Policy Advisory Group Meeting:
September 6th, 2018

UCSRB Snow2flow:
A decision-support tool to support salmon recovery with targeted forest restoration

Mike Mertens, Ecotrust

ecotrust

AGENDA

01 *Background*

ECOTRUST

We focus on middle ground solutions to address resource management issues:

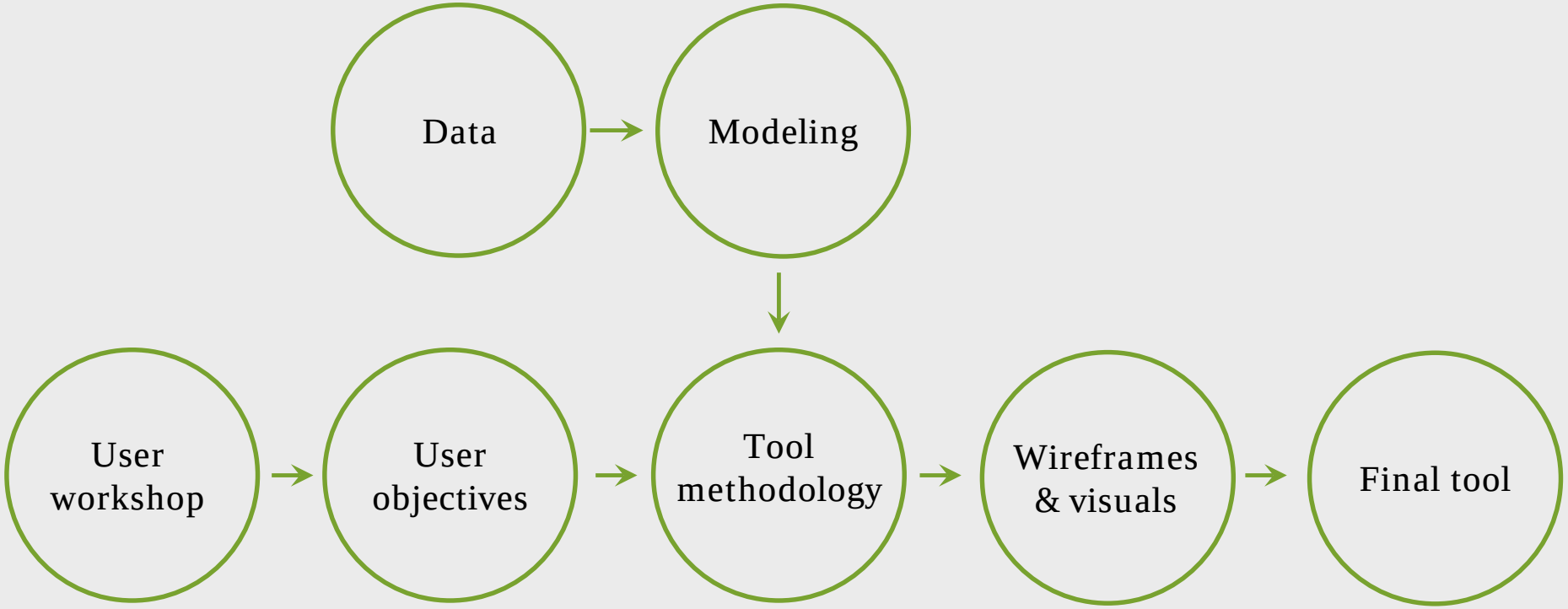
- stakeholder engagement
- economic analysis
- decision support tools

GOAL

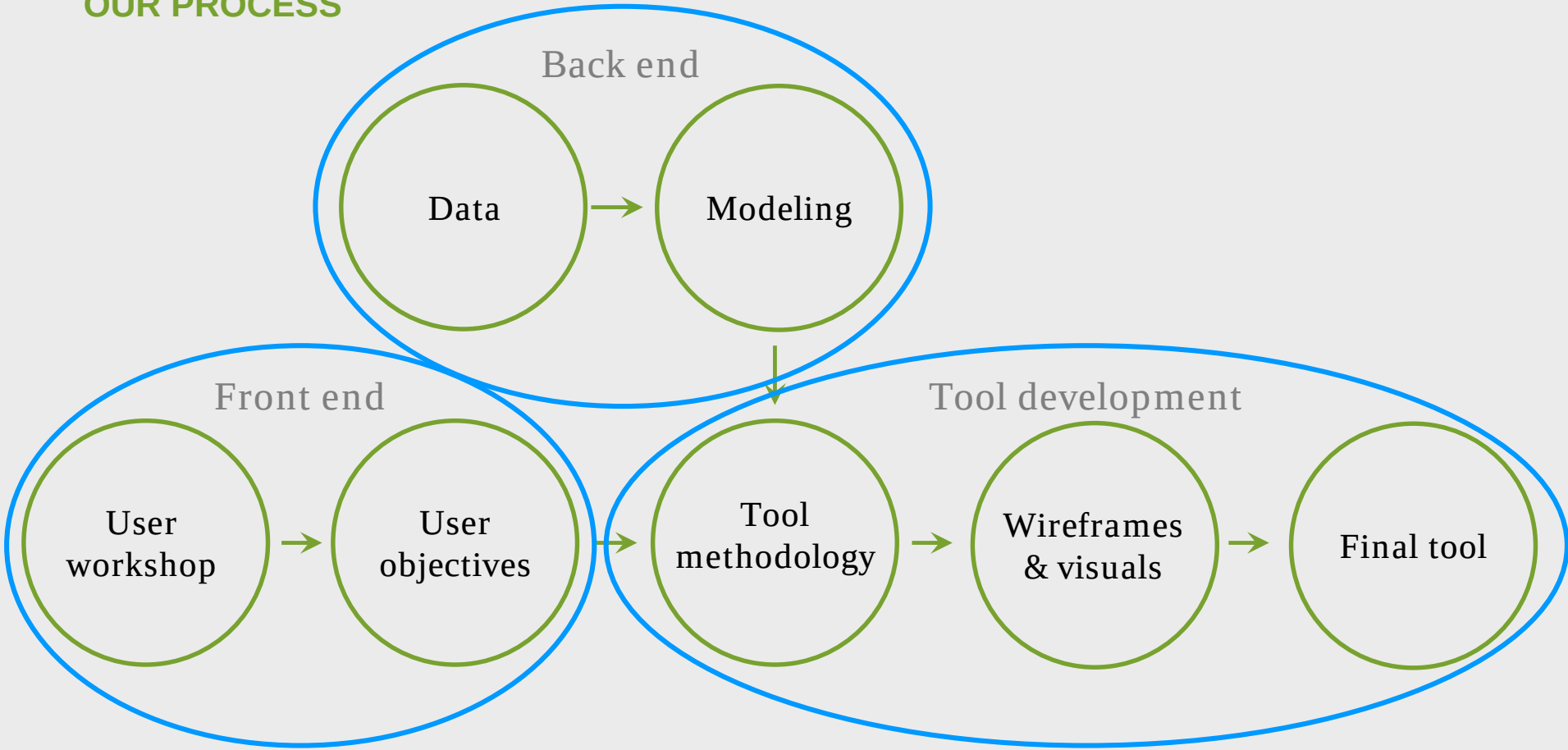
Allow users to explore the effects of forest management (prescriptions and treatment locations) on snowpack and resulting stream flows.

02 *Process*

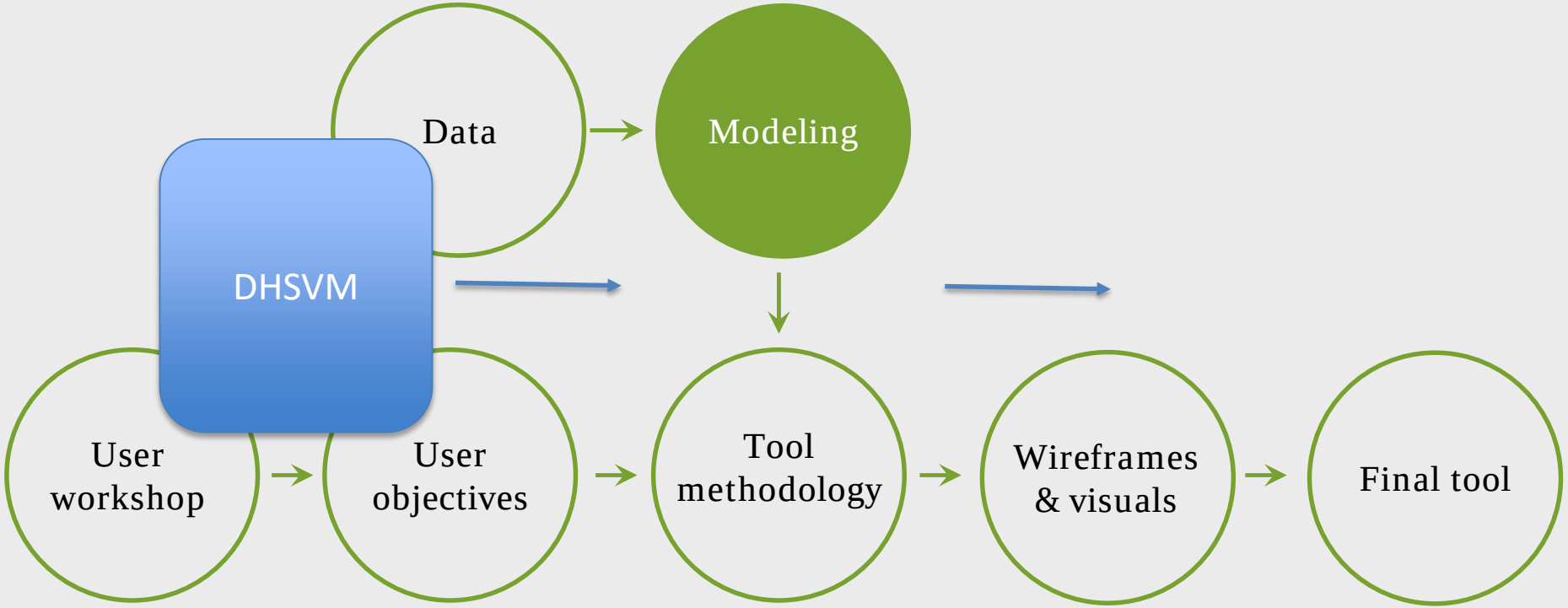
OUR PROCESS


Data
Modeling
User workshop
User objectives
Tool methodology
Wireframes & visuals
Final tool

OUR PROCESS


Back end
Data
Modeling
Front end
User workshop
User objectives
Tool development
Tool methodology
Wireframes & visuals
Final tool

BACK-END MODLEING

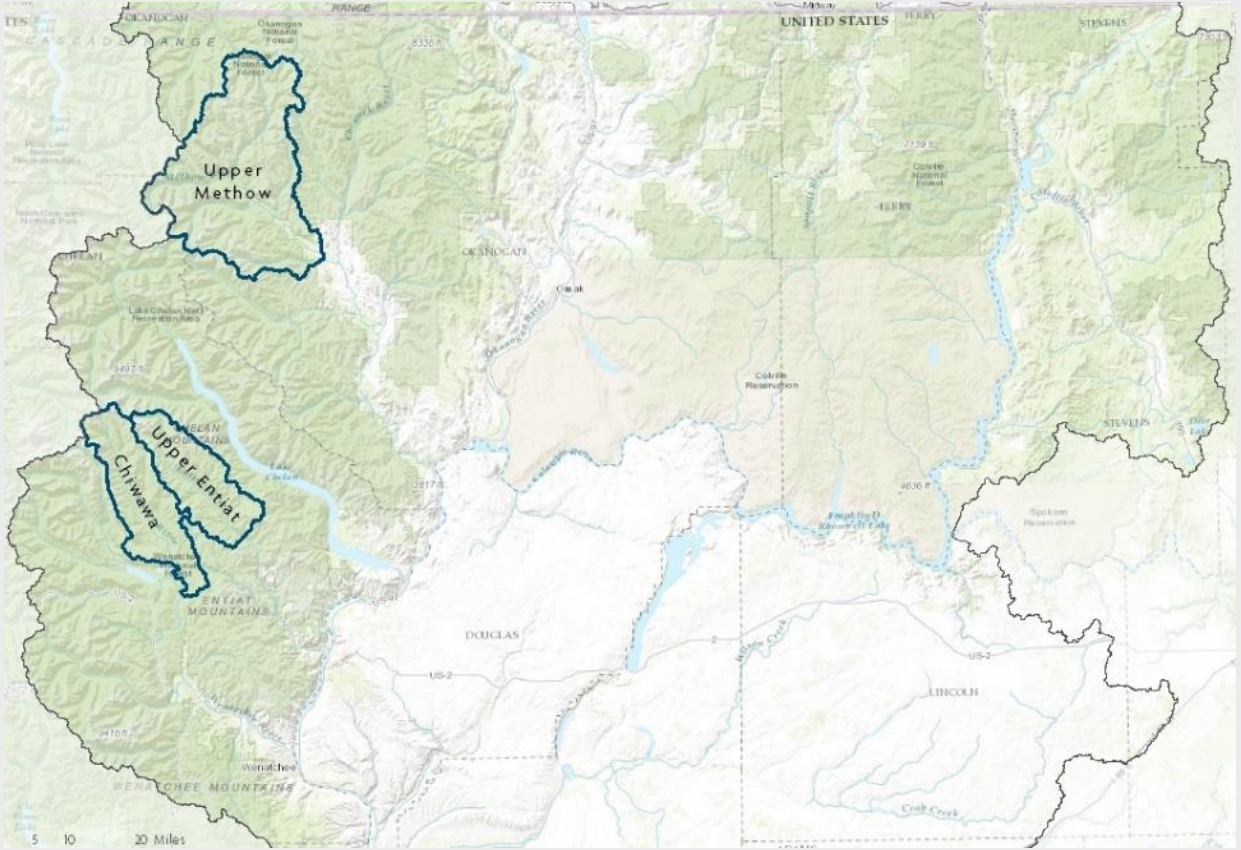


03 *Phase I model*

PHASE I MODEL

Designed to evaluate the effects of vegetation and vegetation change, on the hydrological cycle at spatial scales that are *relevant for forest management practices*.

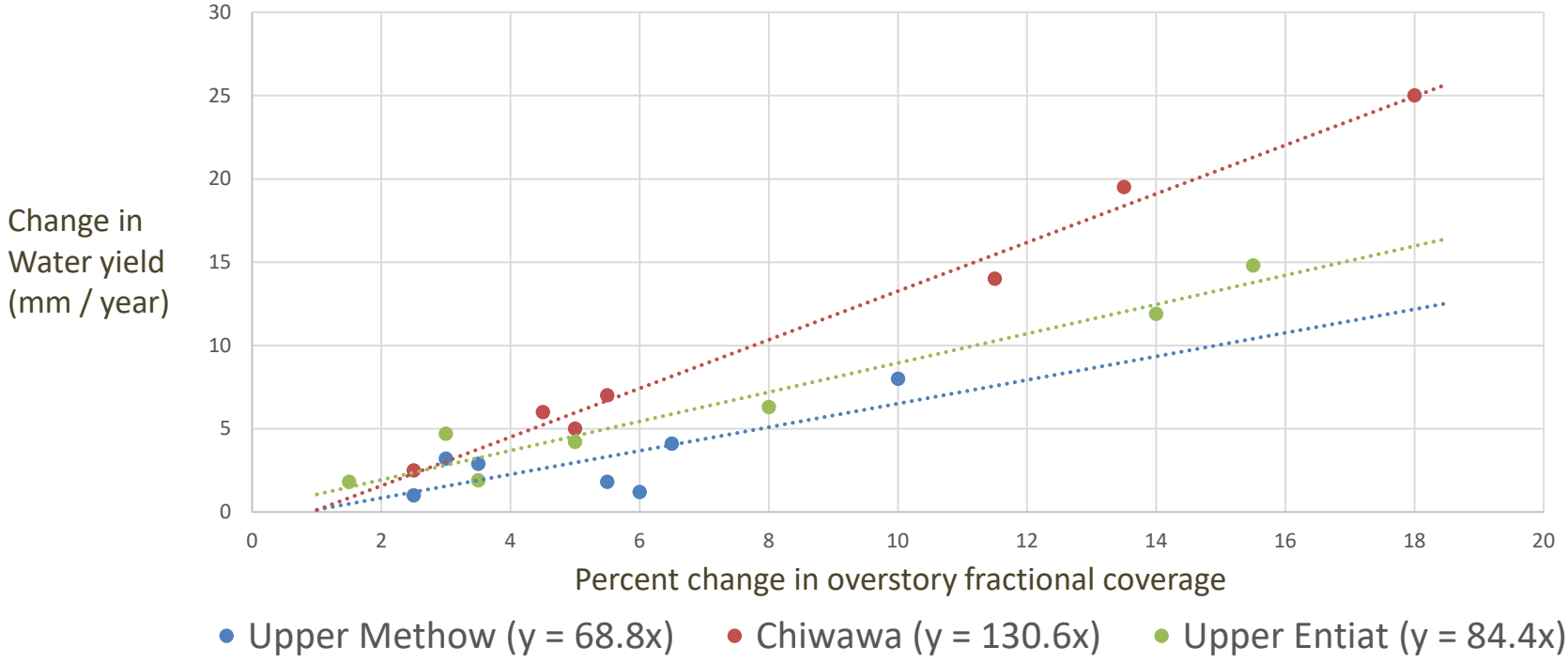
PHASE I MODEL



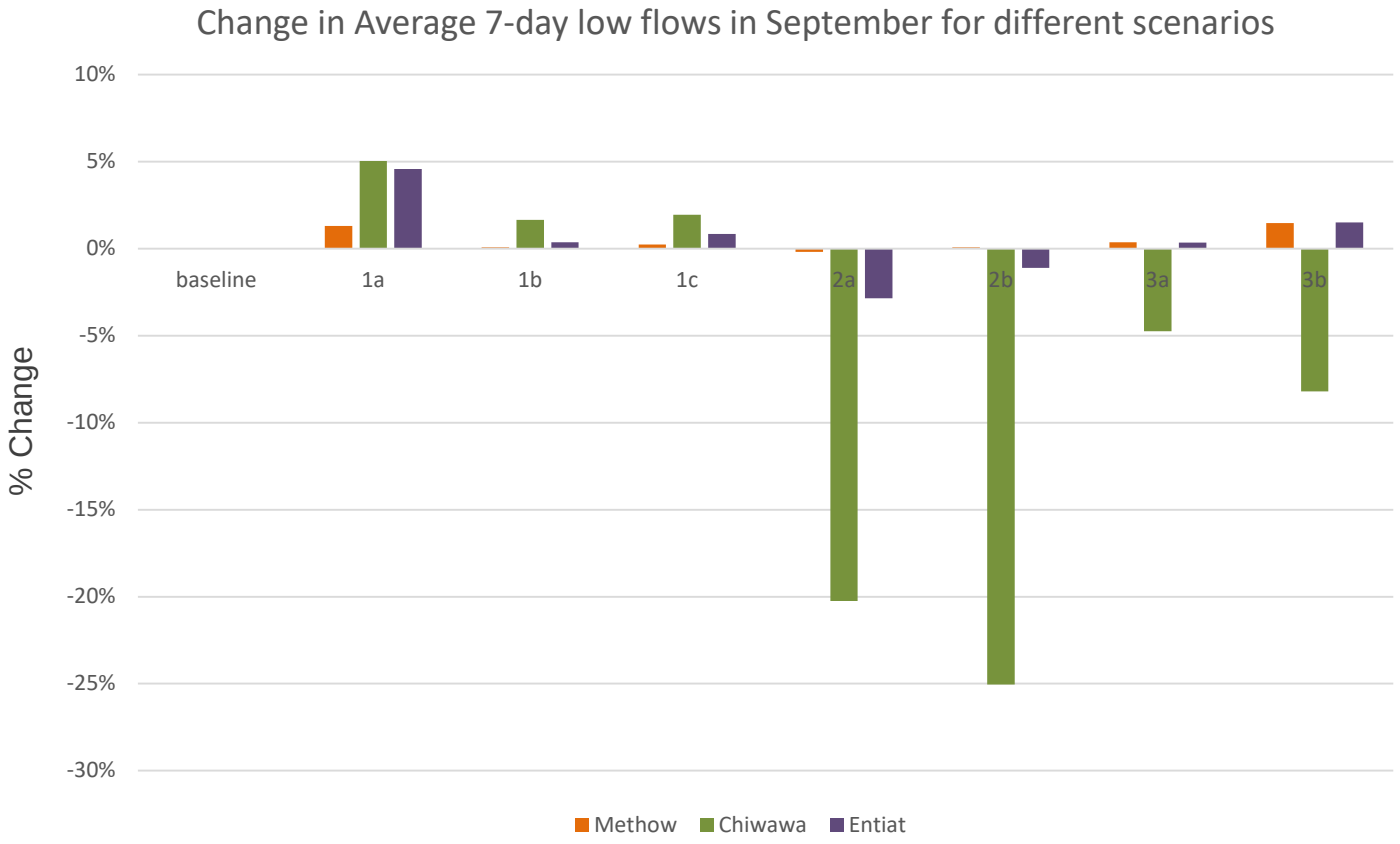
DHSVM Scenario Descriptions

Scenario	Forest Type	Land Form	Geographic Consideration	Resulting Fractional coverage
1a	Dry and Moist	Ridgetops	All	30%
1b	Dry and Moist	South Facing	High Elevation	50%
1c	Dry Moist	South Facing	All	50%
2a	Cool and Cold	All	Top 30% Fire Risk	30%
2b	Cool and Cold	All	Top 50% Fire Risk	50%
3a	All	North Facing and Valley Bottoms	Top 10% Fire Risk	0%
3b	All	North Facing and Valley Bottoms	Top 30% Fire Risk	0%

Change in annual water yield (mm) as a function of reductions in overstory fractional coverage



(Wigmosta et al, 2015)

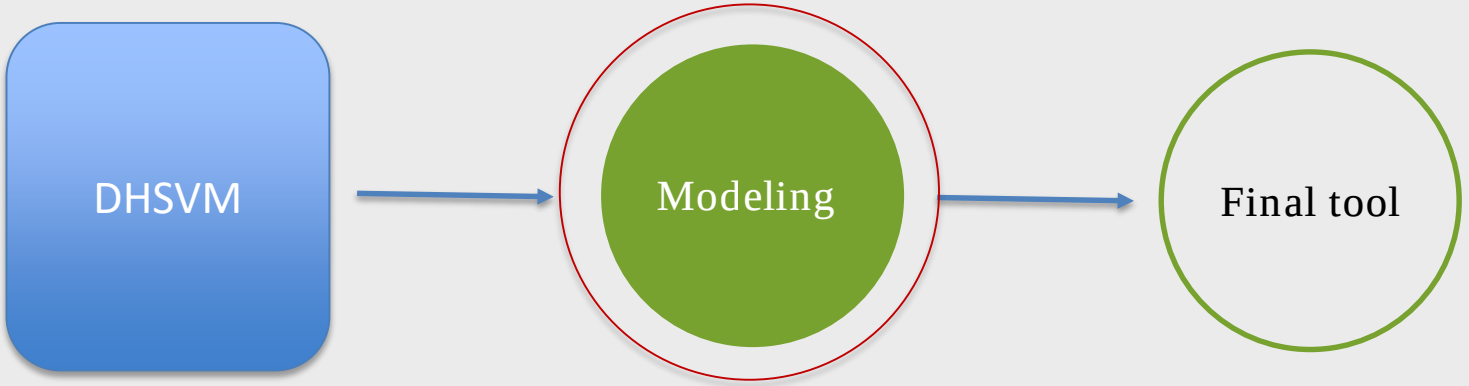

Change in Average 7-day low flows in September for different scenarios
% Change
10%
5%
0%
-5%
-10%
-15%
-20%
-25%
-30%
baseline
1a
1b
1c
2a
2b
3a
3b
Methow
Chiwawa
Entiat

04 *Tool methodology*

GOAL (Phase 2)

Allow users to explore the effects of forest management (prescriptions and treatment locations) on snowpack and resulting stream flows.

BACK-END MODLEING



BACK-END MODLEING

- Develop relationship between DSVM modeled and non-modeled watersheds in the region using a set of variables that most affect flows.
- “Impute” DHSVM outputs from modeled watersheds to non-modeled watersheds.

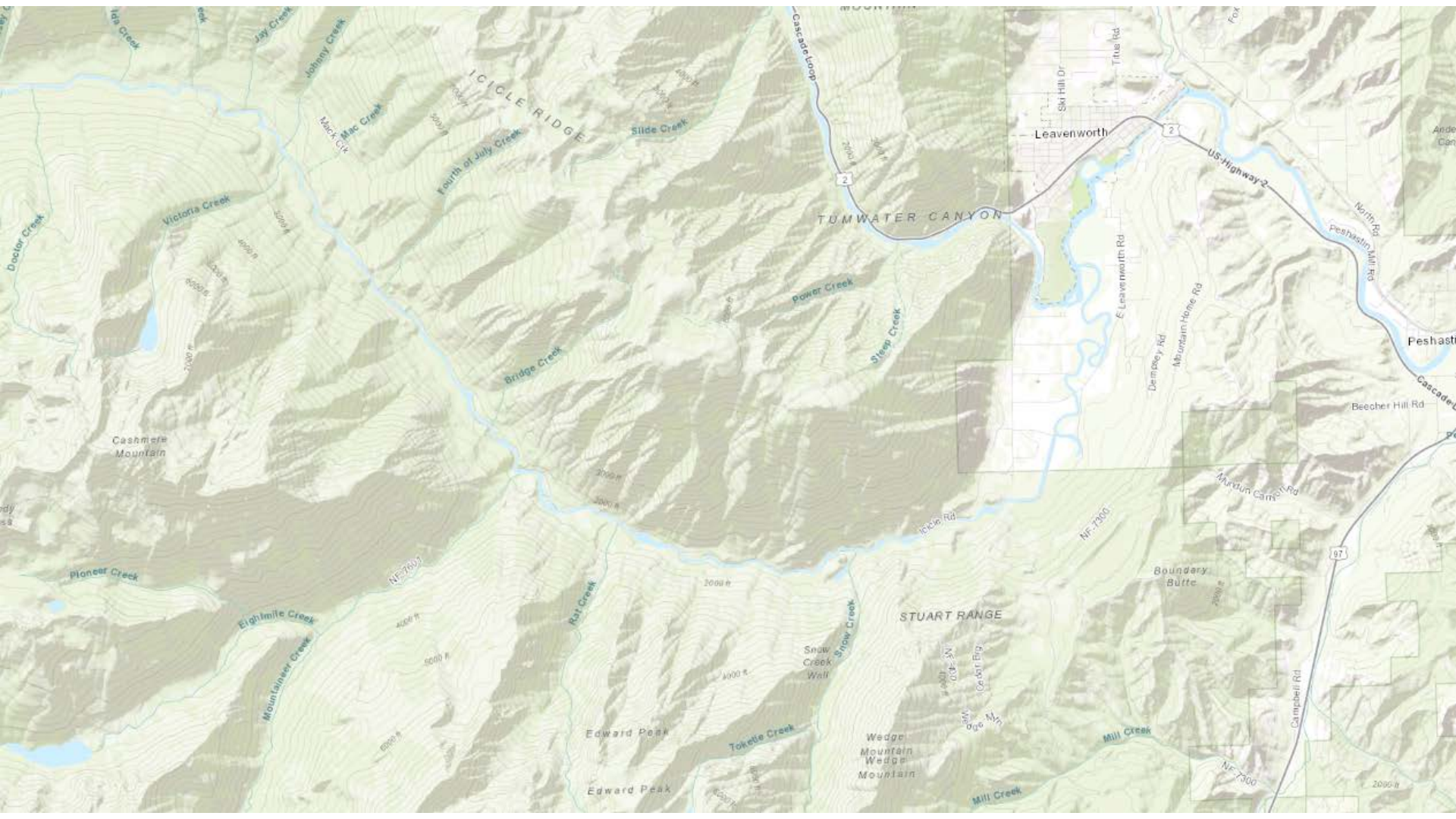
Output = *f*(W,V,M)

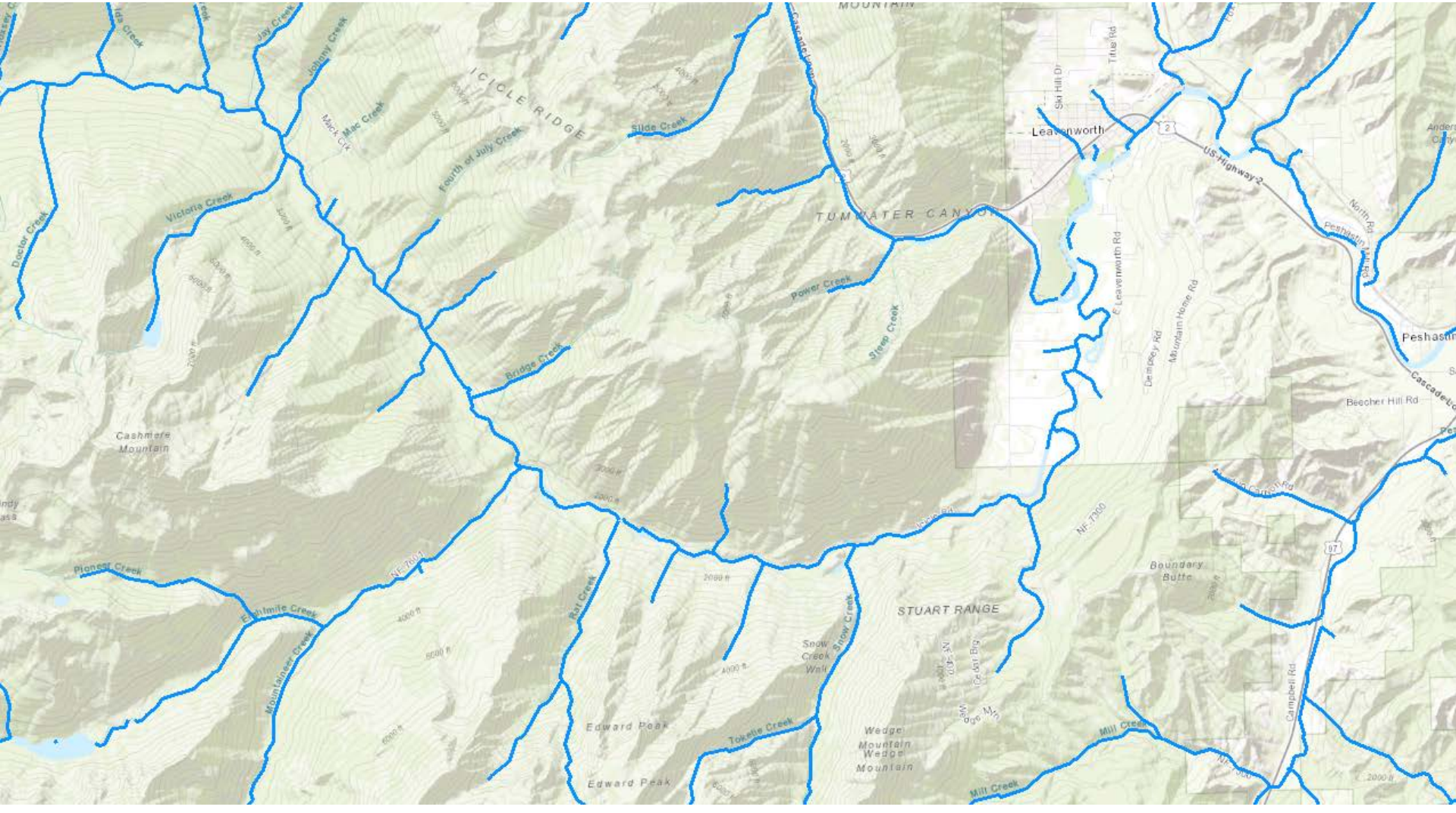
Where:

- Output is an aggregate term related to a hydrologic classification of a watershed that represent important factors for salmon.
- W = a set of watershed characteristics expressed at the watershed scale – e.g. proportion of watershed above 60% slope.
- V = a set of land type characteristics expressed at the watershed scale – e.g. proportion of watershed covered by dry forests on south facing slopes.
- M = a set of meteorological conditions

Watershed specific hydrologic classification

- All watersheds in study area are classified into a discrete number of classes.
- Watersheds in DHSVM modeled basins are matched with watersheds outside of DHSVM domain based on varying levels of aggregation within the classification.
- DHSVM outputs are “imputed” into the matched watersheds.


Leavenworth
US-Highway 2
TUMWATER CANYON
ICICLE RIDGE
Cascade Loop
Ski Hill Dr
Titus Rd
E Leavenworth Rd
Dempsey Rd
Mountain Home Rd
Peshastin Mill Rd
North Rd
Beecher Hill Rd
Peshastin
Cascade
Murdun Camp Rd
NF-7300
Icicle Rd
Boundary Butte
STUART RANGE
Campbell Rd
Mill Creek
Wedge Mountain
Edward Peak
Toketie Creek
Snow Creek
Snow Creek Wall
Rat Creek
Eightmile Creek
Mountaineer Creek
Pioneer Creek
Cashmere Mountain
Bridge Creek
Sleep Creek
Power Creek
Slide Creek
Fourth of July Creek
Mack Mac Creek
Johnny Creek
Jay Creek
Victoria Creek
Doctor Creek
Ida Creek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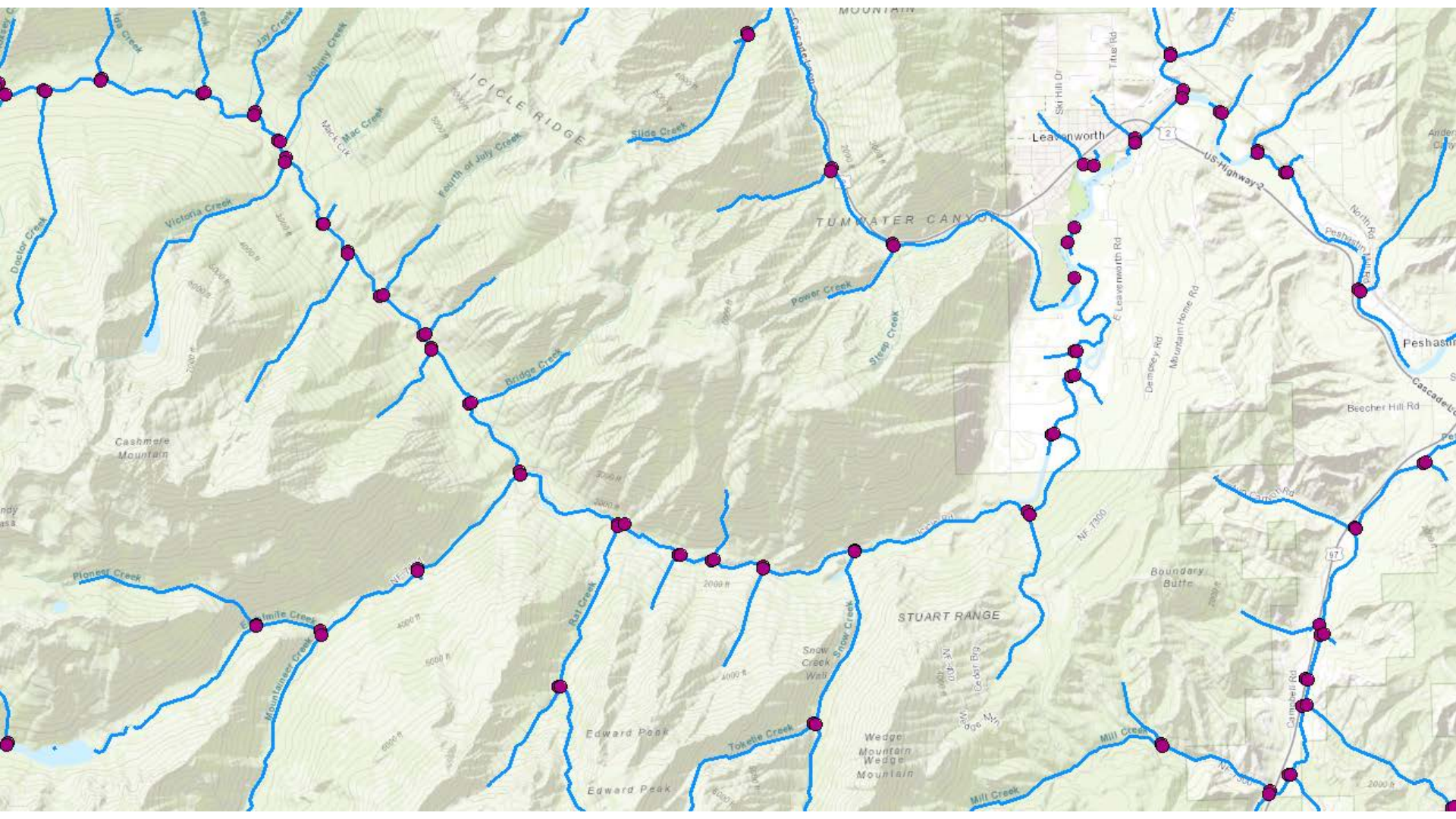
Victoria Creek
Doctor Creek
Power Creek
Steep Creek
Bridge Creek
Cashmere Mountain
Pioneer Creek
Eightmile Creek
Mountaineer Creek
NF-7601
Rat Creek
Snow Creek
Snow Creek Wall
STUART RANGE
Edward Peak
Tokette Creek
Wedge Mountain
Boundary Butte
NF-7300
Campbell Rd
Mill Creek
97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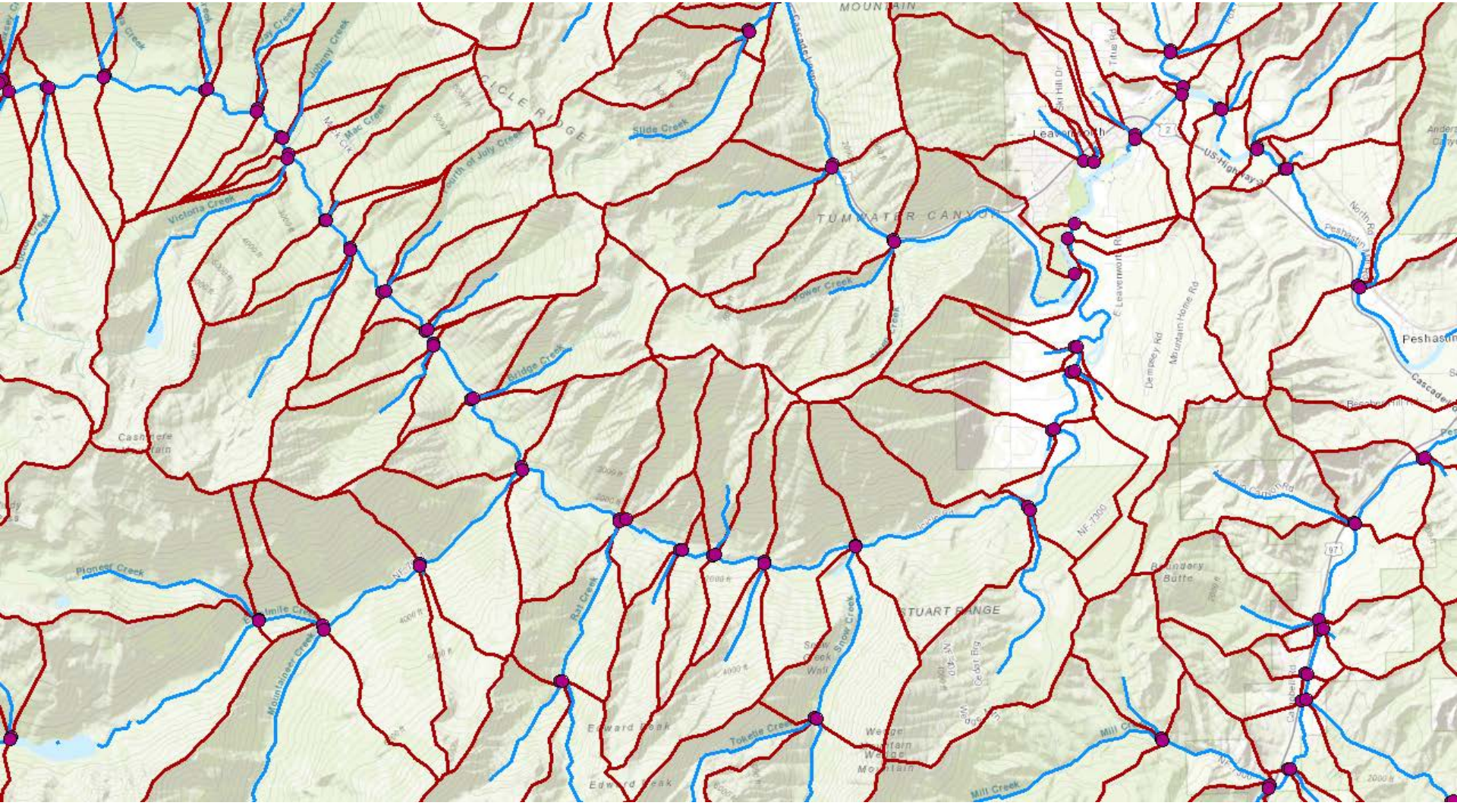
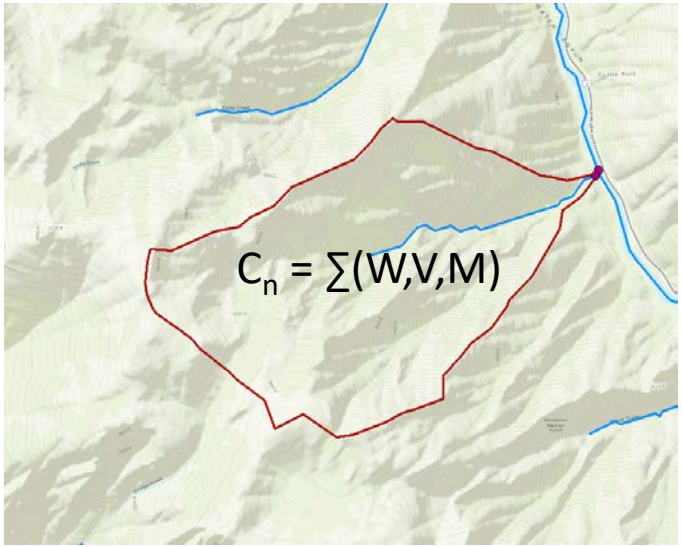
Ida Creek
Mack Creek
Mac Creek
Fourth of July Creek
Slide Creek
Victoria Creek
Doctor Creek
Power Creek
Steep Creek
Bridge Creek
Cashmere Mountain
Pioneer Creek
Mountaineer Creek
Rat Creek
Snow Creek
Snow Creek Well
STUART RANGE
Boundary Butte
NF-7300
Edward Peak
Tokette Creek
Wedge Mountain
Mill Creek
Carnation Rd
97

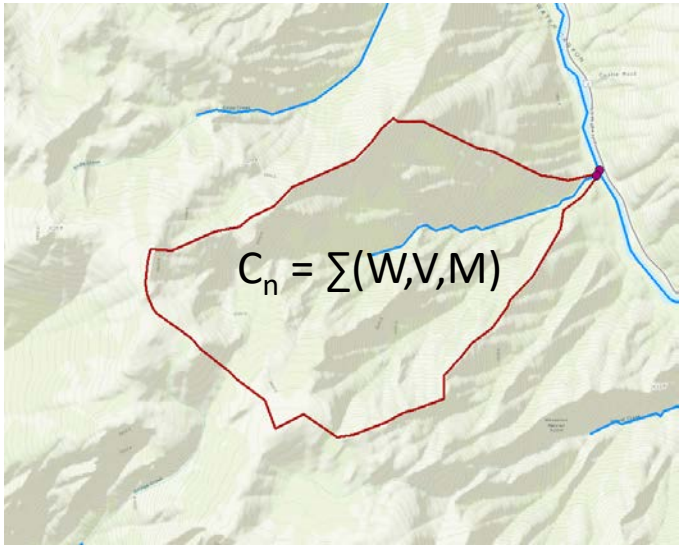

Slide Creek
Victoria Creek
Fourth of July Creek
Johnny Creek
Ridge Creek
Tower Creek
Pioneer Creek
Mountaineer Creek
Toilelie Creek
Snow Creek
Leavenworth
Peshastin
Dempsey Rd
Mountain Home Rd
E Leavenworth Rd
US Highway 2
Tumwater Canyon
Stuart Range
Mill Creek
NF-7300

Un-named creek: Wenatchee sub-basin (un-modeled)



Un-named creek: Wenatchee sub-basin (un-modeled)

C_n



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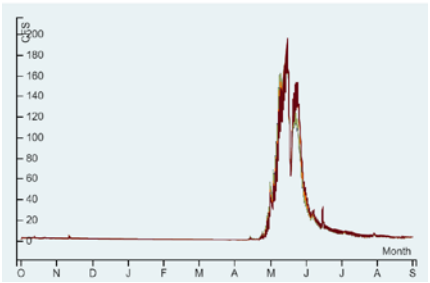
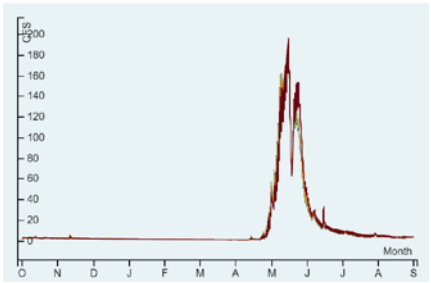
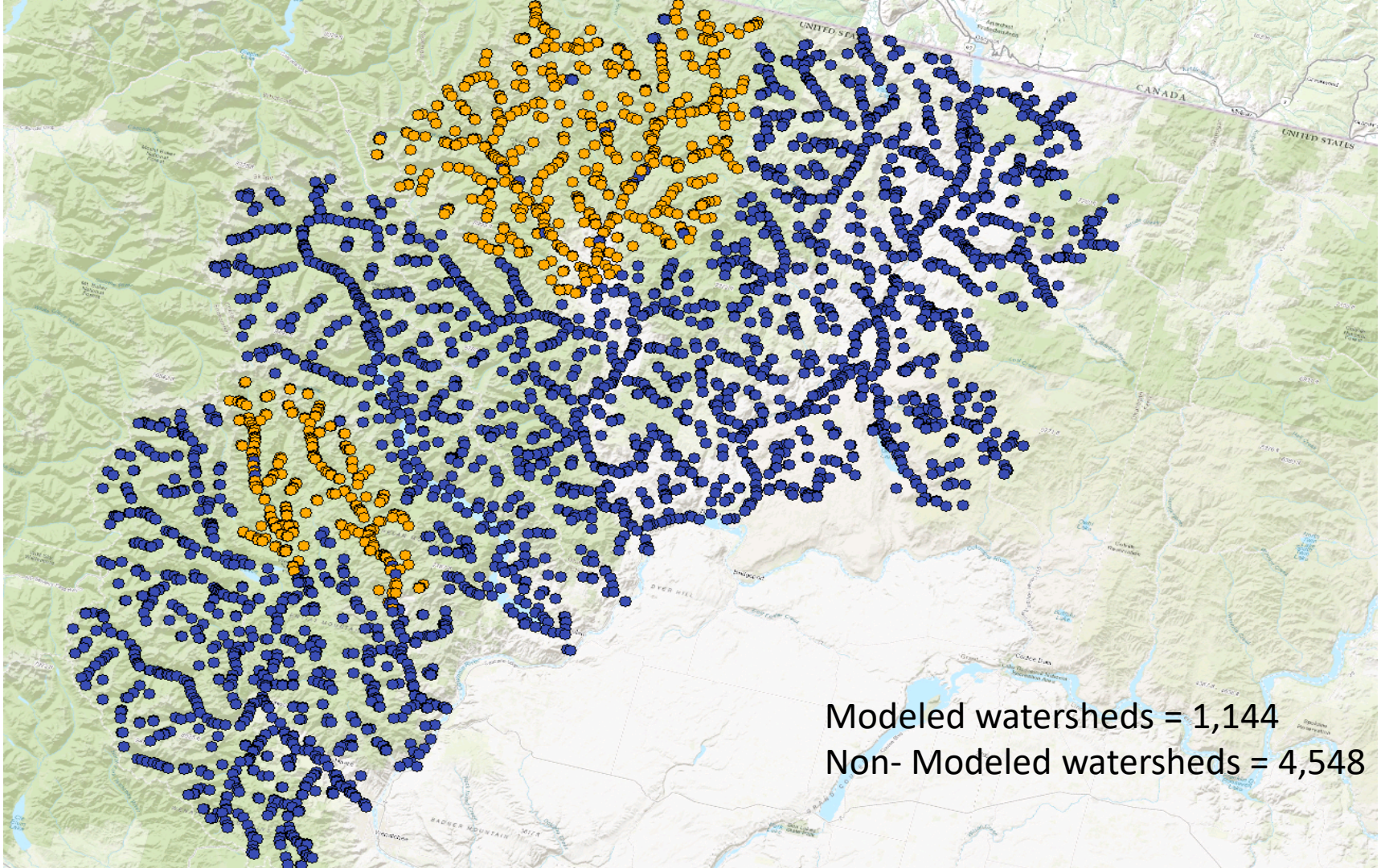
Un-named creek: Methow sub-basin (modeled)

C_n

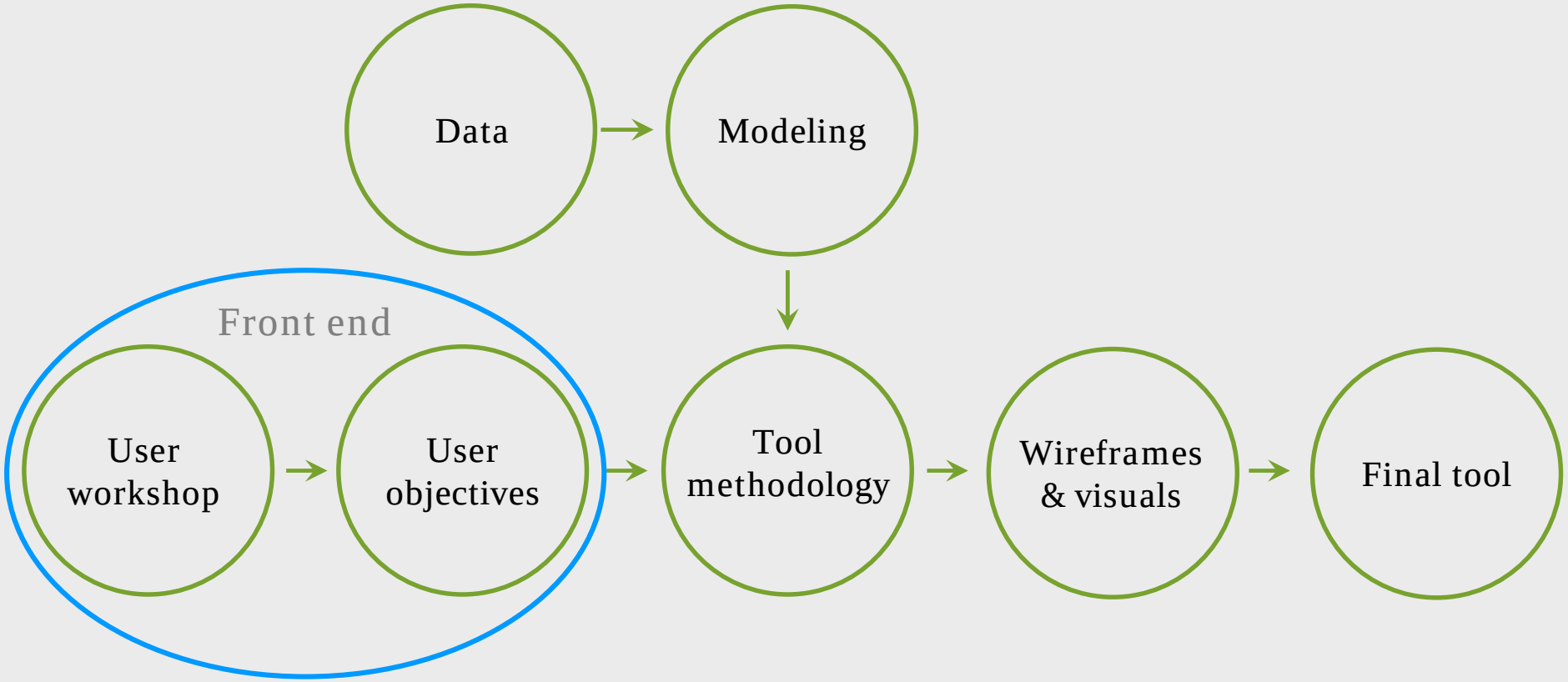


Impute




Modeled watersheds = 1,144
Non- Modeled watersheds = 4,548

USER EXPERIENCE



USER OBJECTIVES

How do I increase flow at a given location on the landscape?

How do my forest management practices impact flow?

USE CASES

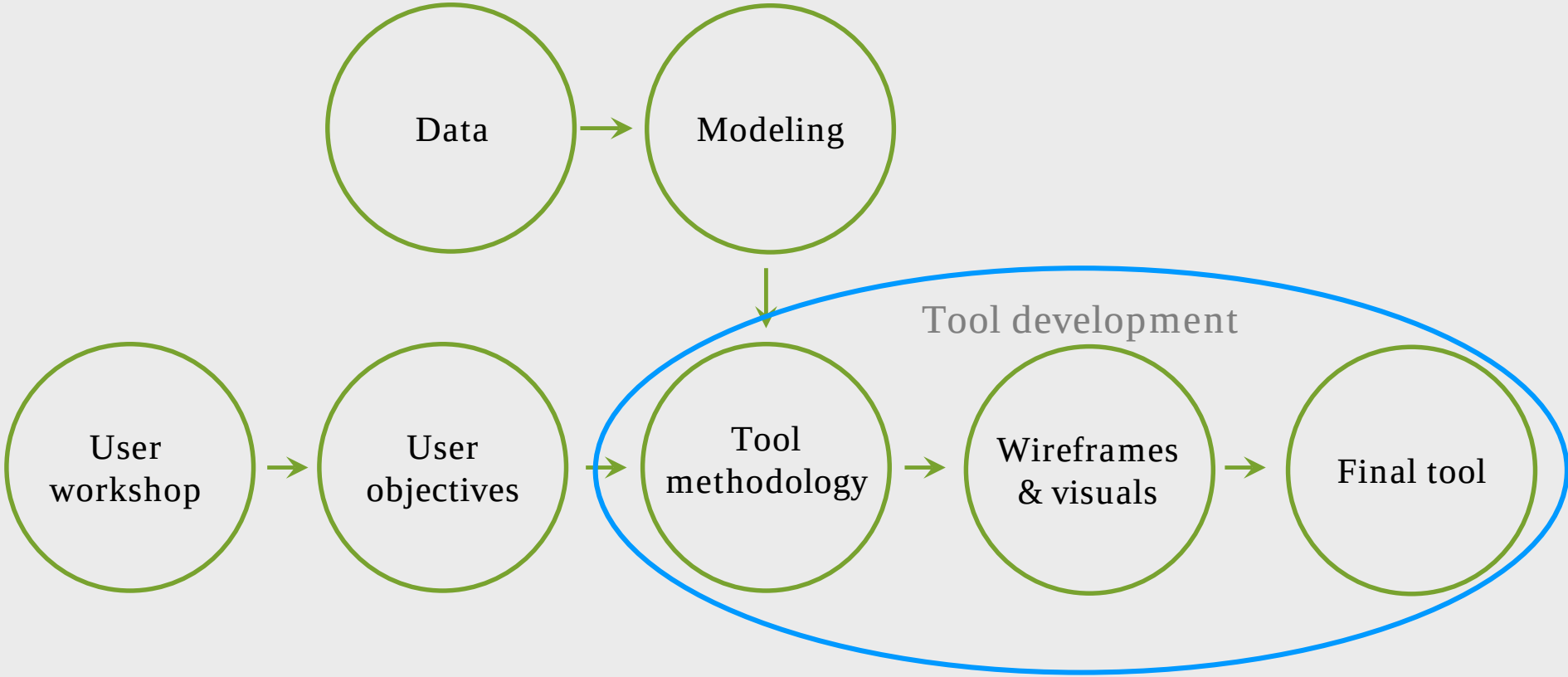
Water Users:

- users interested in flows for specific locations and how treatments affect those flows

Forest managers:

- Understanding impacts to flows when planning forest management activity
- Testing impacts to flows of proposed management

TOOL DEVELOPMENT



05 *Tool Demo*

http://s2fdemo.ecotrust.org

06 *Next steps*

Tool Rollout

- Beta testing through September
- Outreach
- Final release available October 1st on UCSRB website

Tool Rollout

Interested in beta testing tool?

- Mike Mertens, Ecotrust, mike@ecotrust.org, (503) 467-0775
- Jocelyn Tutak, Ecotrust, jtutak@ecotrust.org (503) 467-0750

Thank you

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