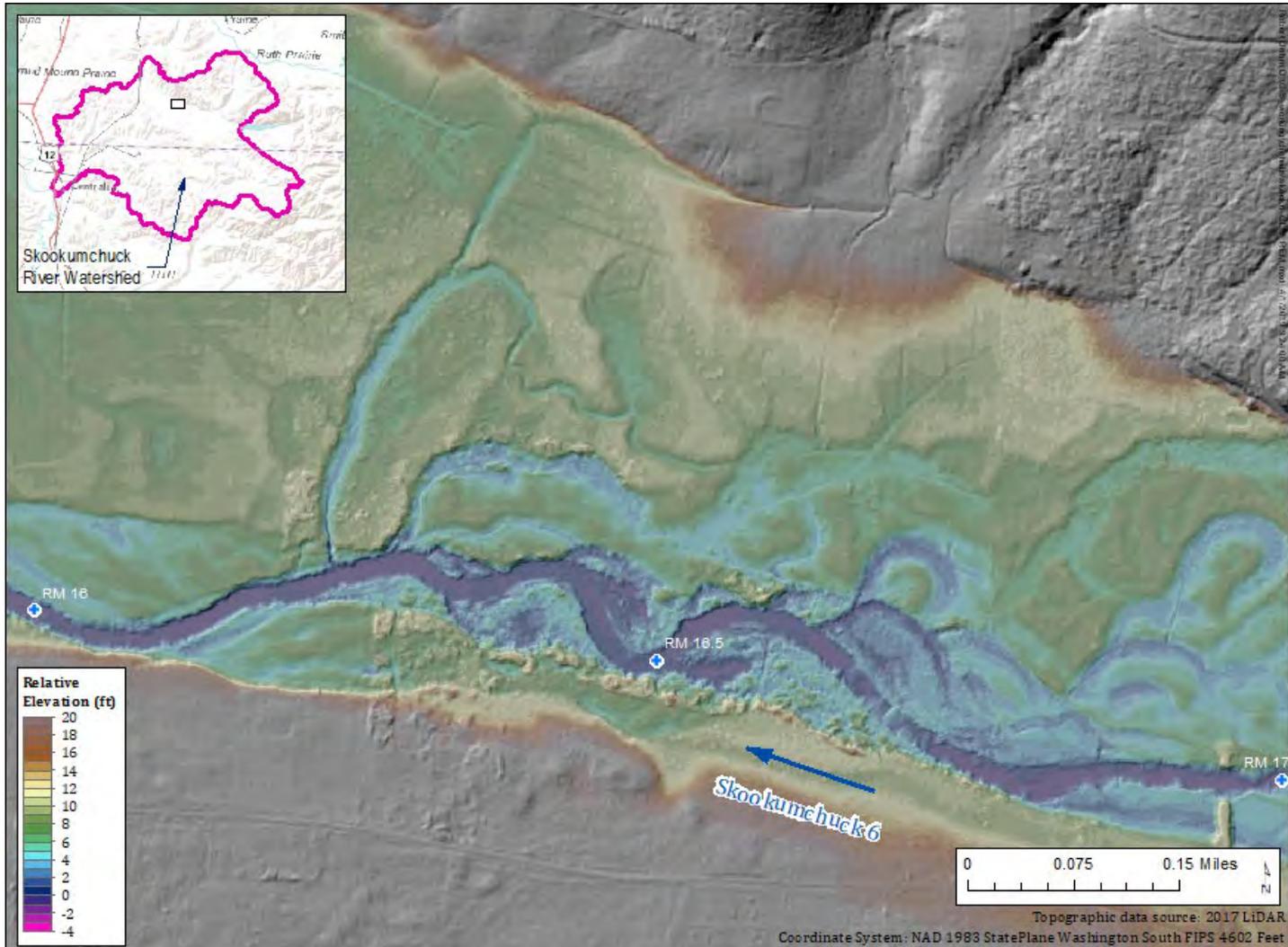


# How? Methods

- Quantify **Current** Channel Length and Floodplain Area
  
- Estimate **Reference Conditions** Channel Length and Floodplain Area
  - ▶ Habitat restoration potential
  - ▶ Geomorphic processes -> Delineate corridor

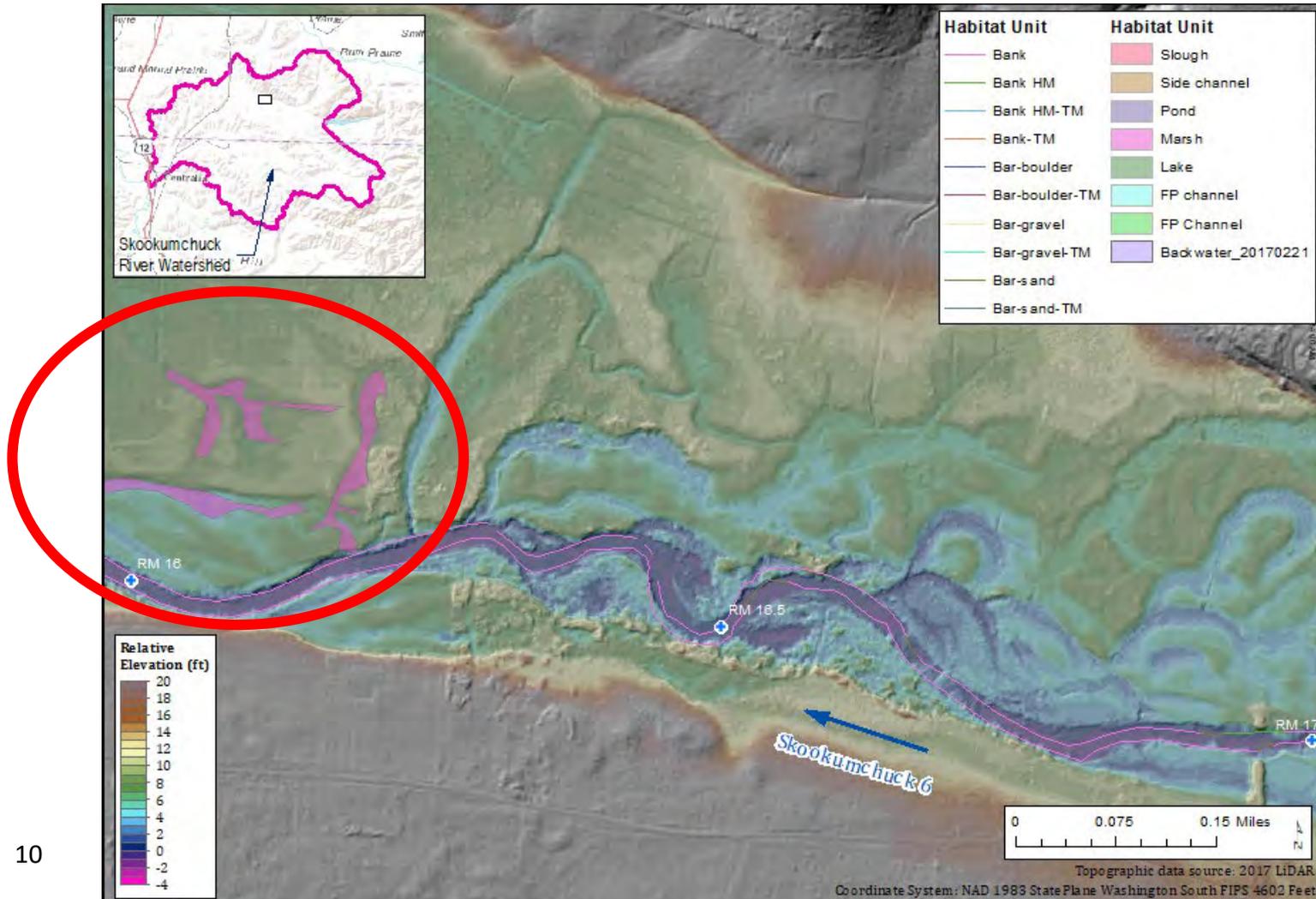
# How? Methods

## Lidar Topography & Relative Elevation Model



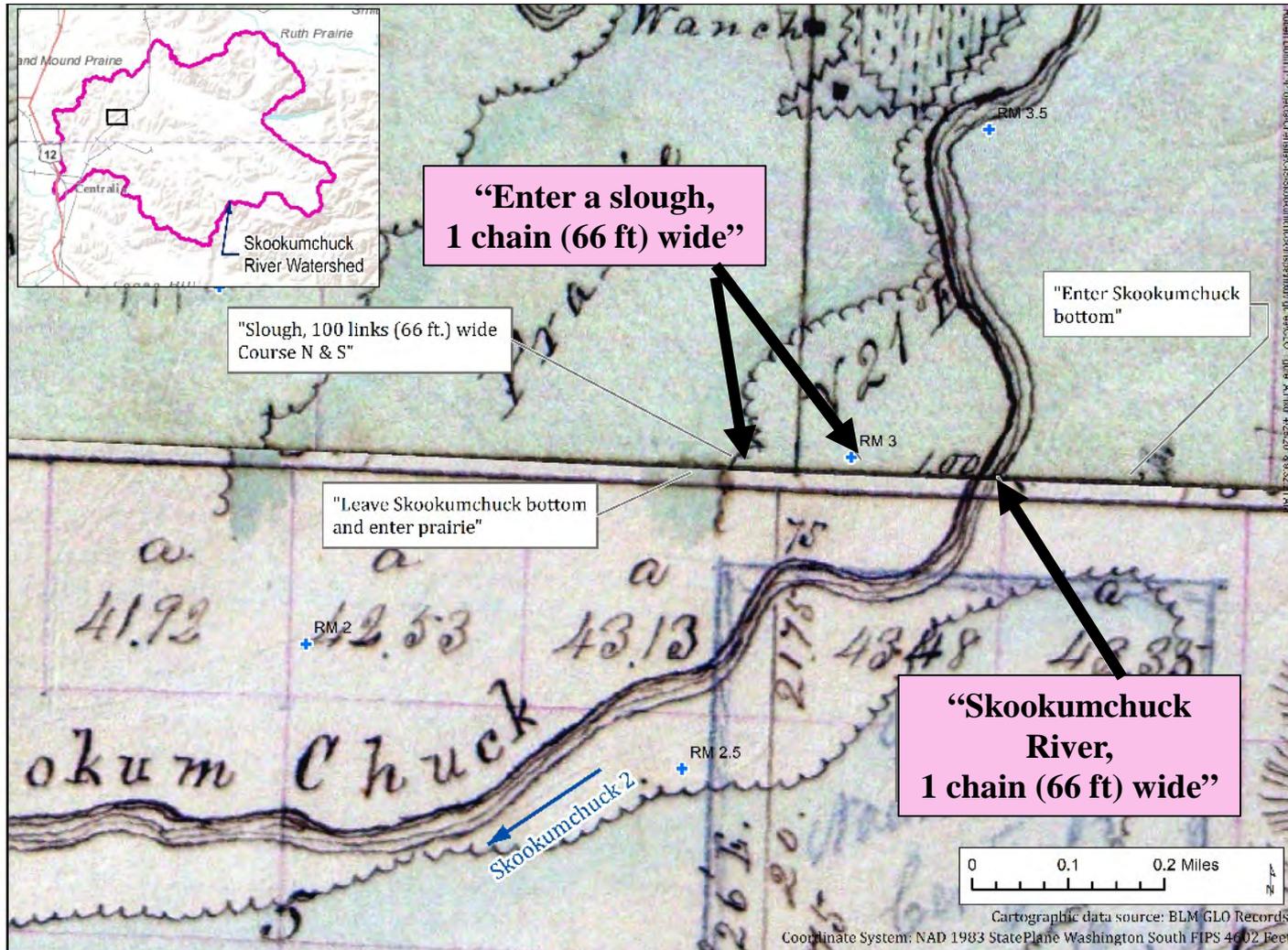
# How? Methods

## Relative Elevation Model + General Land Office (GLO) Surveys



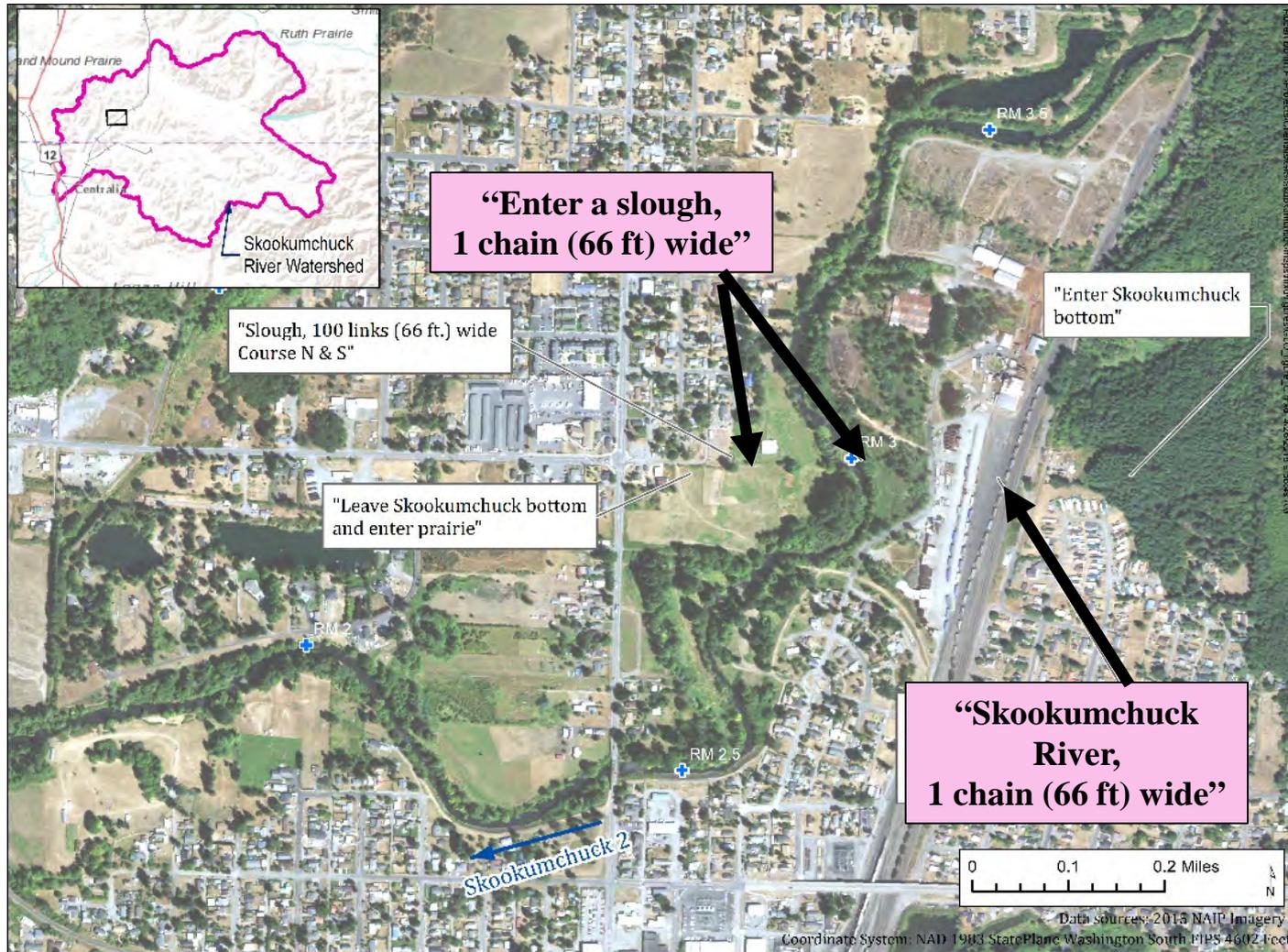
# How? Methods

GLO Surveys + Topographic Evidence -> Channel Length + Process



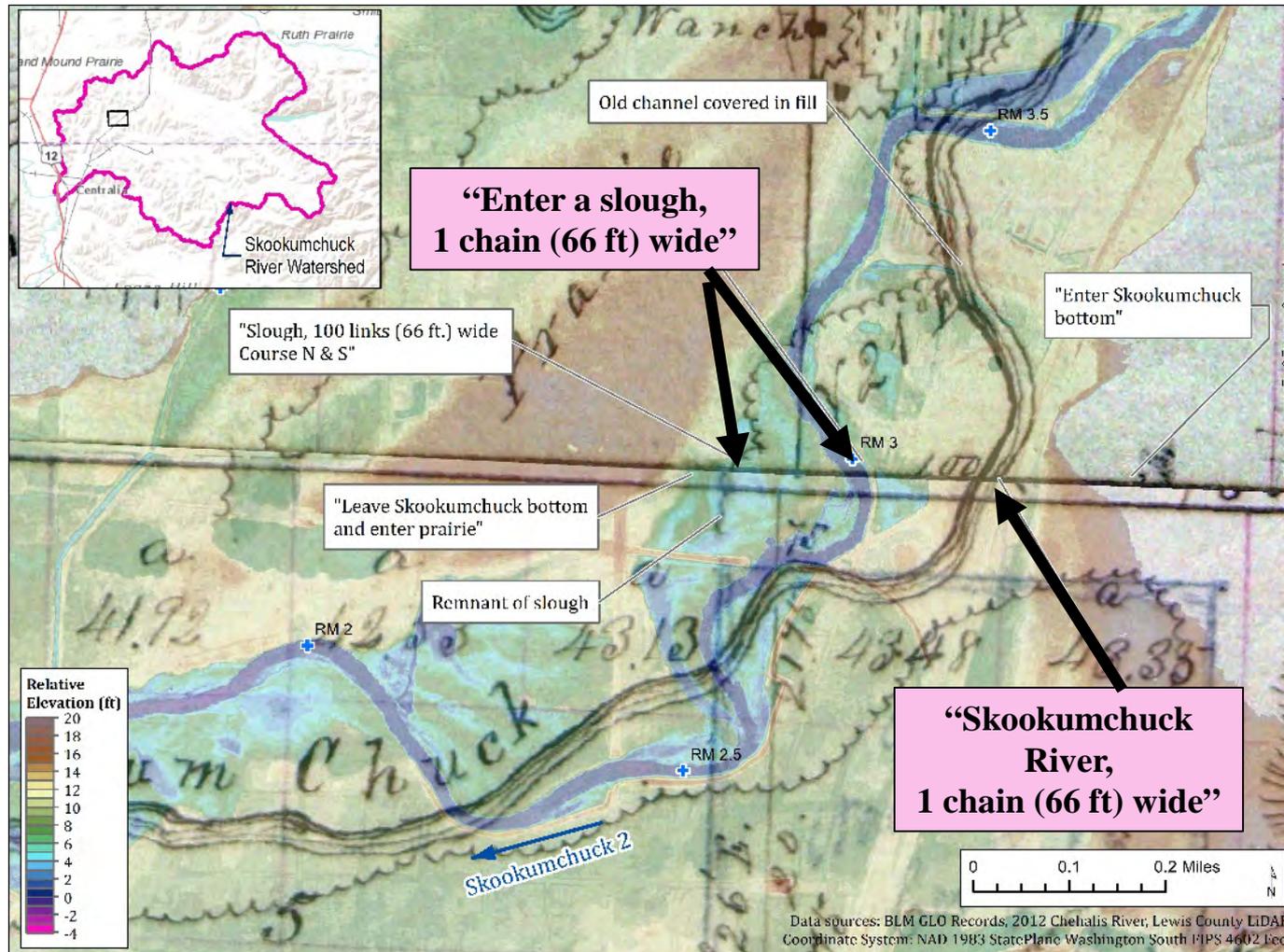
# How? Methods

GLO Surveys + Topographic Evidence -> Channel Length + Process



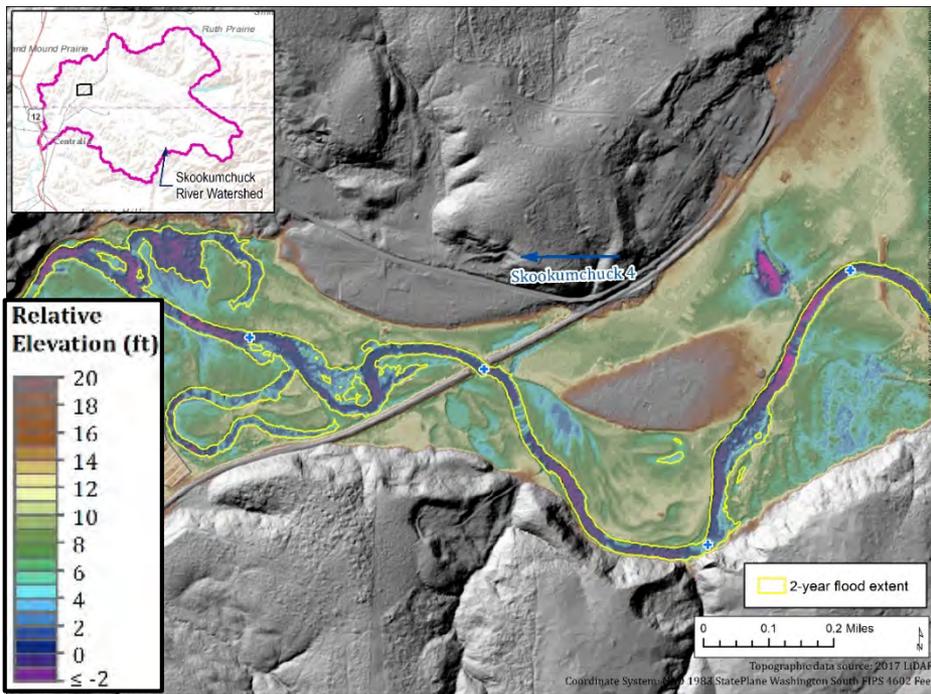
# How? Methods

GLO Surveys + Topographic Evidence -> Channel Length + Process

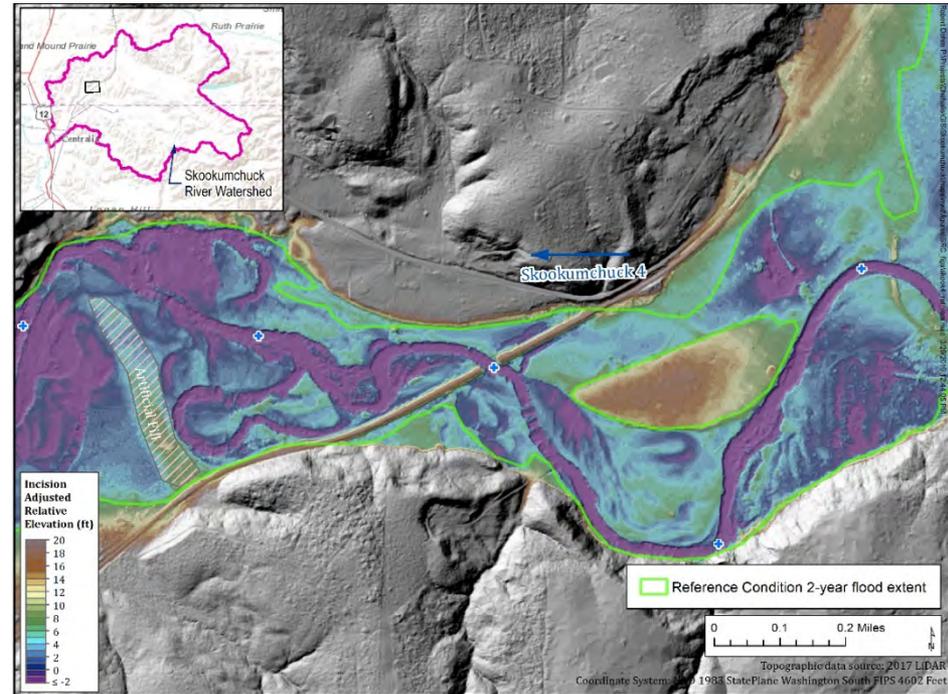


# How? Methods

## Estimate Channel Length + Floodplain Inundation Area



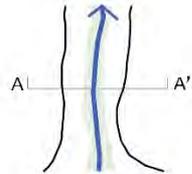
Current Incised Channel



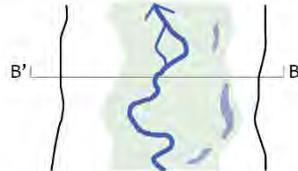
Restored Channel Elevation

# Methods – Geomorphic Setting and E.C.

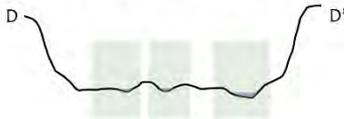
## 1. CONFINED



## 2. UNCONFINED



## 4. UNCONFINED WITH FLOODPLAIN DEPRESSIONS



Ecological Corridor =

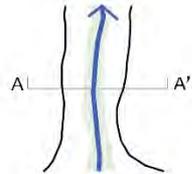
Spatial scale of dominant  
habitat-forming processes

+

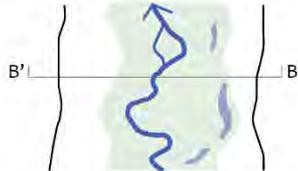
Width for riparian forest

# Methods – Geomorphic Setting and E.C.

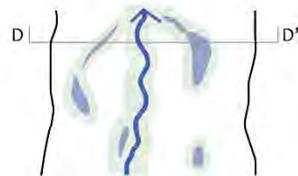
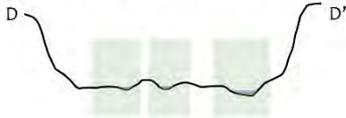
## 1. CONFINED



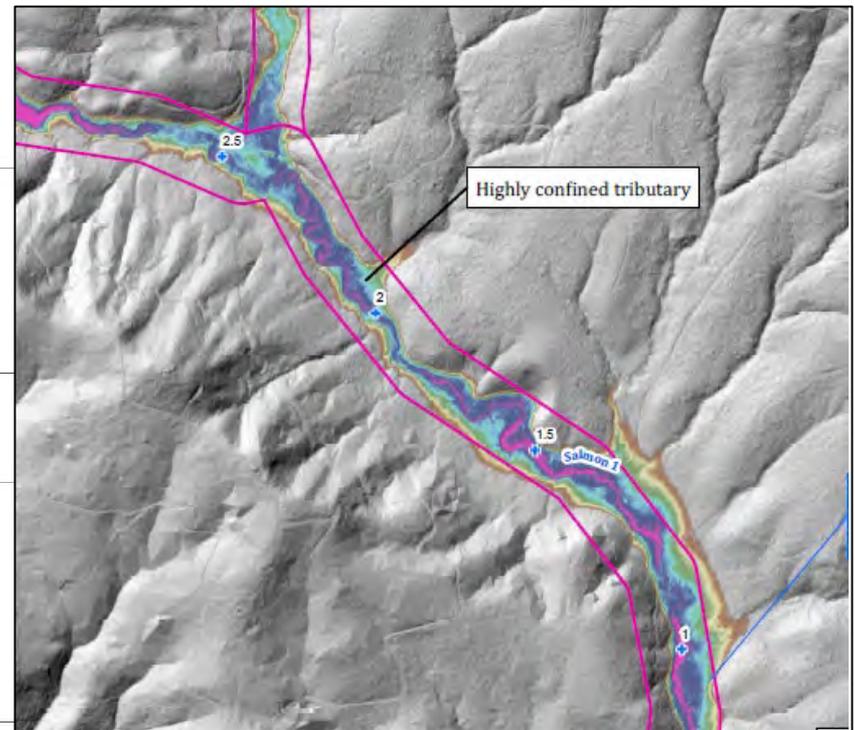
## 2. UNCONFINED



## 4. UNCONFINED WITH FLOODPLAIN DEPRESSIONS



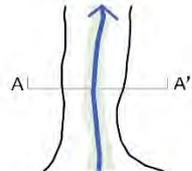
Confined and semi-confined reaches ->  
Corridor ~ Alluvial valley



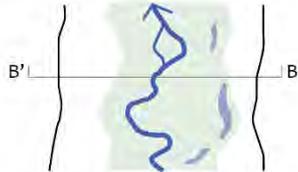
# Methods – Geomorphic Setting and E.C.

Unconfined -> Portion of alluvial valley

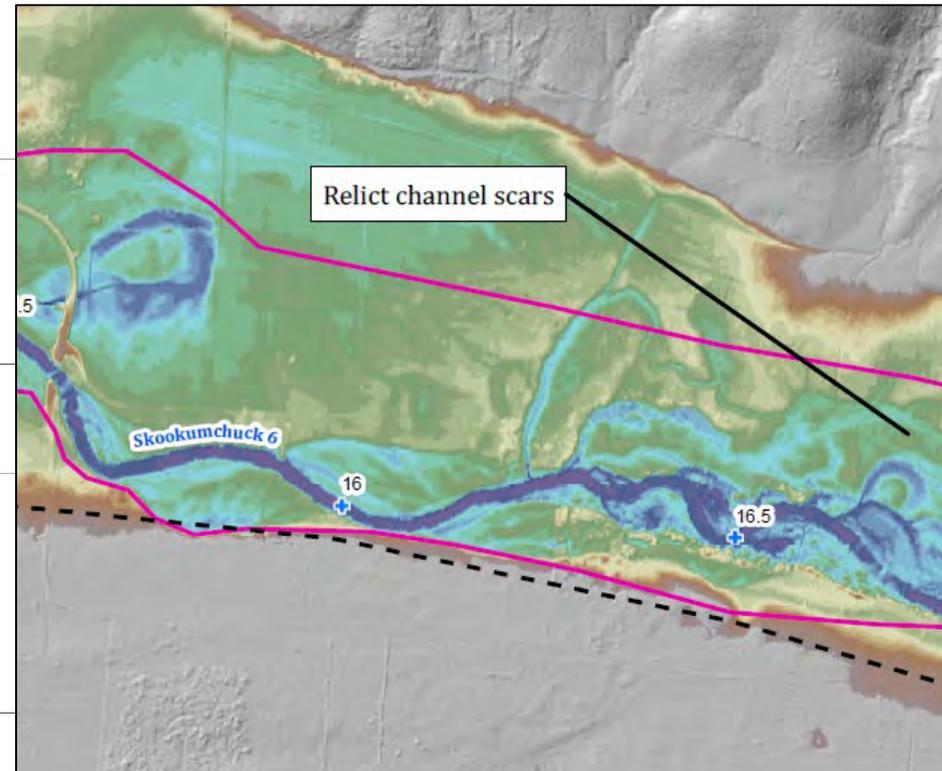
1. CONFINED



2. UNCONFINED



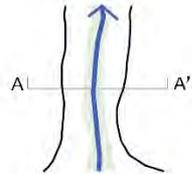
4. UNCONFINED WITH FLOODPLAIN DEPRESSIONS



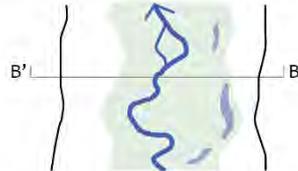
# Methods – Geomorphic Setting and E.C.

Unconfined with Floodplain Depressions -> Smaller Corridor + Nodes

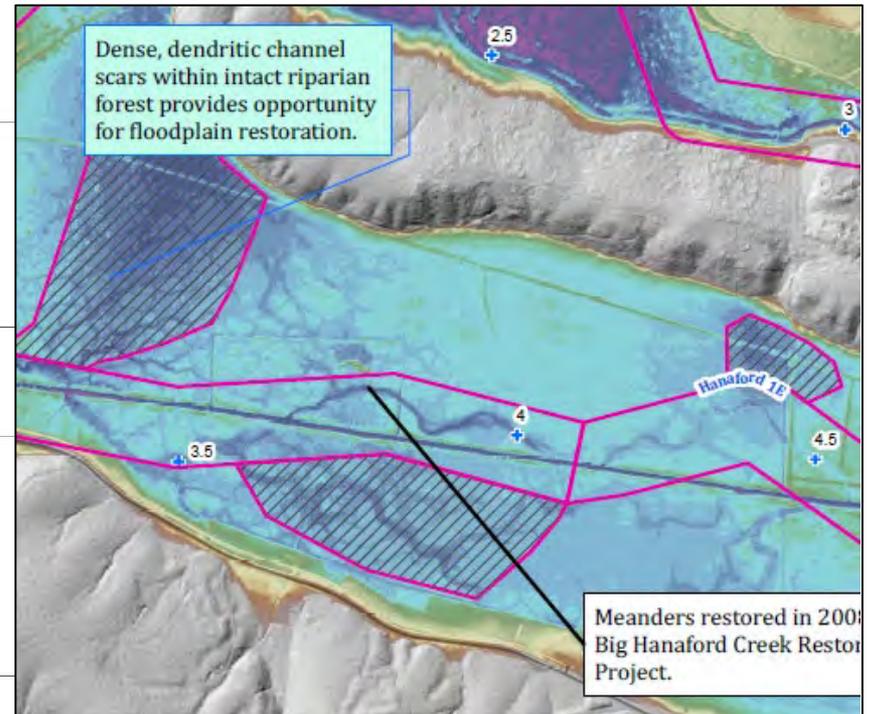
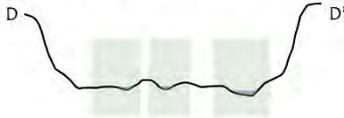
1. CONFINED



2. UNCONFINED

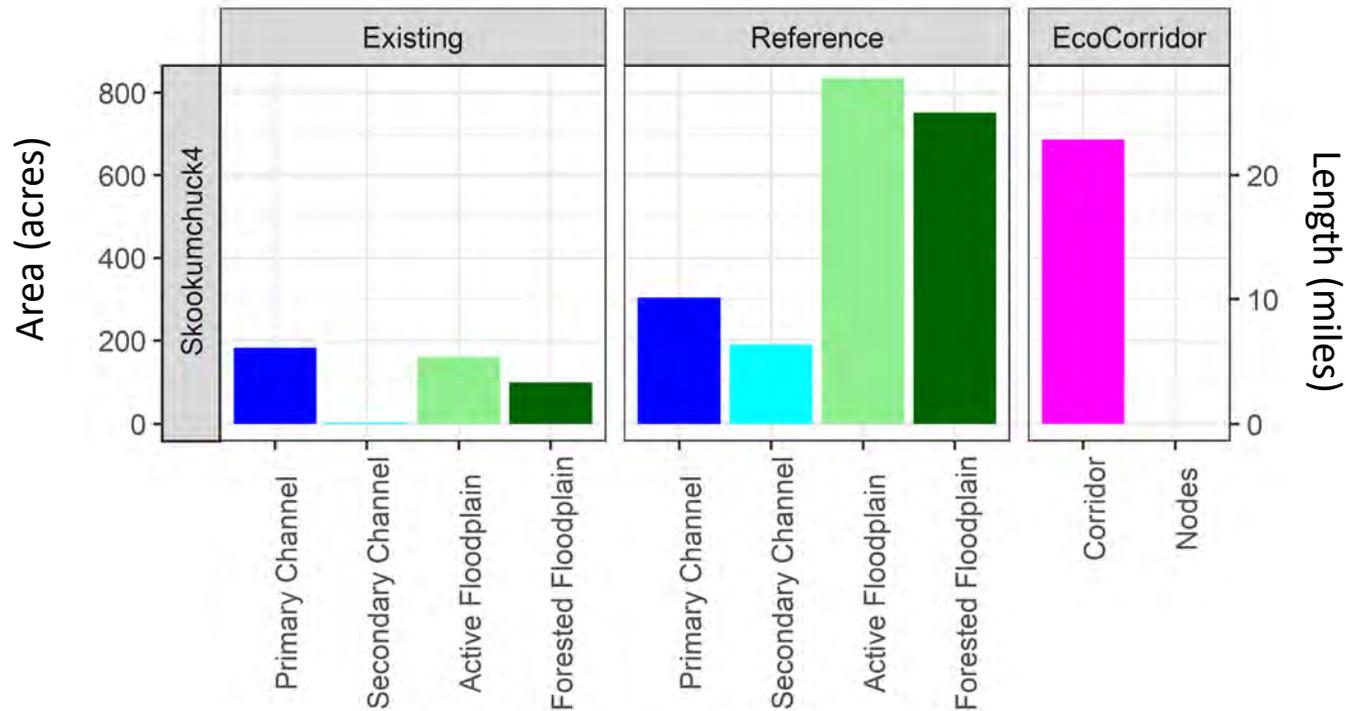


4. UNCONFINED WITH FLOODPLAIN DEPRESSIONS



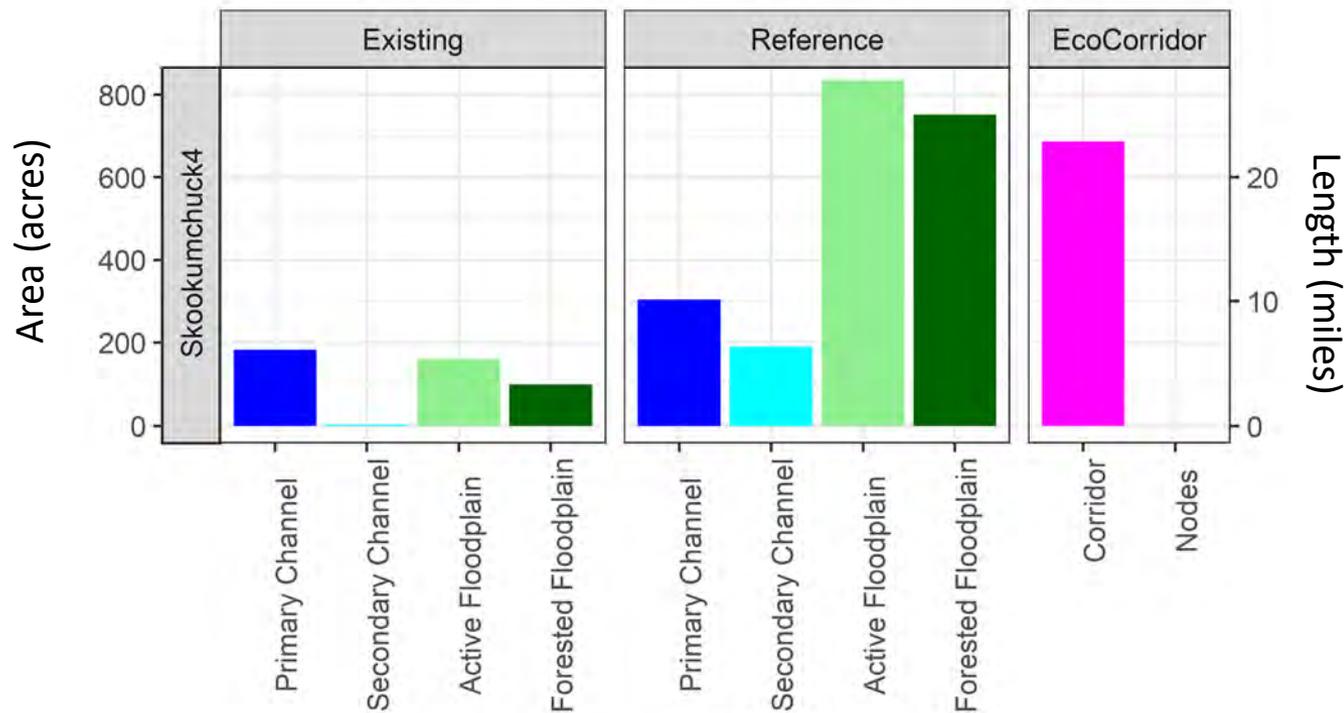
# Results

- ▶ Reference condition channel lengths range from 1.6 to over 6 times longer than current



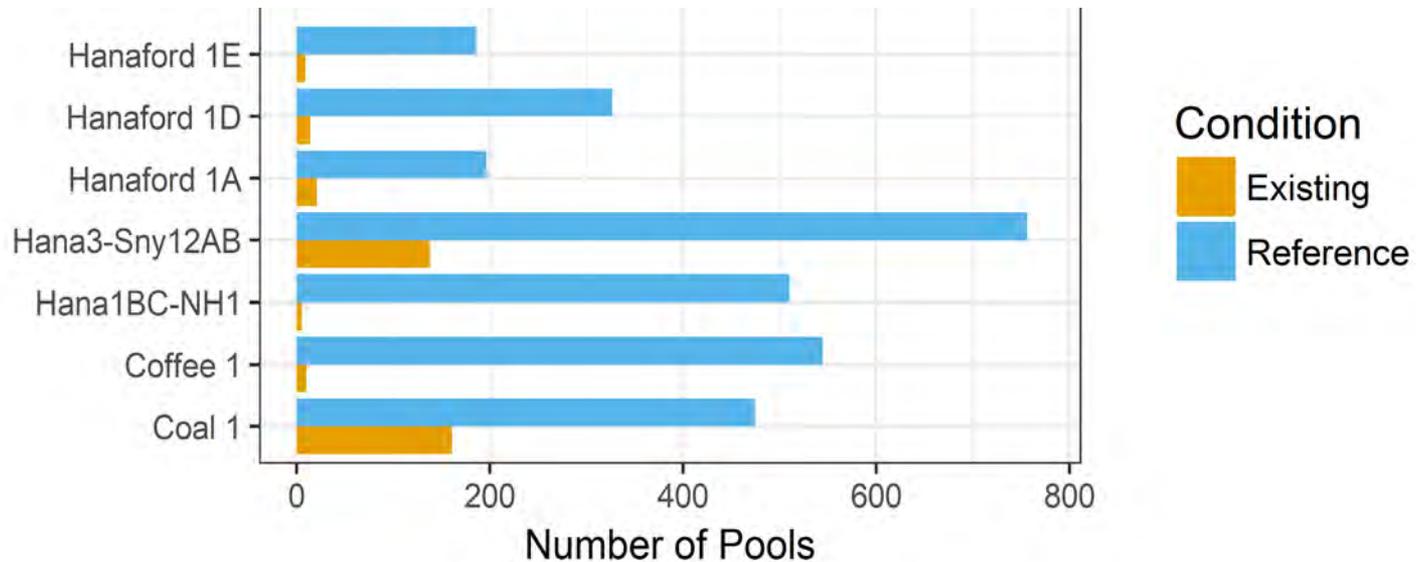
# Results

- ▶ Reference condition channel lengths range from 1.6 to over 6 times longer than current
- ▶ Minimum corridor is generally smaller than the reference condition floodplain in unconfined reaches, ranging from 25 to 90%



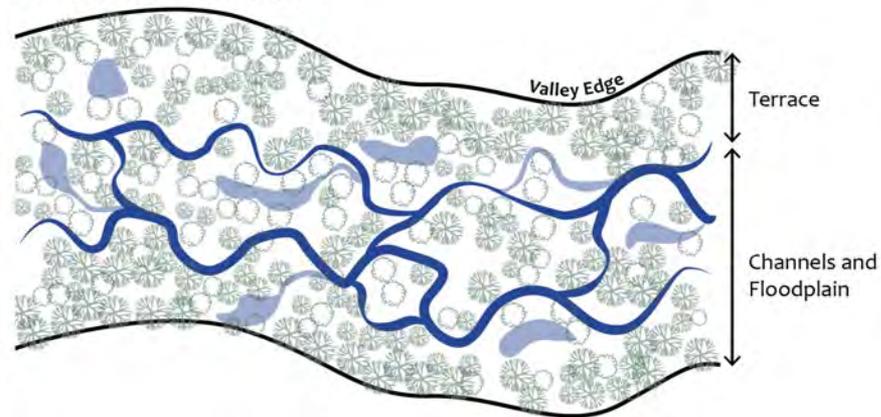
# Results

- ▶ Frequency of channel features, such as pools, was several times greater in reference conditions



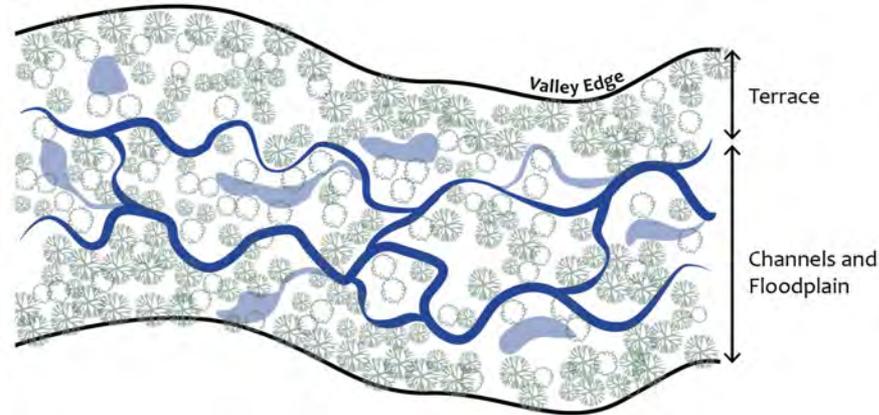
# Conclusions

A. Reference Condition

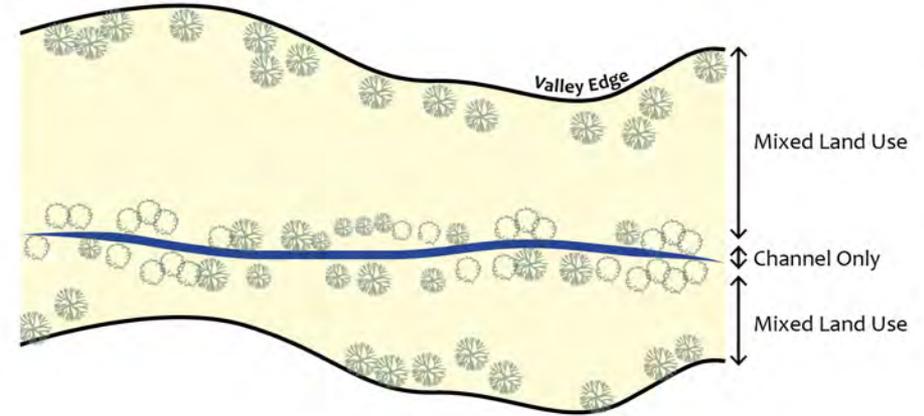


# Conclusions

A. Reference Condition

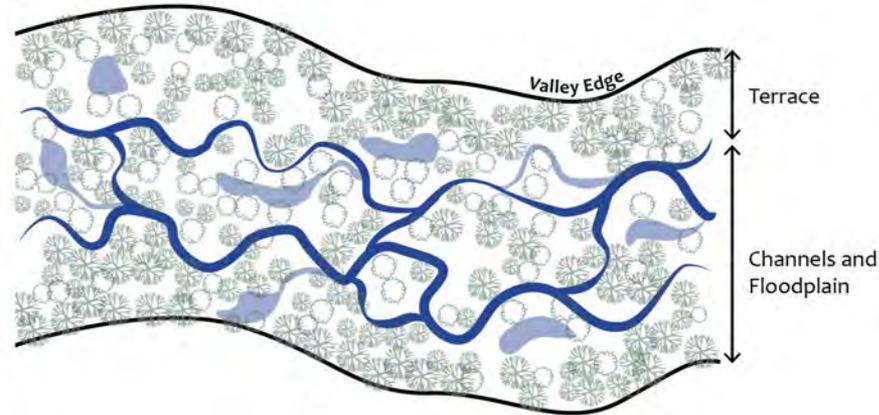


B. Existing Condition

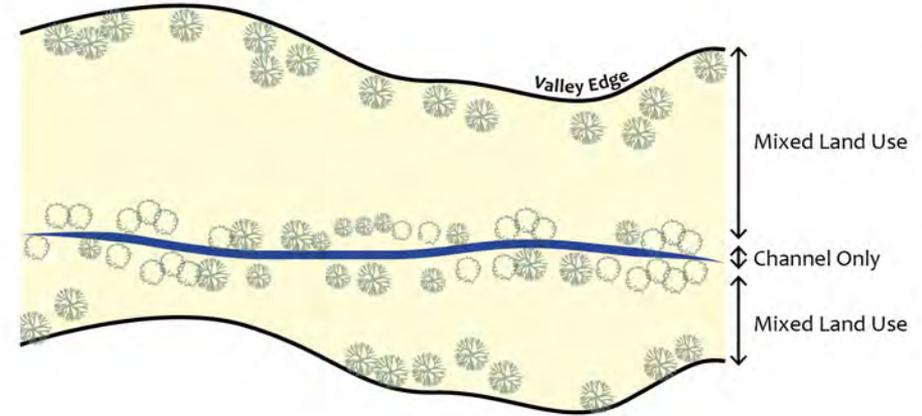


# Conclusions

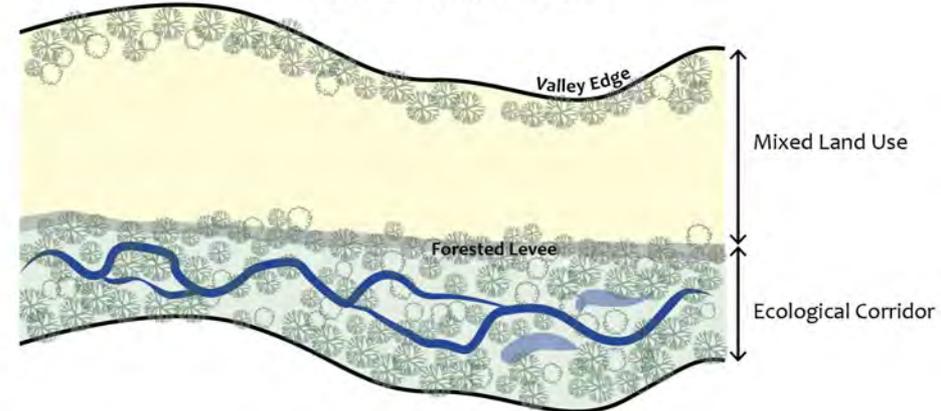
A. Reference Condition

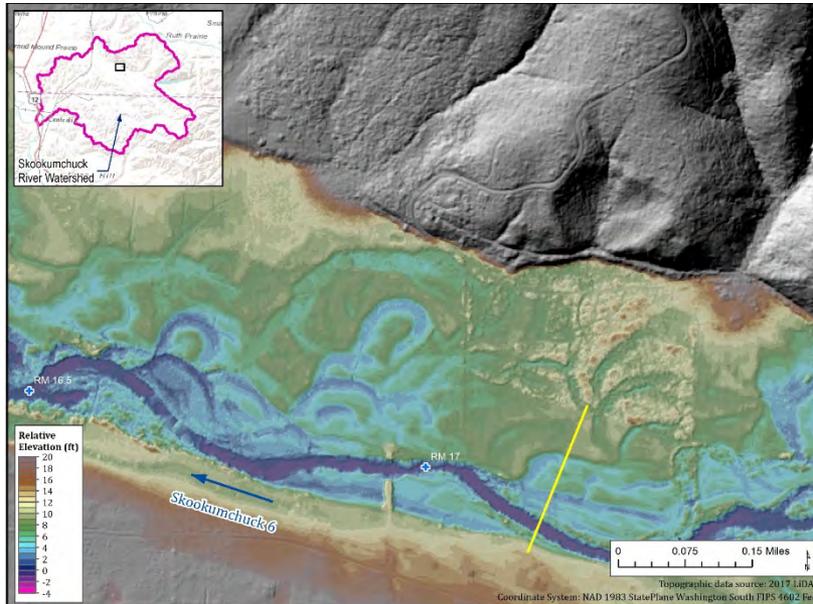


B. Existing Condition

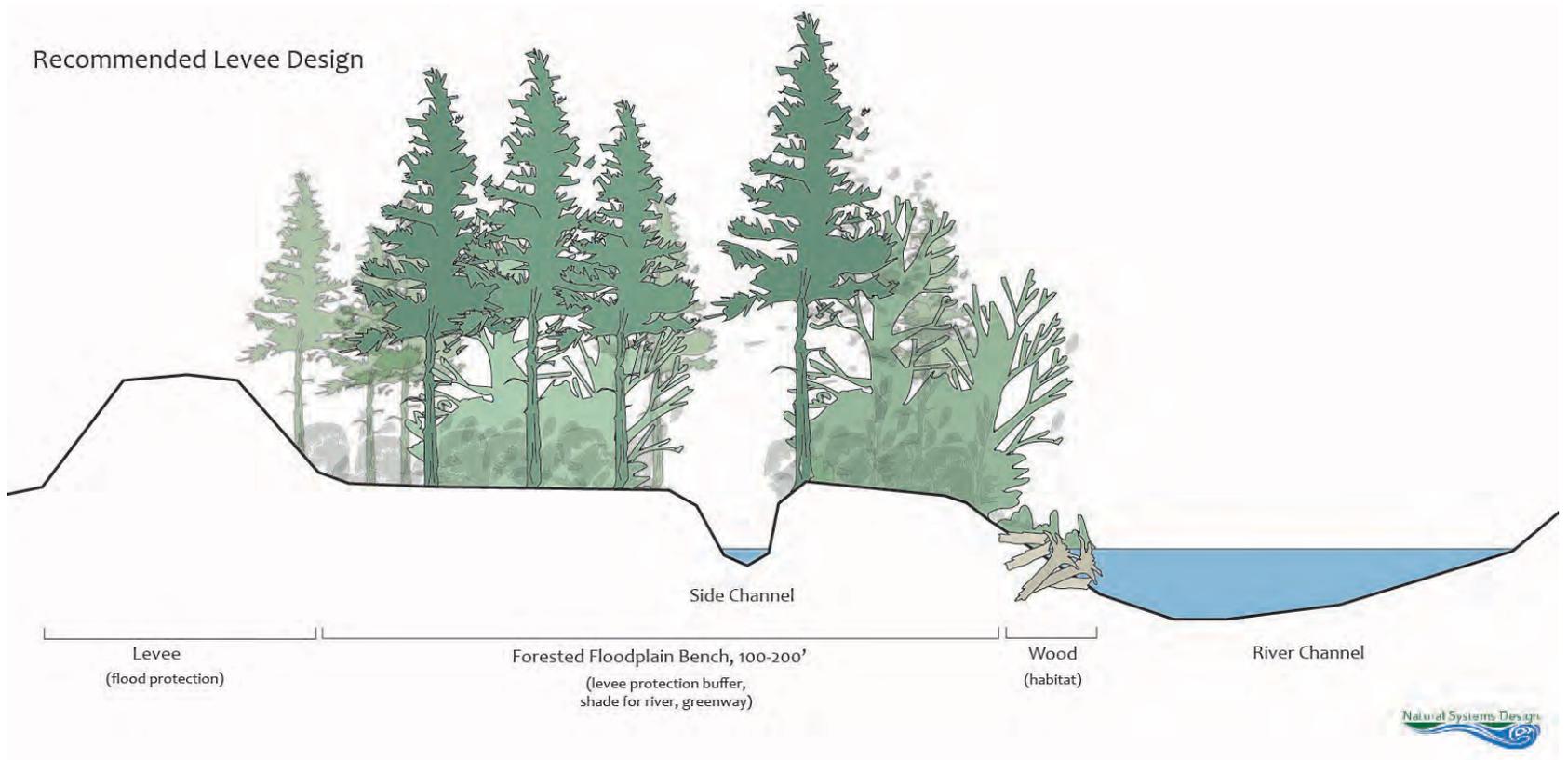


C. Restored Condition with Ecological Corridor



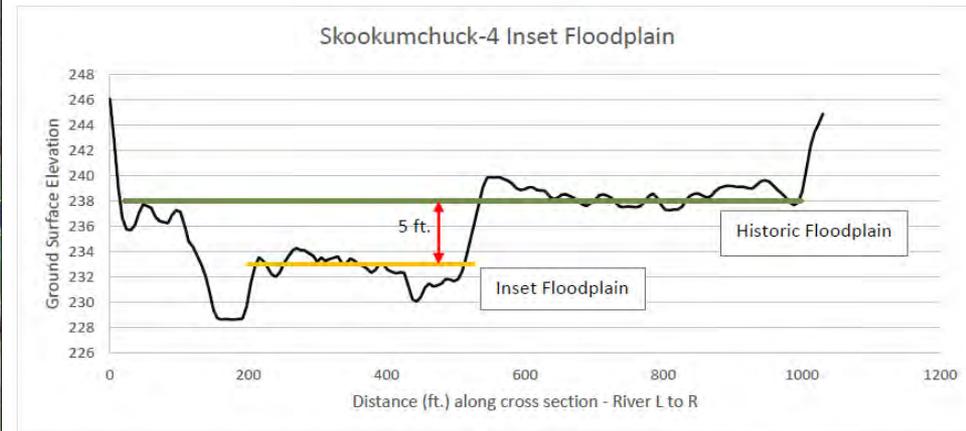
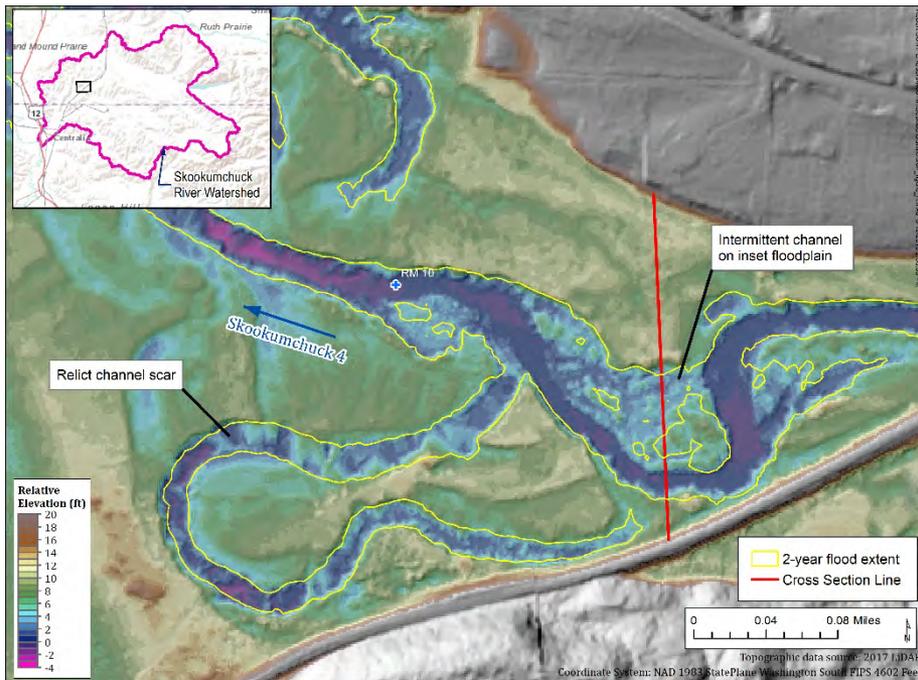


Thanks!  
Susan Dickerson-Lange  
[susan@naturaldes.com](mailto:susan@naturaldes.com)



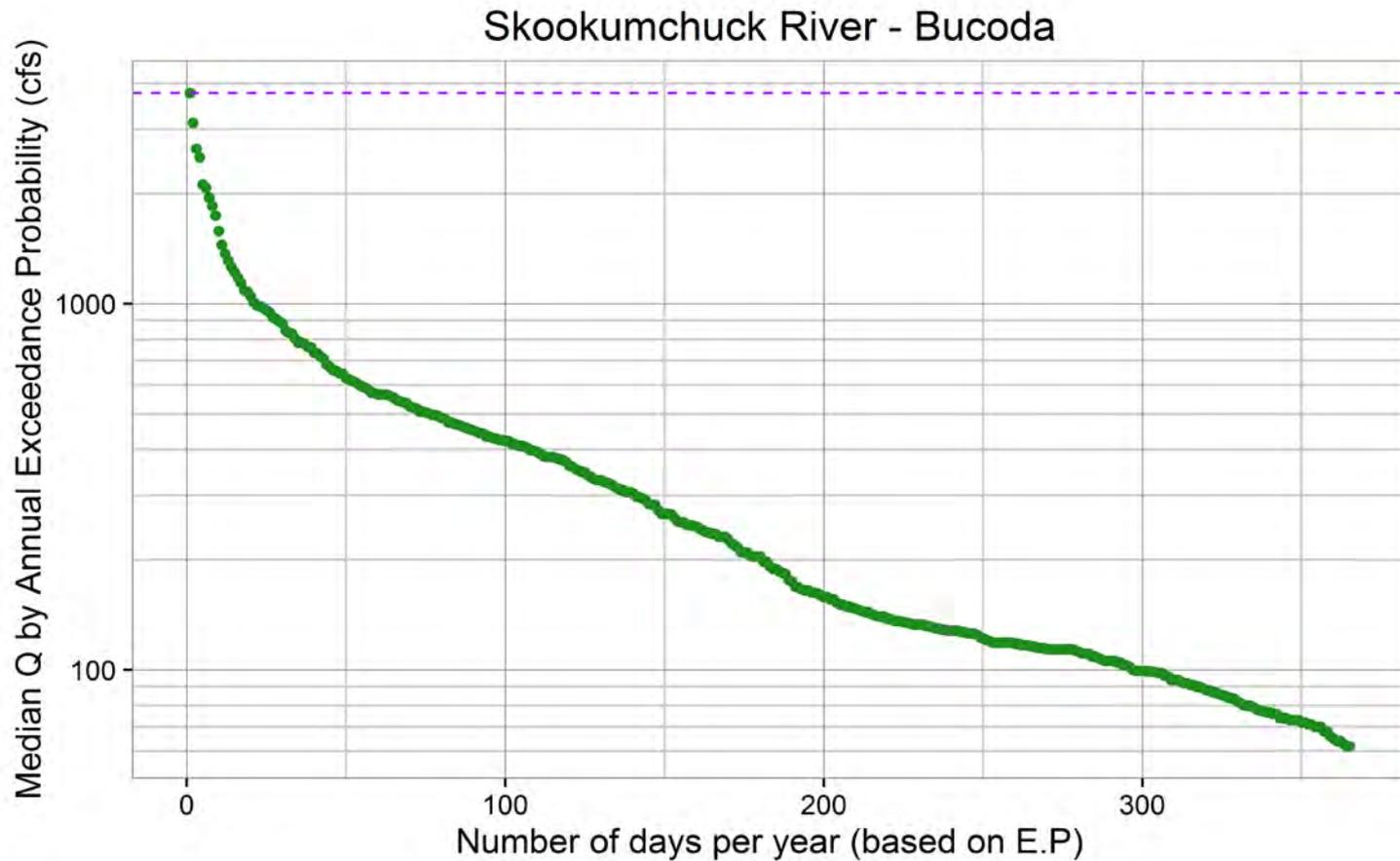
# How? Methods

## Estimating Incision



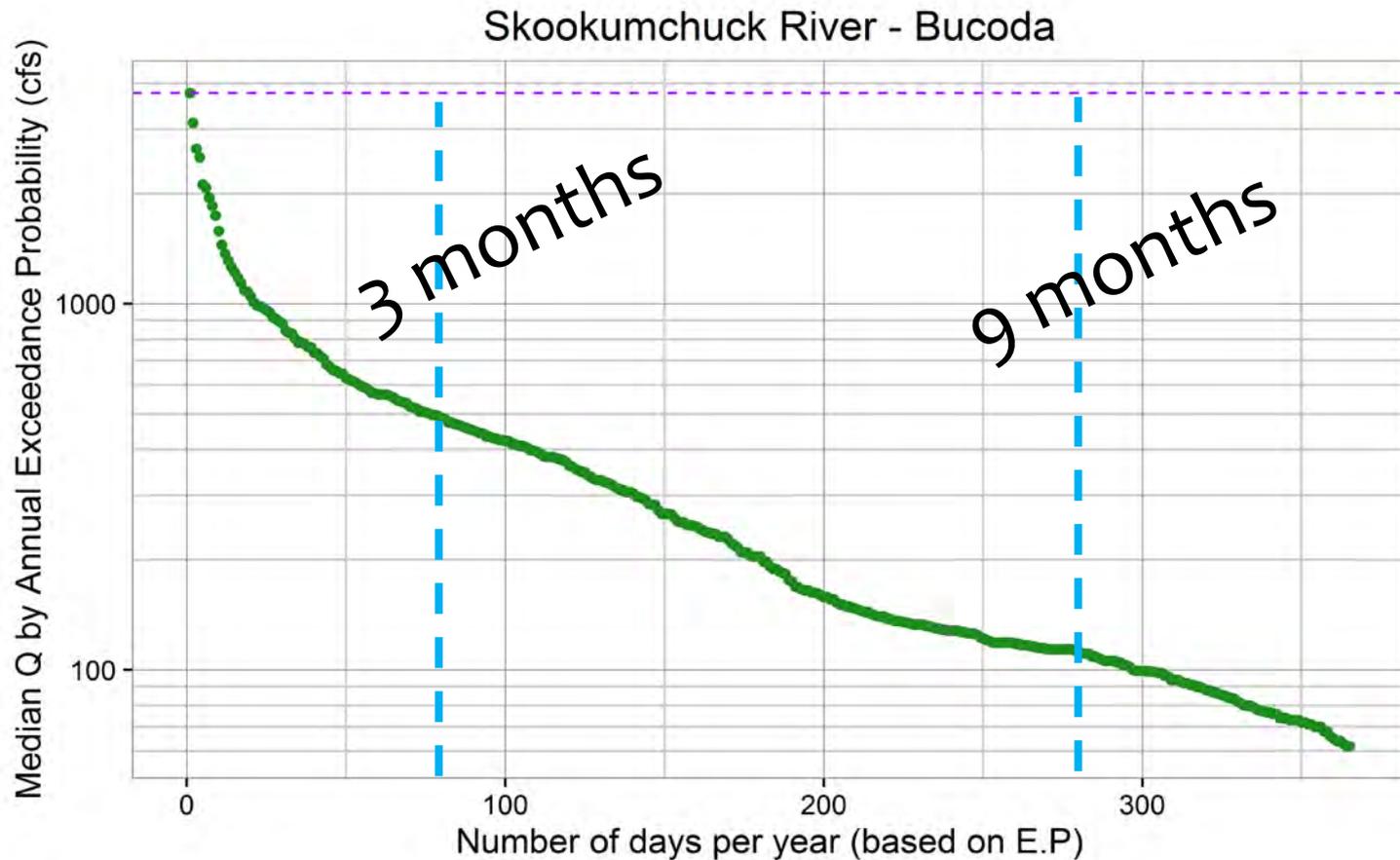
# How? Methods

## Gage Analysis – Flow Duration

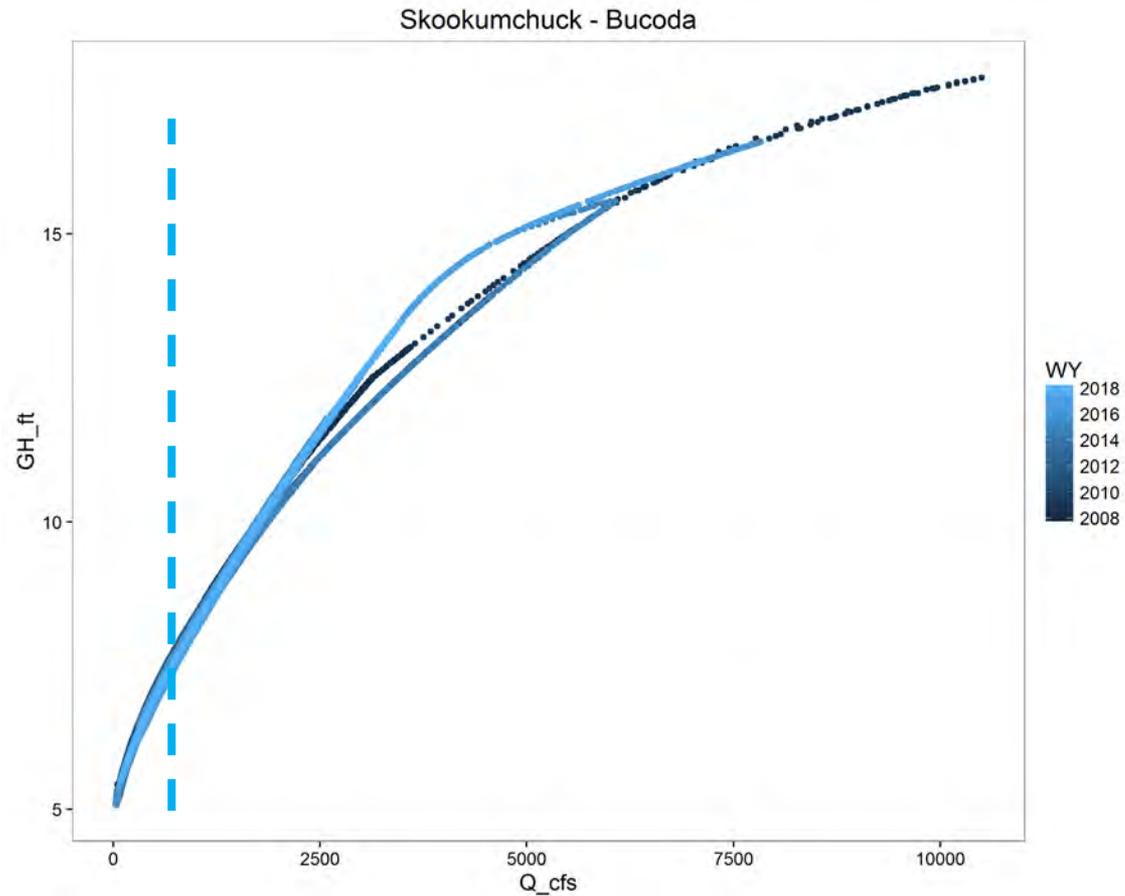


# How? Methods

## Relevant Hydroperiods

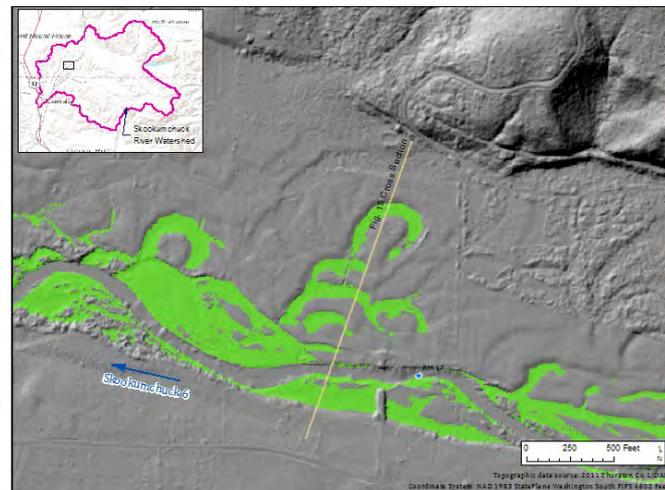
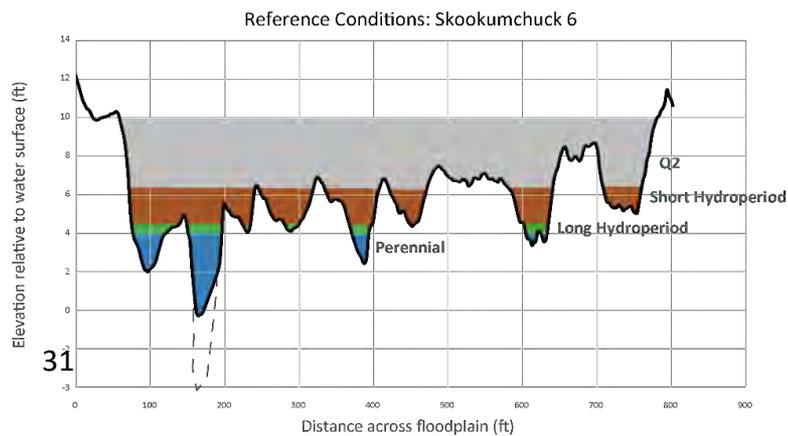
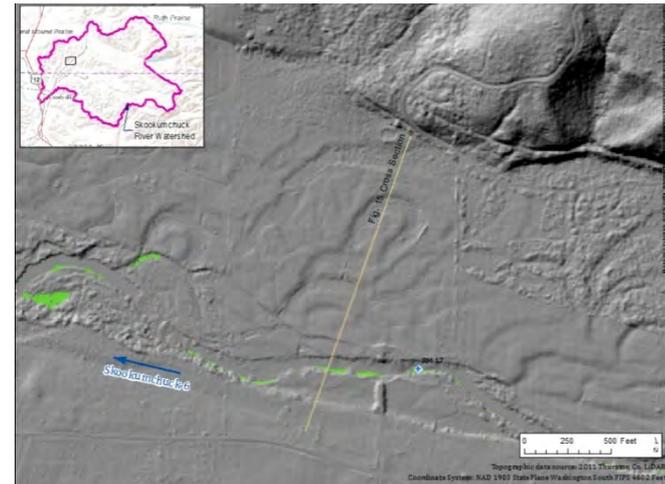
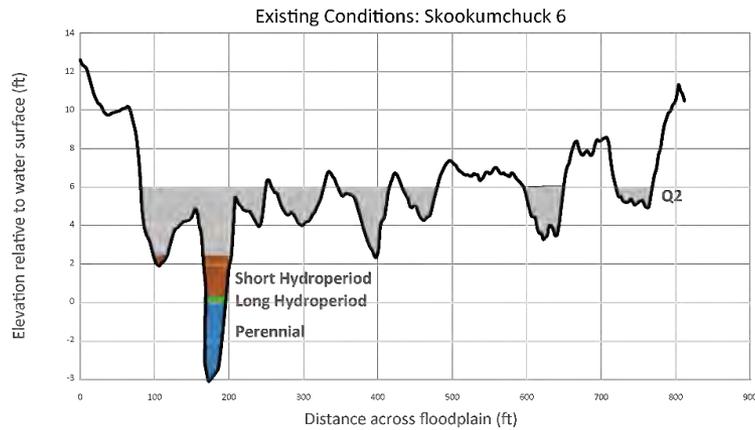


# Gage Height Associated with Q Thresholds



# How? Methods

## Floodplain Habitat Areas



# Results

- ▶ Reference condition floodplain habitat areas (9-month hydroperiod) range from 1.2 to more than 20 times larger than in current conditions

