



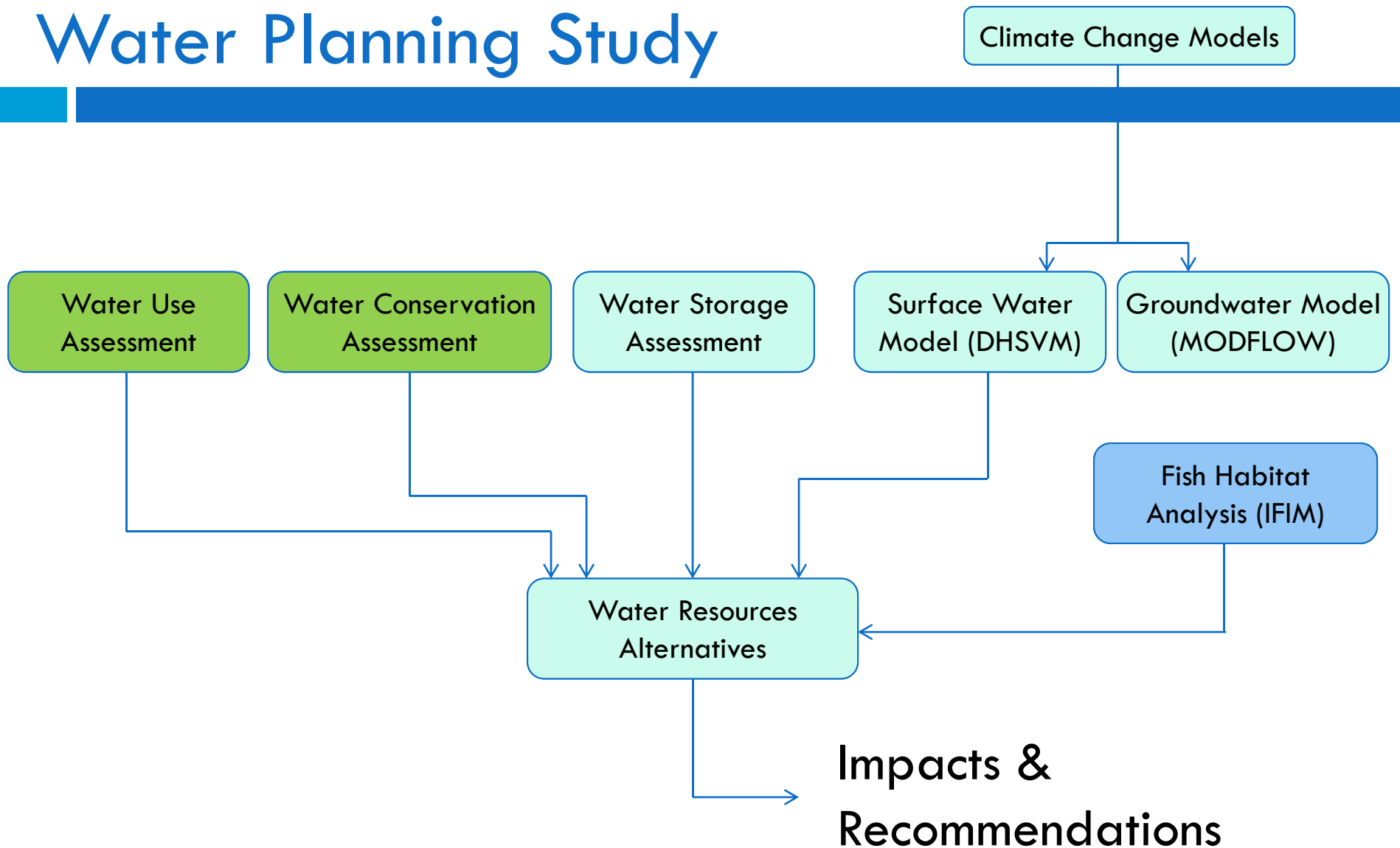
# Hood River Basin Study

## Climate Change Impacts to Streamflow & Opportunities for a Sustainable Future

Cindy Thieman  
Hood River Watershed Group

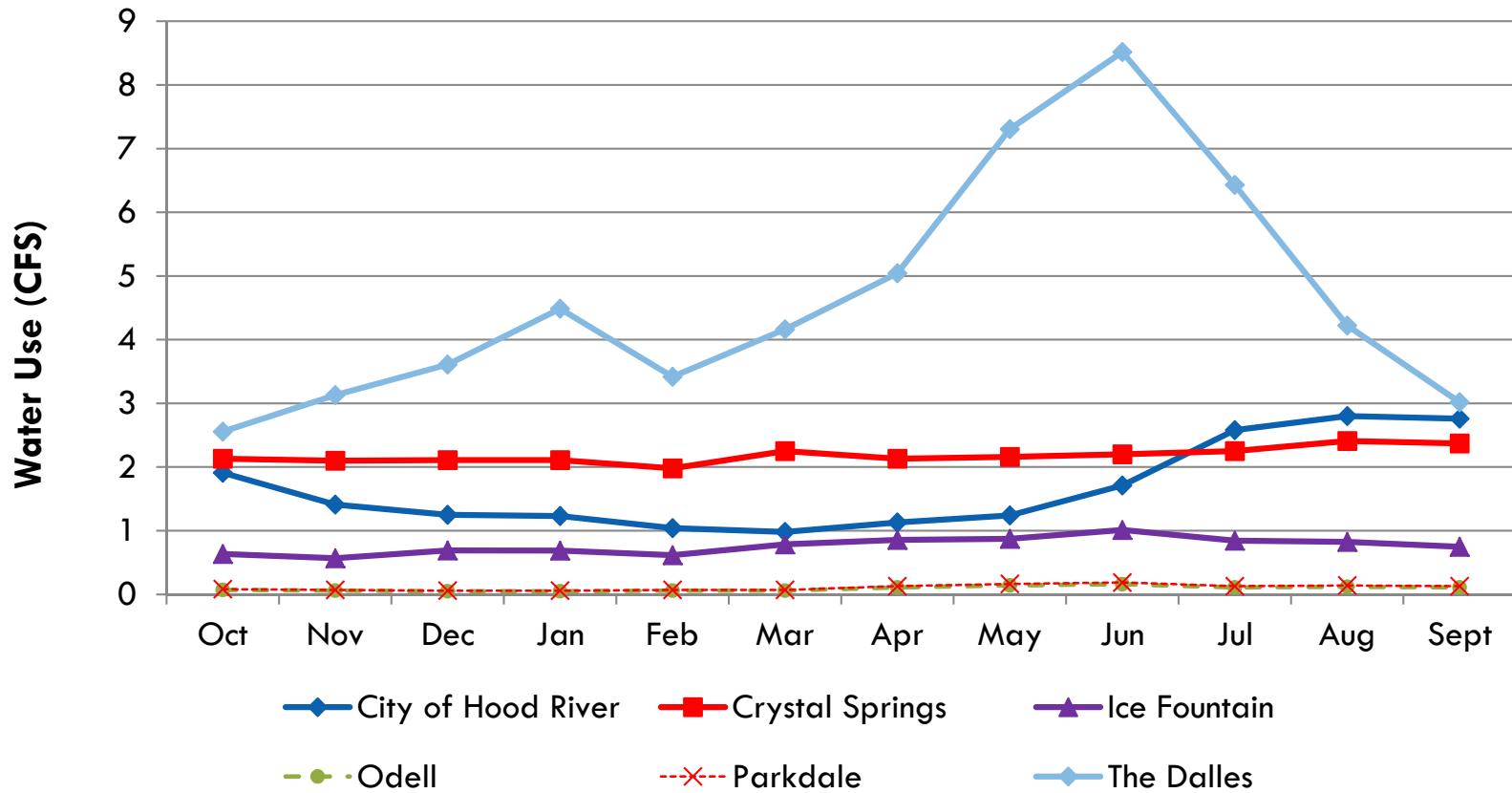
Niklas Christensen  
Watershed Professionals  
Network

# Overview of Water Planning Study

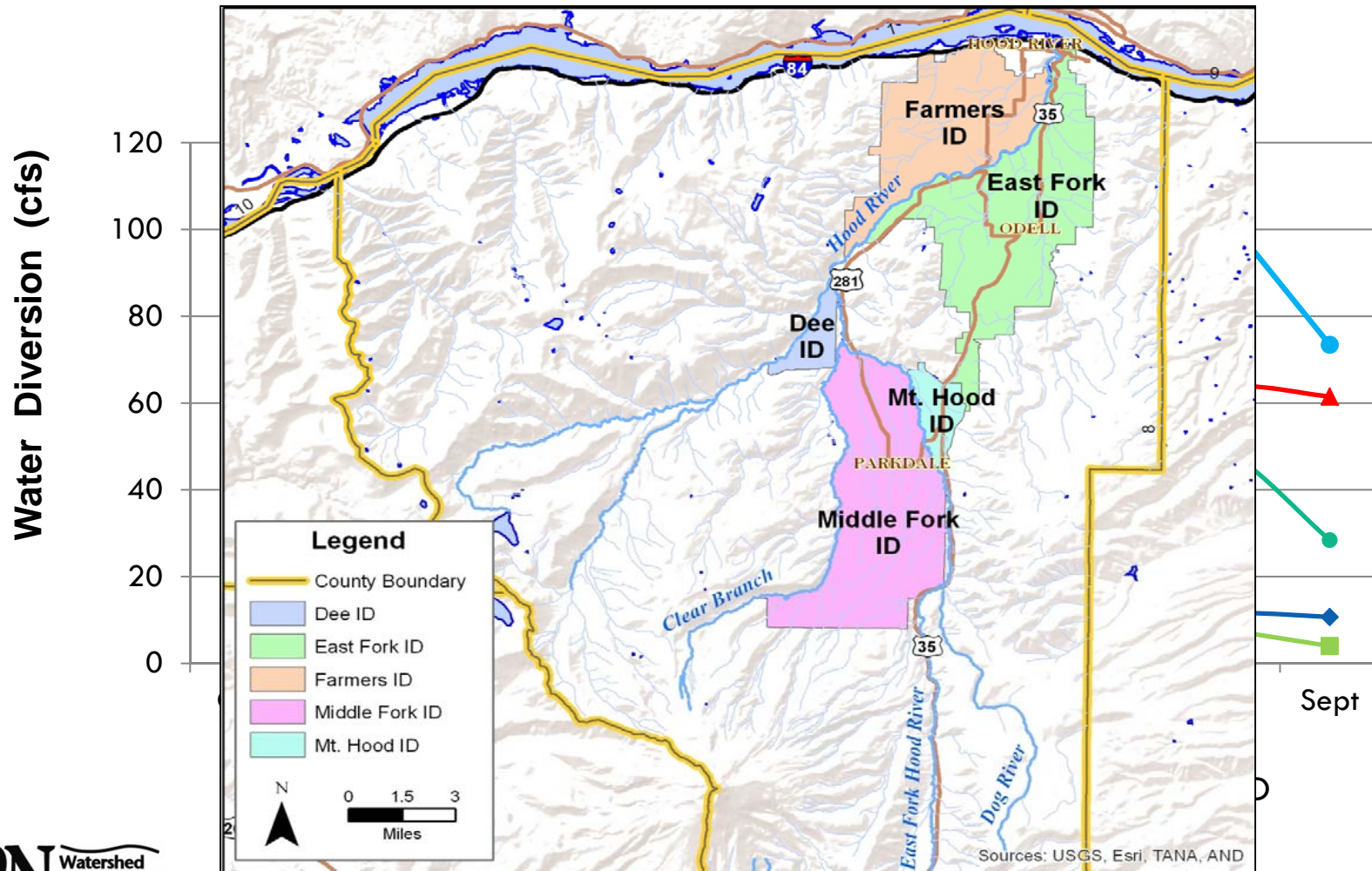


# Water Use - Potable

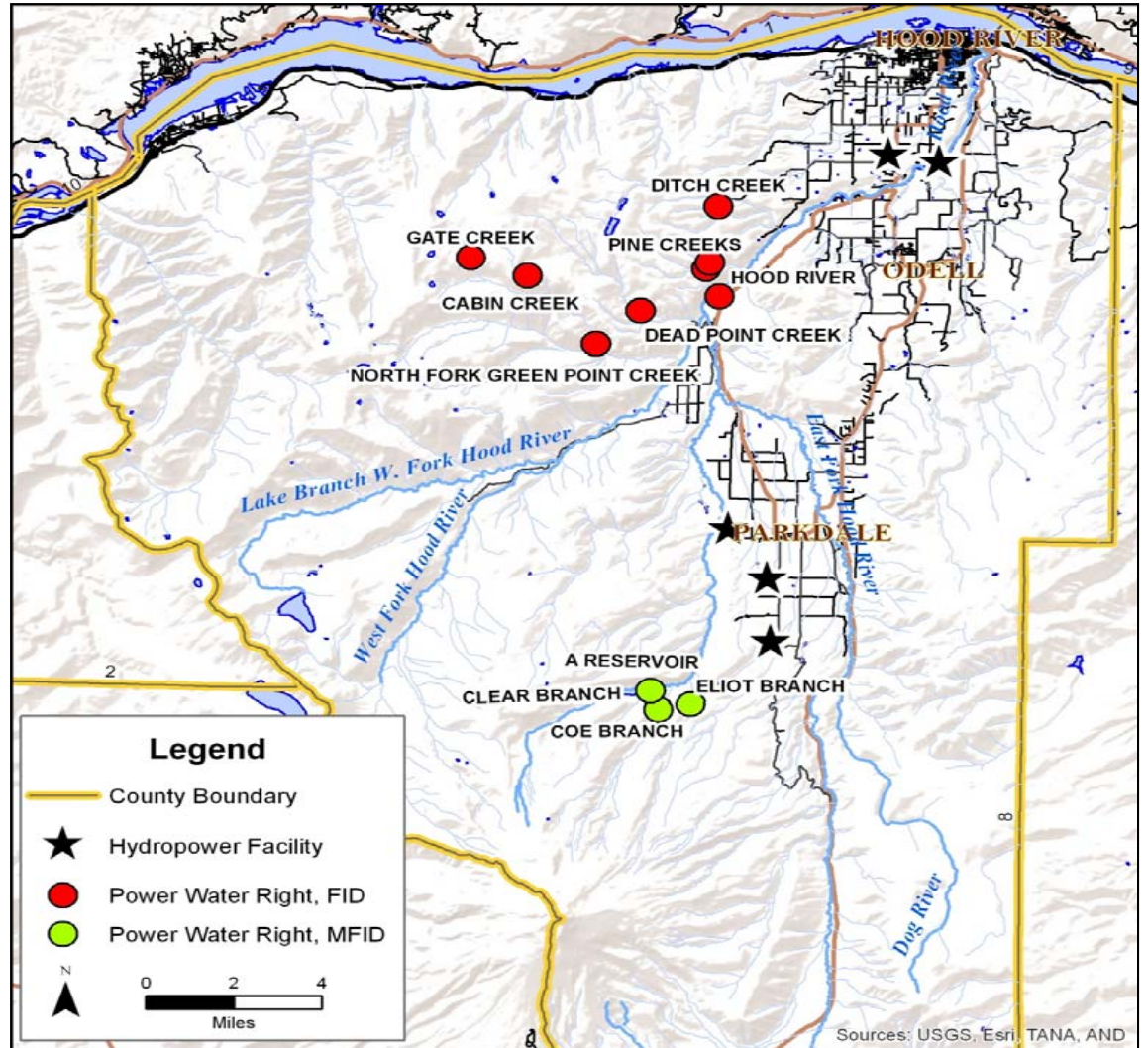
## Average Monthly Use (CFS)



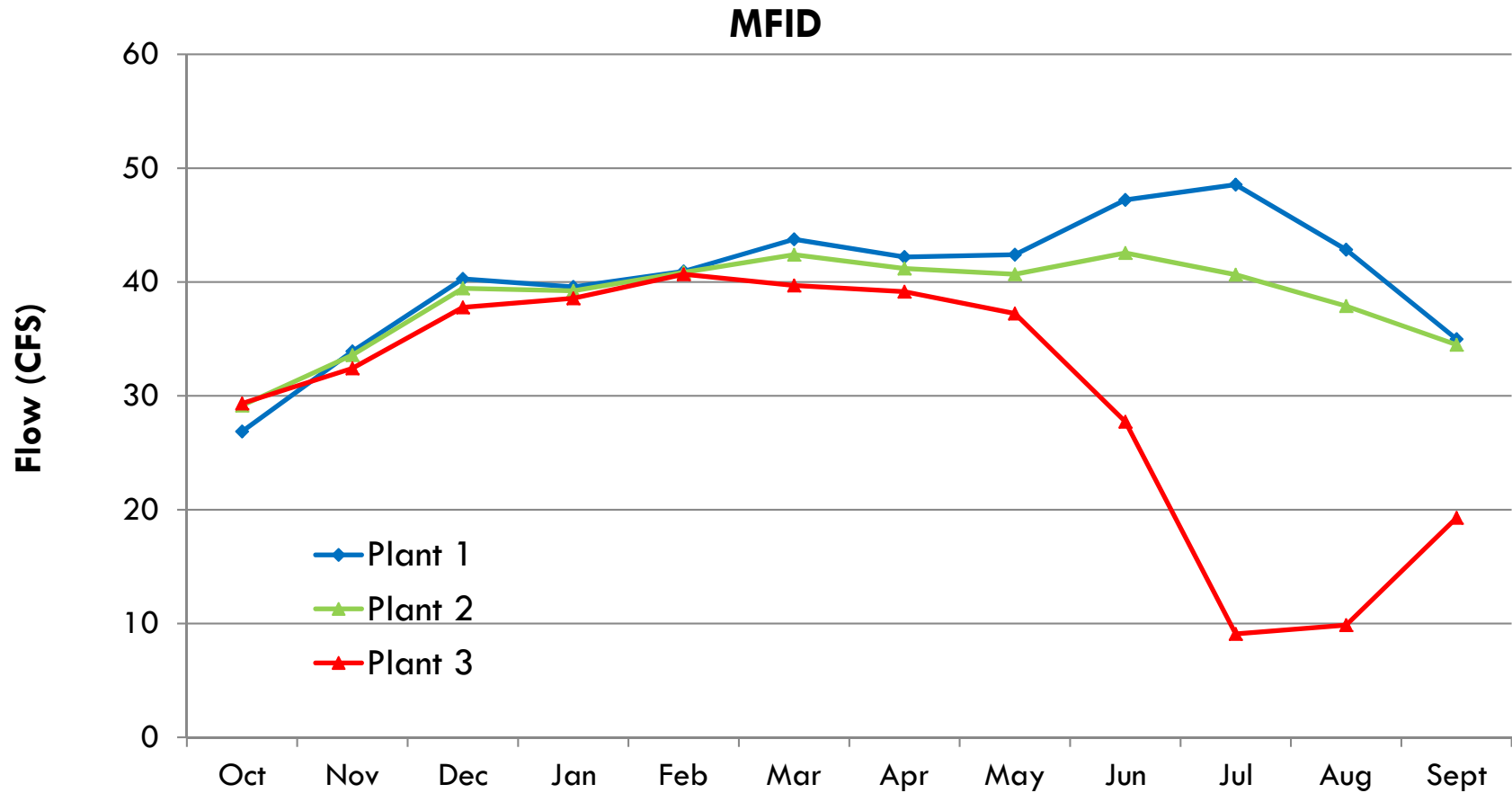
# Water Use - Irrigation



# Water Use - Hydropower

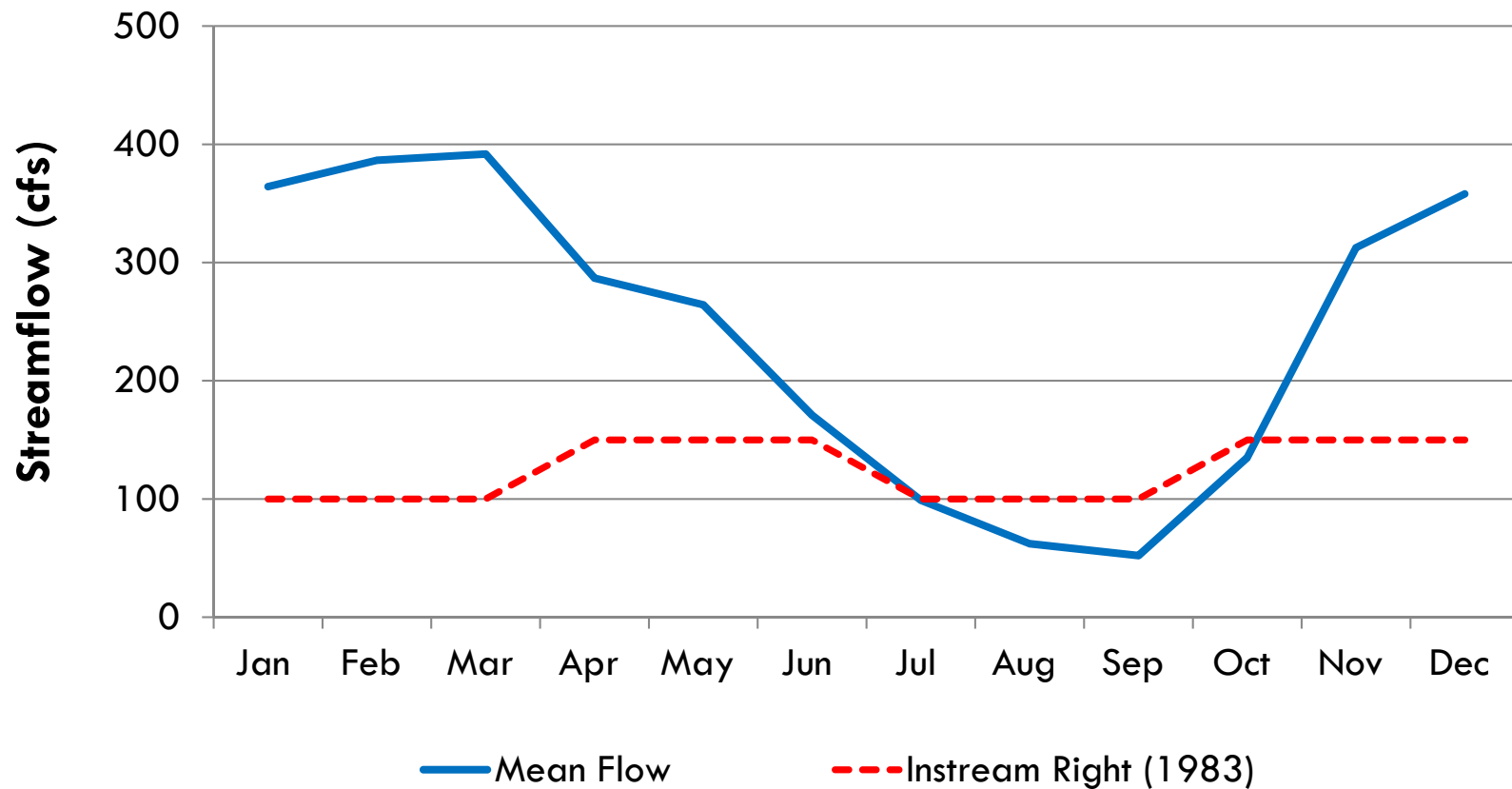


# Water Use - Hydropower



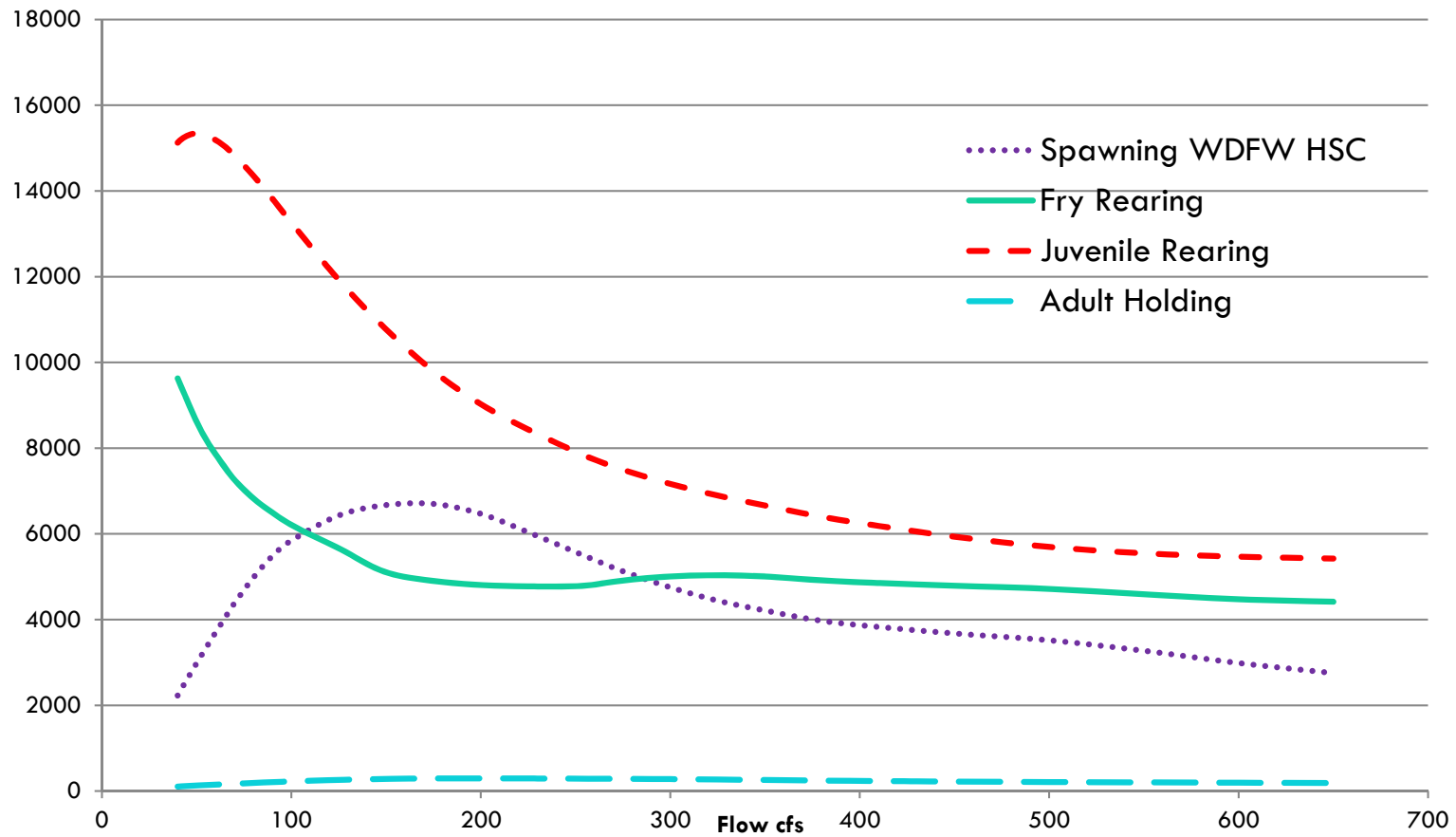
# Water Use - Instream

## East Fork above Middle Fork



# Water Use - Instream

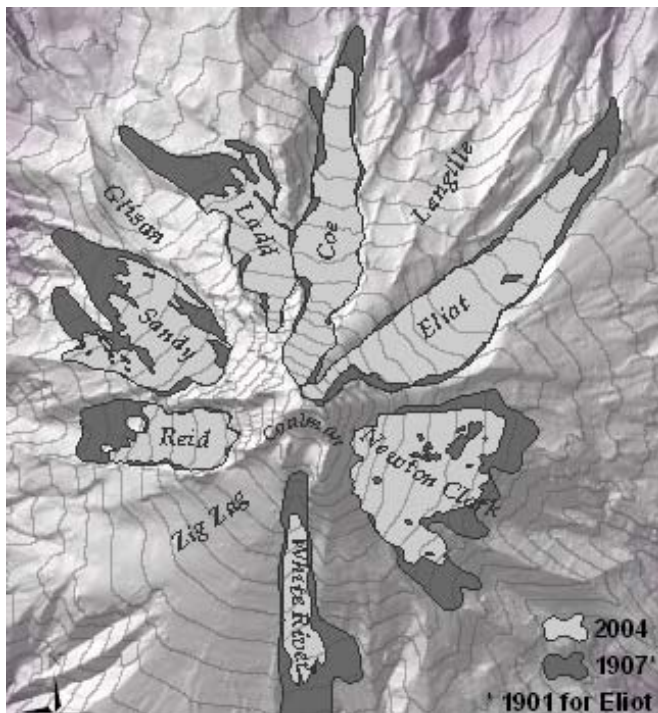
## East Fork- spring Chinook



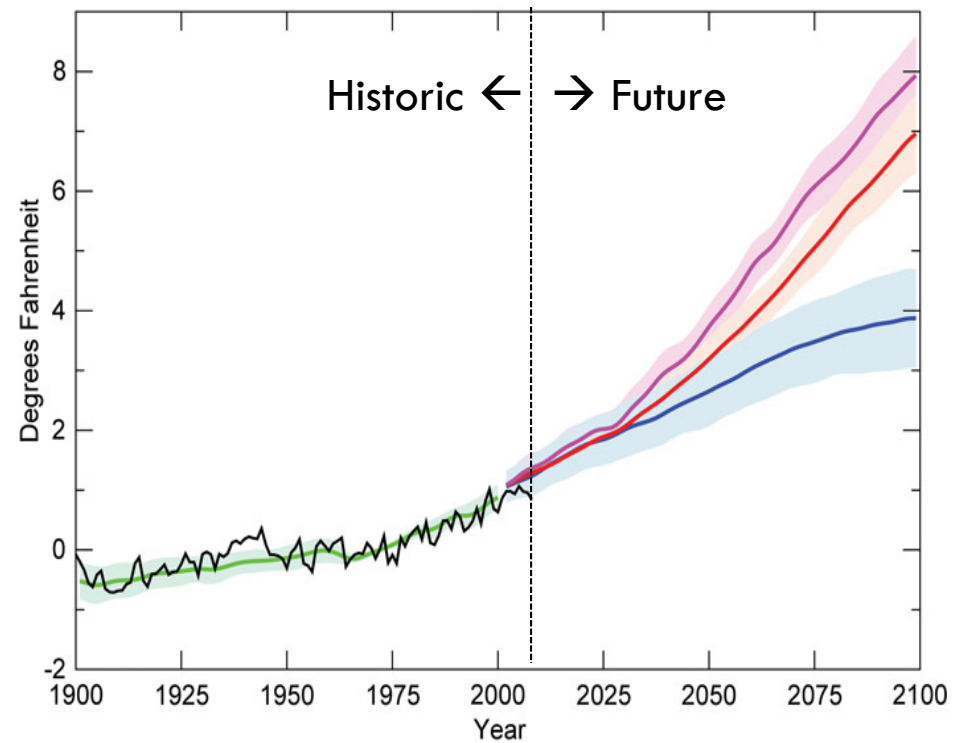


# Projected Climate Change (2030-2060)

Mt. Hood Glaciers



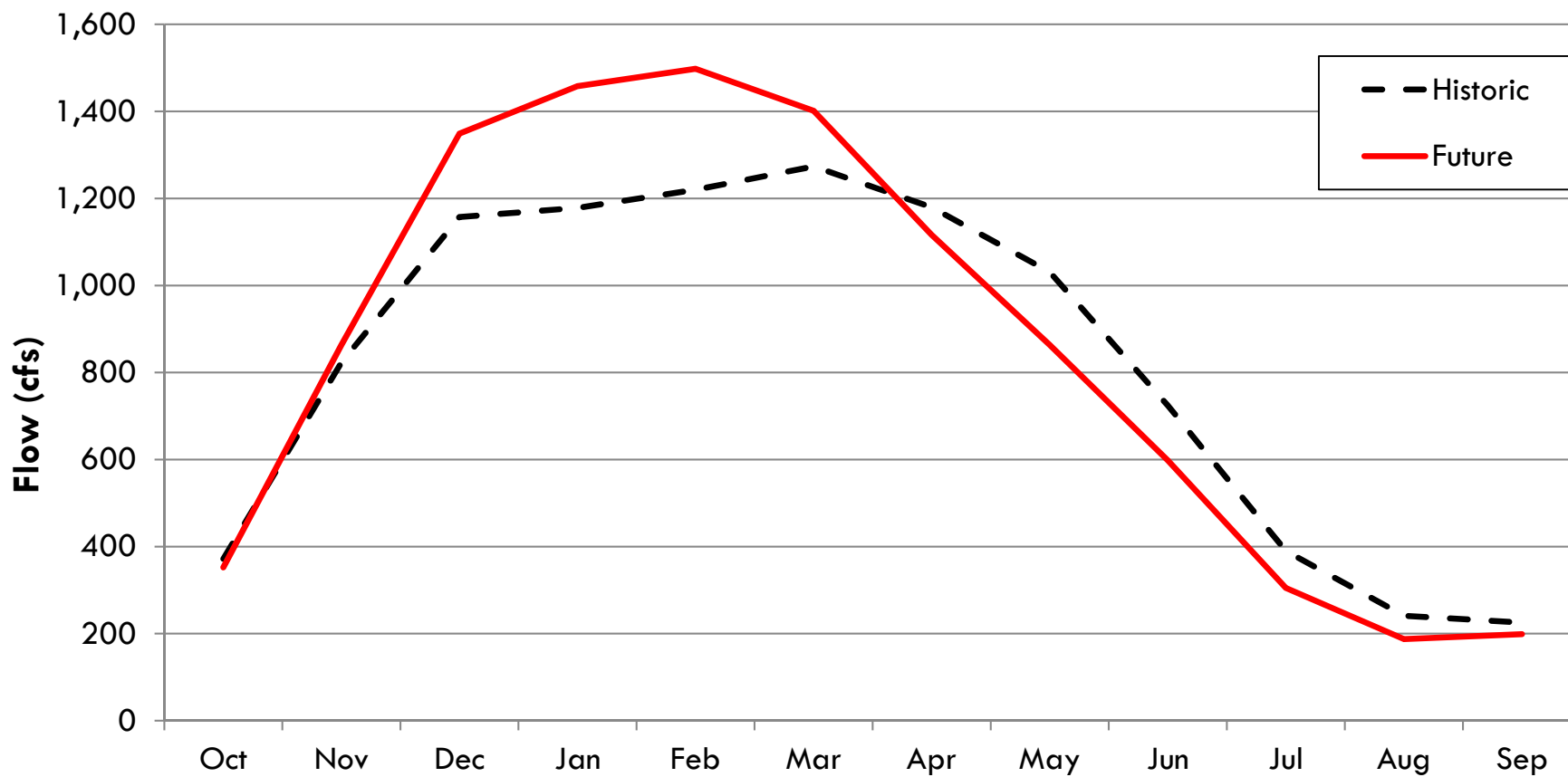
Historic & Future Temperature



Projected Temperature Increase → 2.3°F (range of 1.7°F - 3.0°F)  
 Projected Precipitation Increase → 2.4 % (range of -2.8% - 4.7%)

# Streamflow

## Hood River At Tucker Bridge, Monthly Mean Flows



# Options to Increase Water Availability



- More groundwater use? (Need more groundwater data to calibrate model)
- Increasing Reservoir Storage- two existing reservoirs have potential to expand (most cost effective); one potential new site
- Potable Water Conservation- relatively small impact
- Irrigation Water Conservation

# Water Conservation - Irrigation



Impact sprinklers on handline



Solid set micro sprinkler

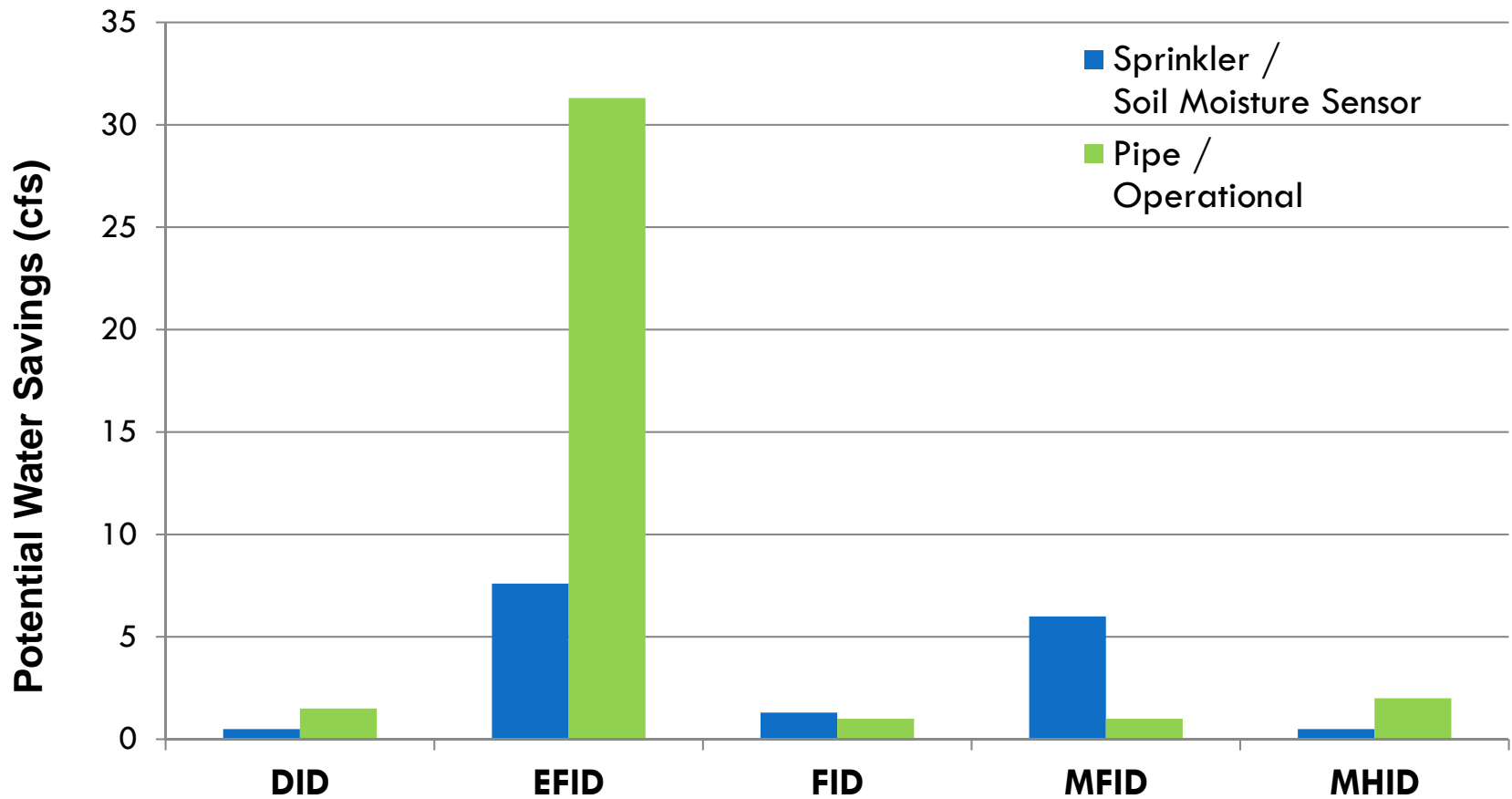


Open canal

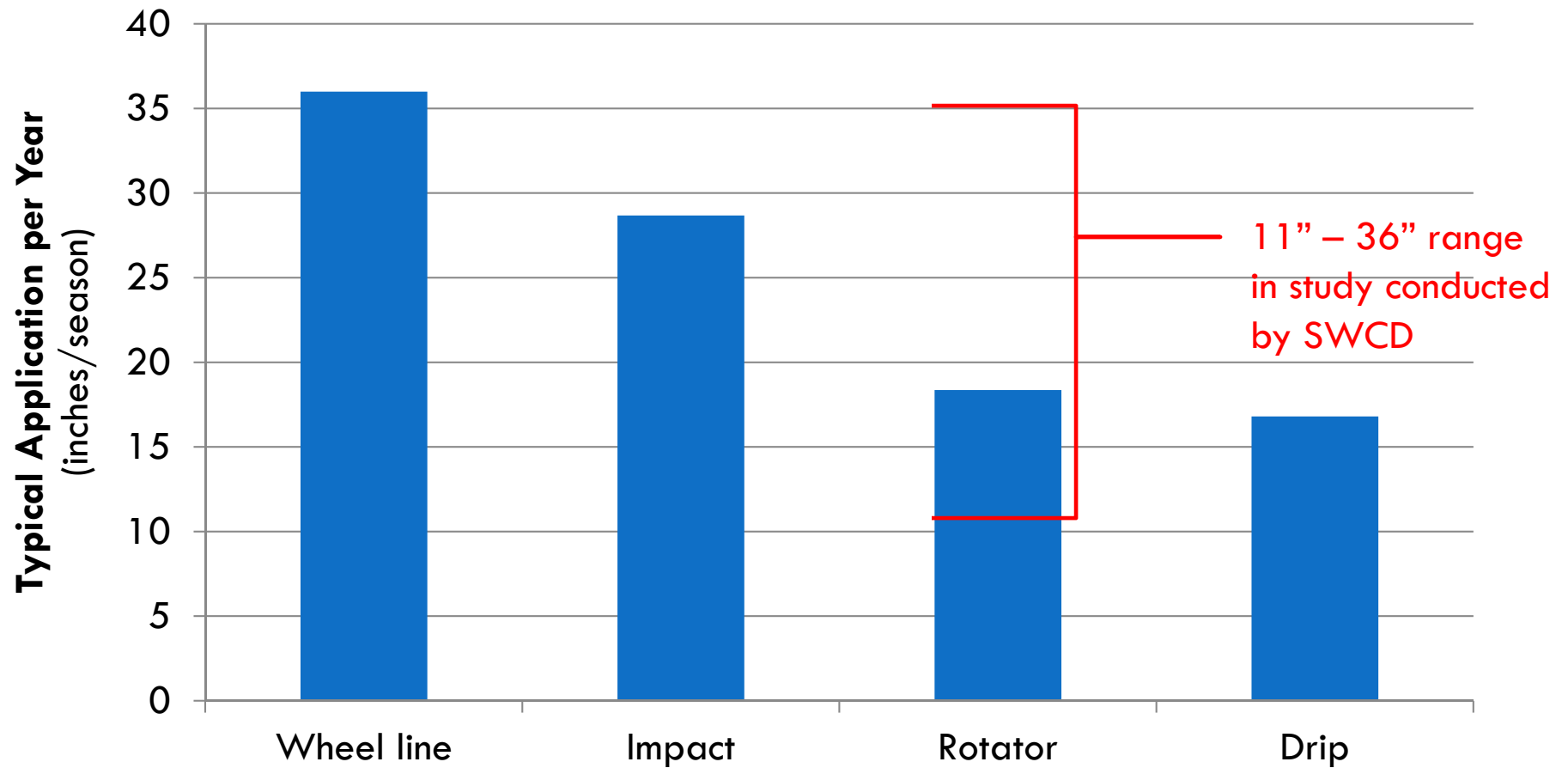


New pipe project

# Water Conservation – Irrigation



# Water Use of Different Application Methods



# Irrigation Management & Outreach to Orchardists

- ❑ Apply water at appropriate rate
  - ❑ Exceeding soil absorption rate → crops don't get all of it, soil erodes, wastes water
  - ❑ Over-watering can compromise fruit quality & increase costs
  - ❑ Using soil moisture sensors is key
  - ❑ Micro-sprinklers allow more even application at an appropriate rate
- ❑ Micro-sprinklers & drip irrigation improve ability to adequately water in a low-water year
- ❑ Efficient watering systems are good for business

# Alternative Management Scenarios under Median Climate Change

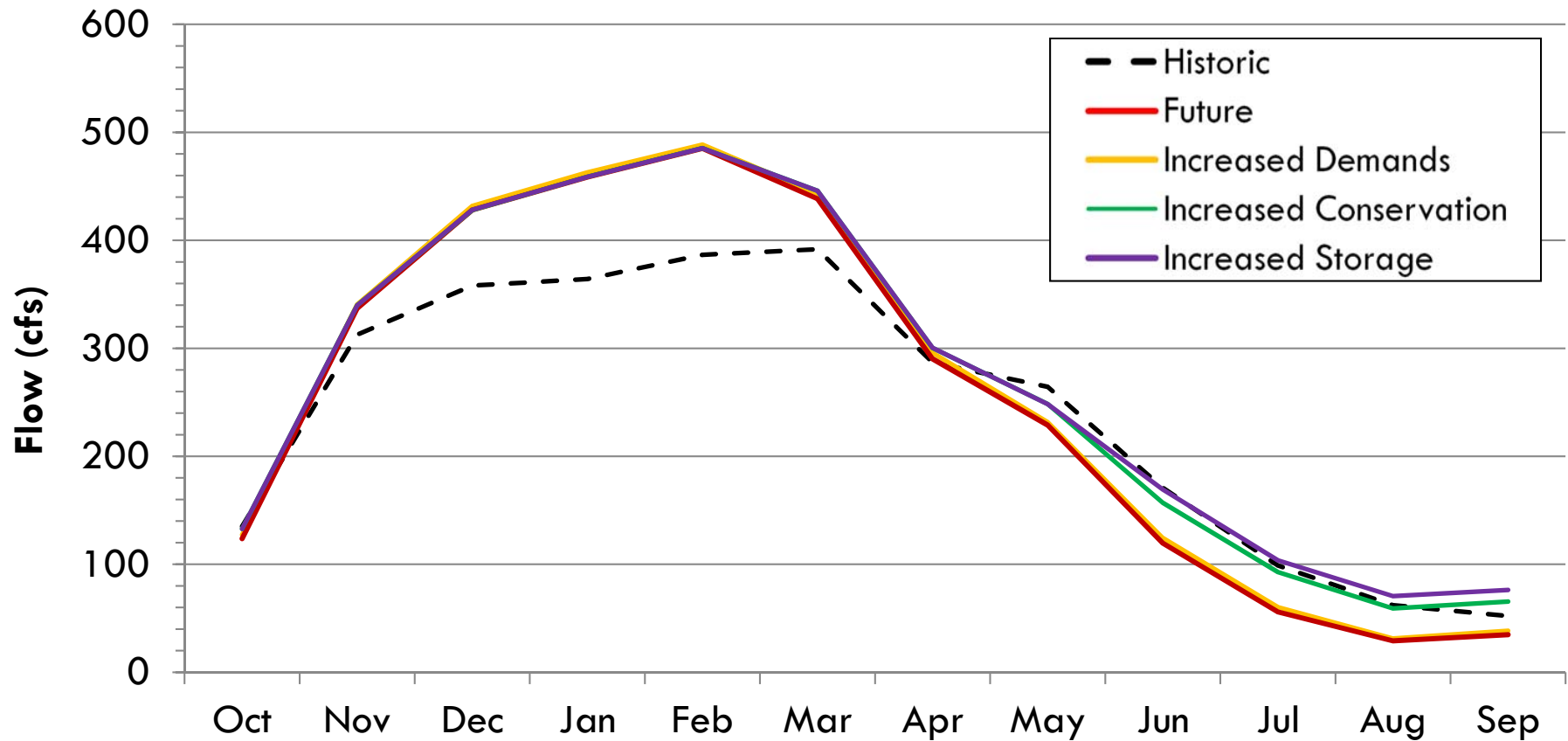
- “Historic”: 1980- 2010 stream flows
- “Future”: Climate change only
- “Increased Demand”: Climate change + increased demand
- “Increased Conservation”: Climate change + increased demand + increased conservation
- “Increase Storage”: Climate change + increased demand + increased conservation + increased storage



# Streamflow Response to Alternative Management Scenarios

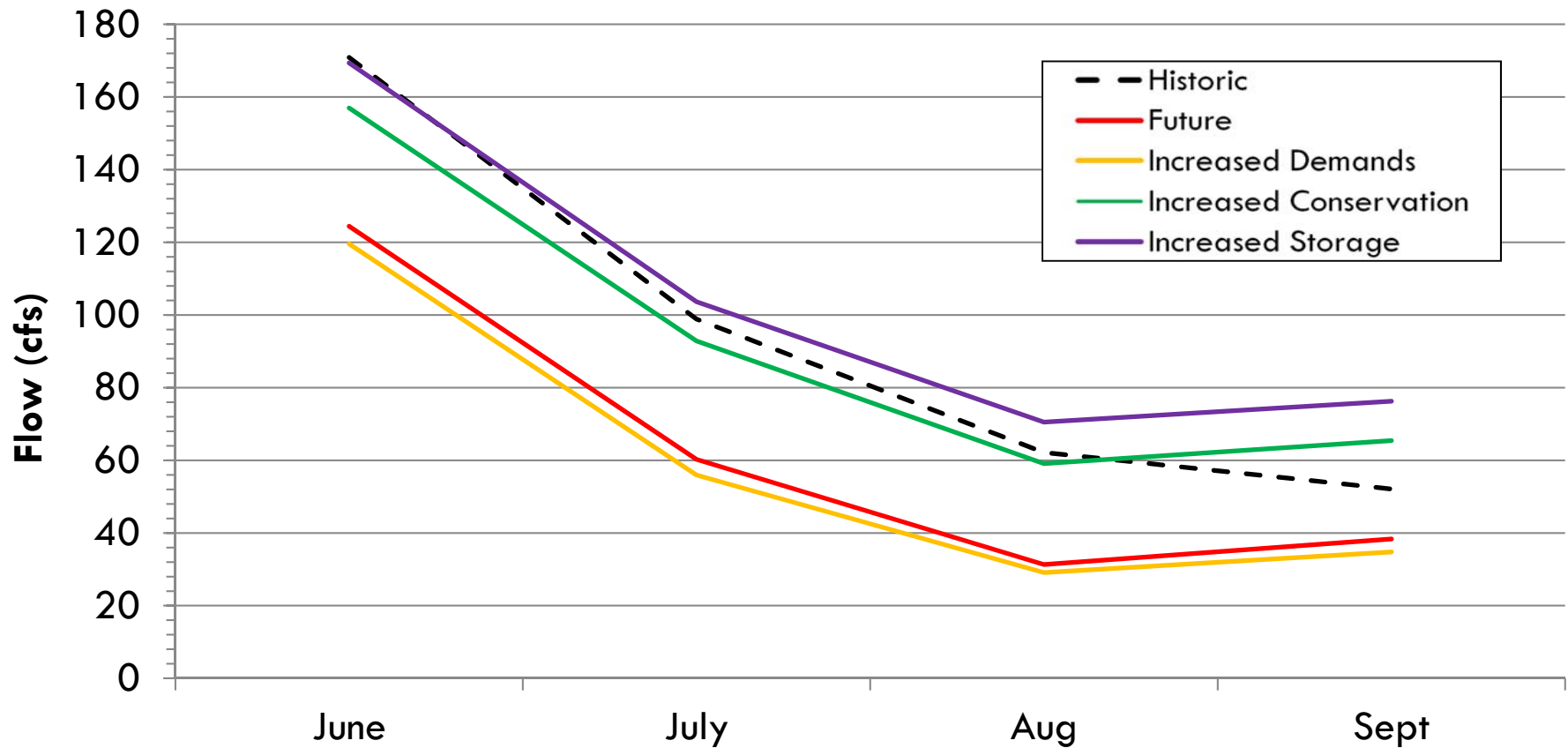
(Average Year/Median Climate Model)

## East Fork Above Middle Fork, Monthly Mean Flows



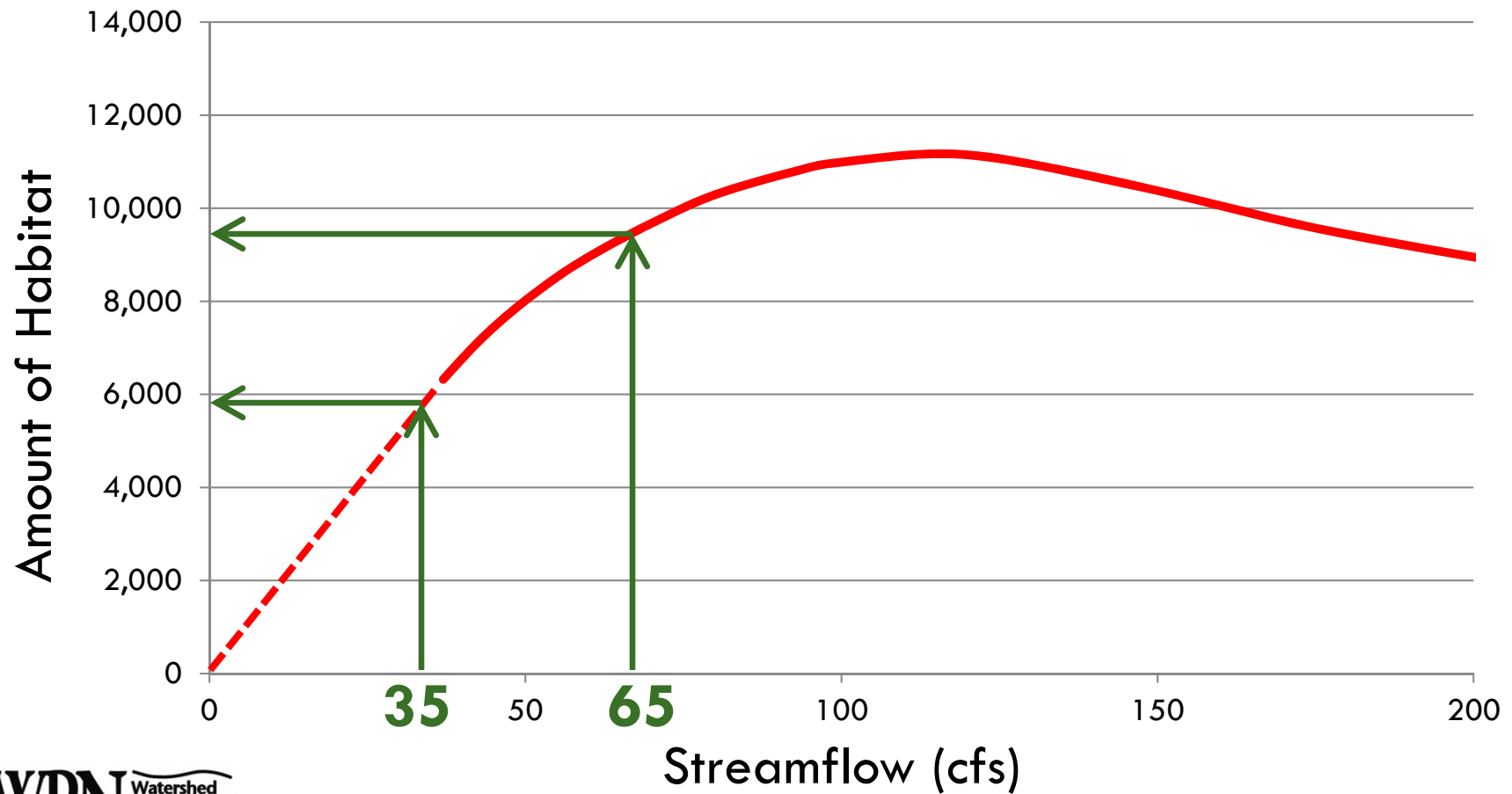
# Streamflow Response to Alternative Management Scenarios (Average Year/Median Climate Model)

## East Fork Above Middle Fork, Monthly Mean Flows



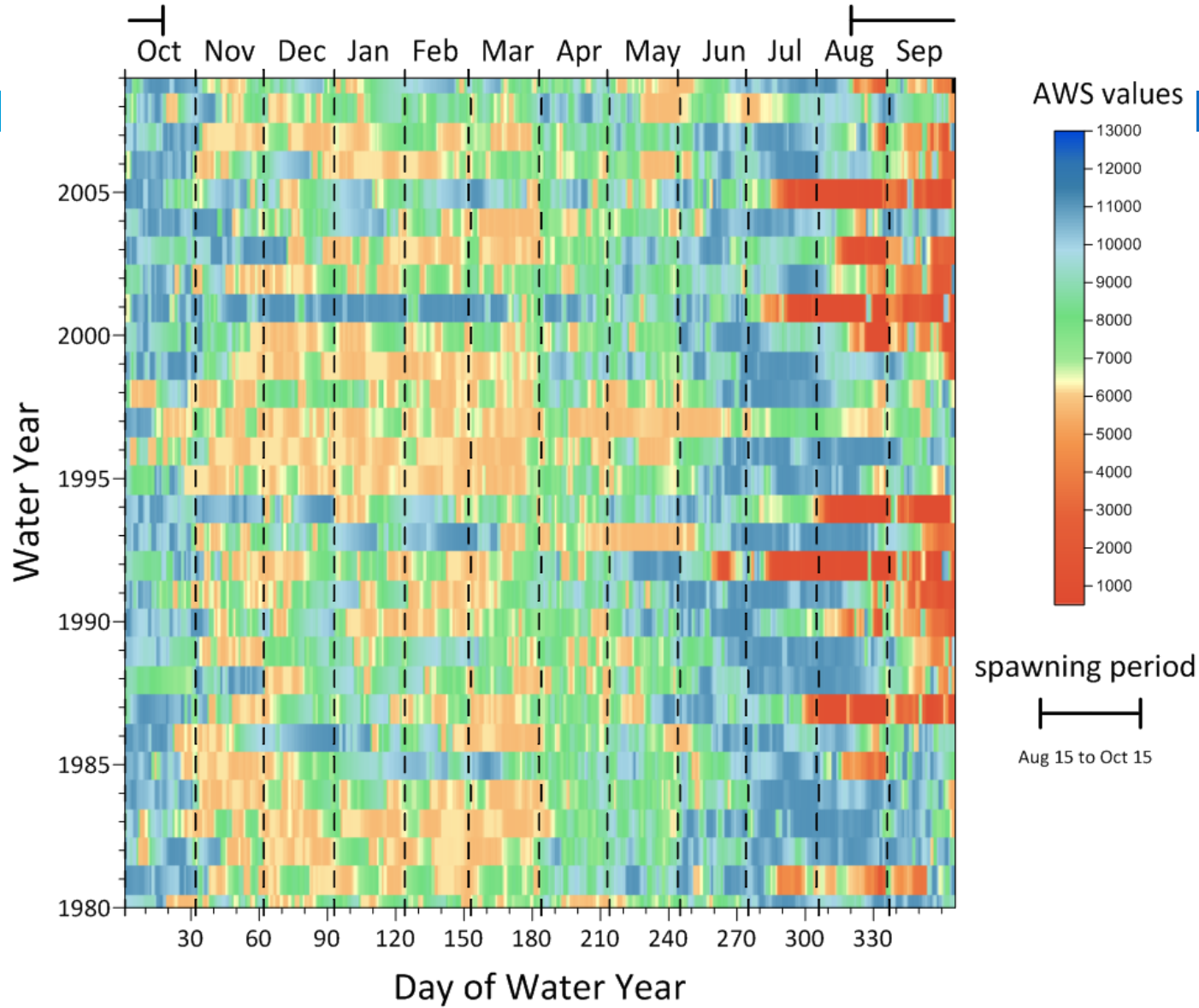
# Improved Fish Habitat

## East Fork – Chinook Spawning



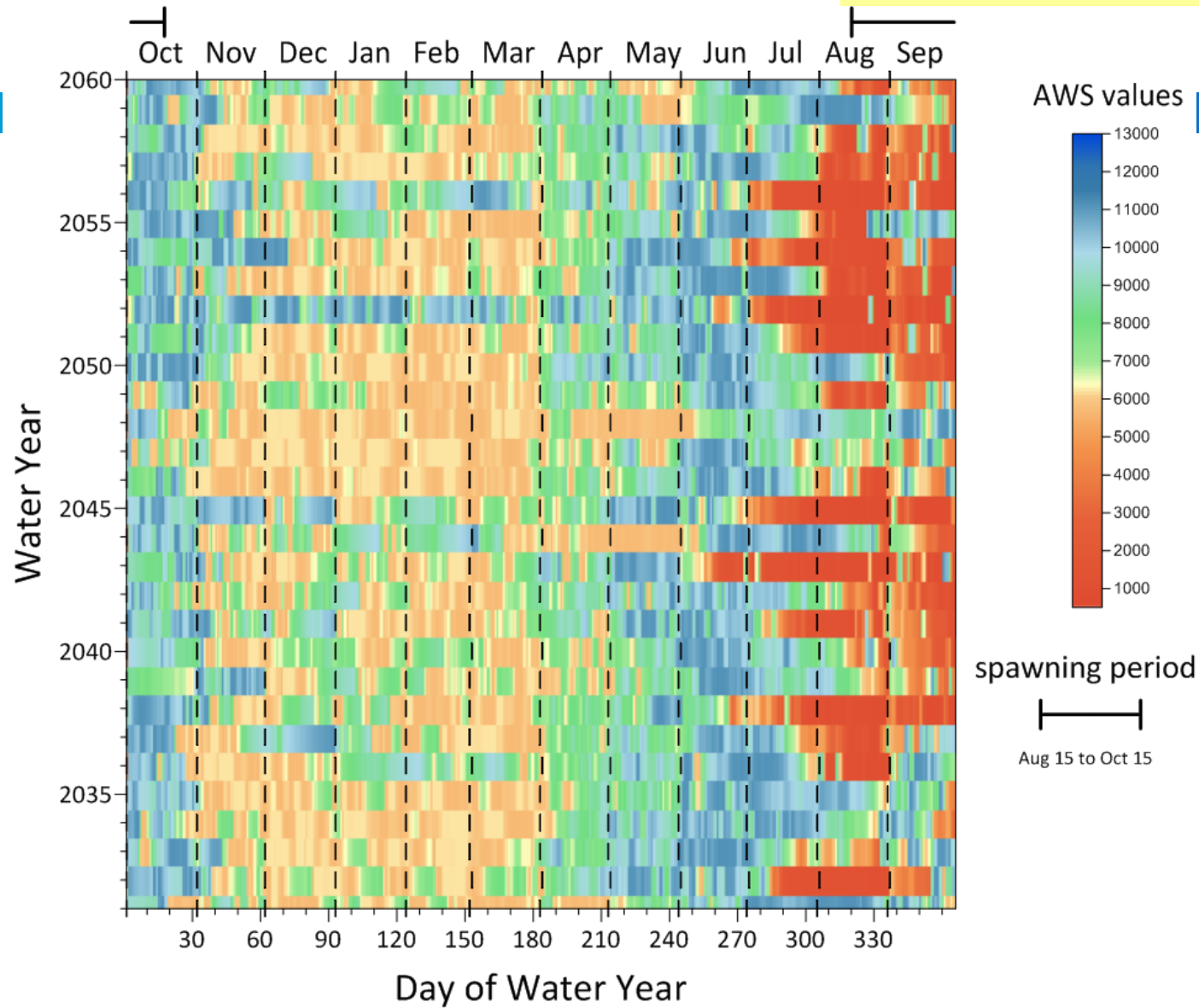
Upper East Fork Hood River, OR  
Spawning Chinook Salmon AWS values  
Historic Simulation (WY 1980 to 2009)

Historic/Existing (WY 1980-2010)



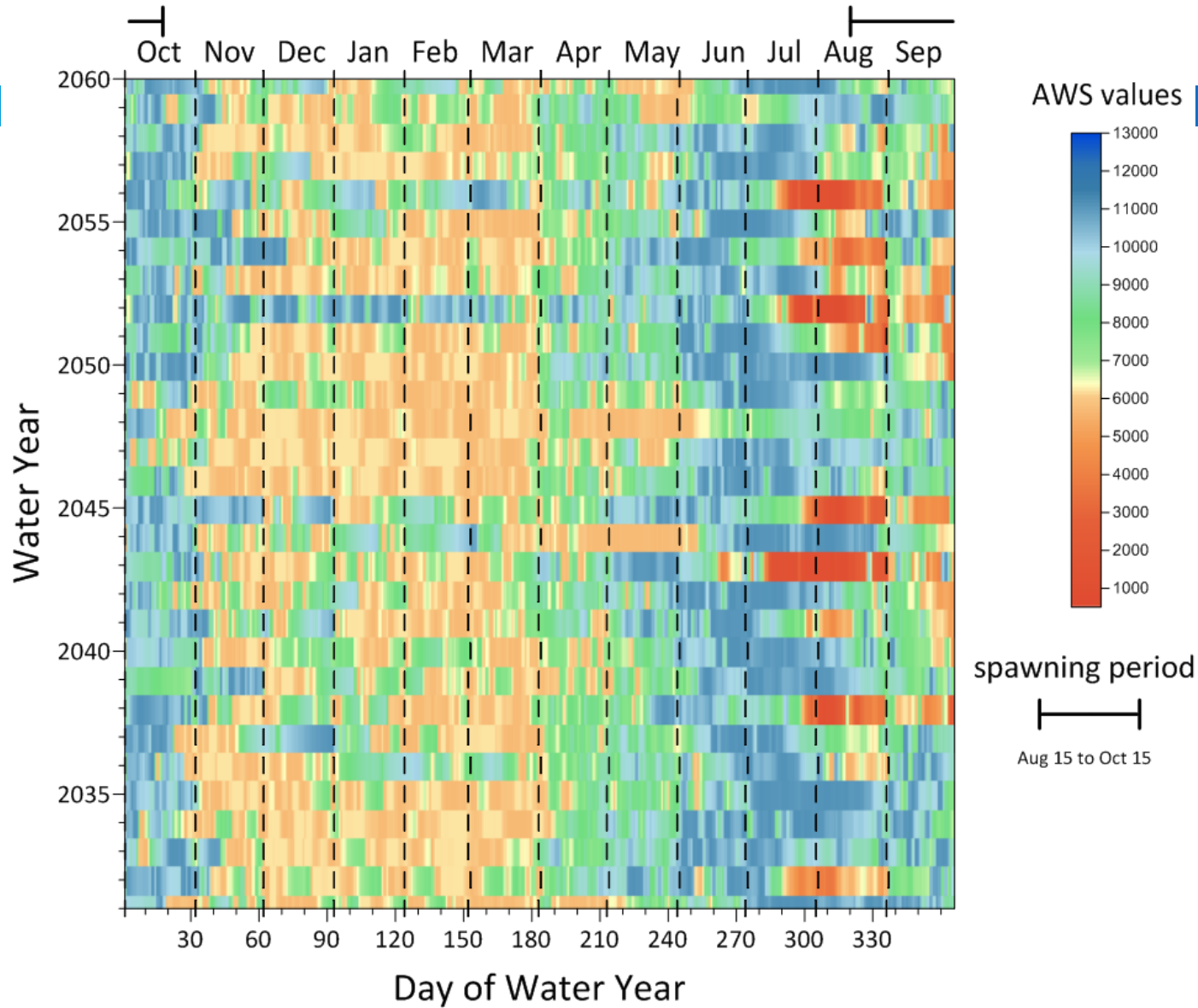
Upper East Fork Hood River, OR  
Spawning Chinook Salmon AWS values  
Future Simulation 2.1 (WY 2031 to 2060)

No Change in Water Use or Conservation  
(WY 2031-2060)



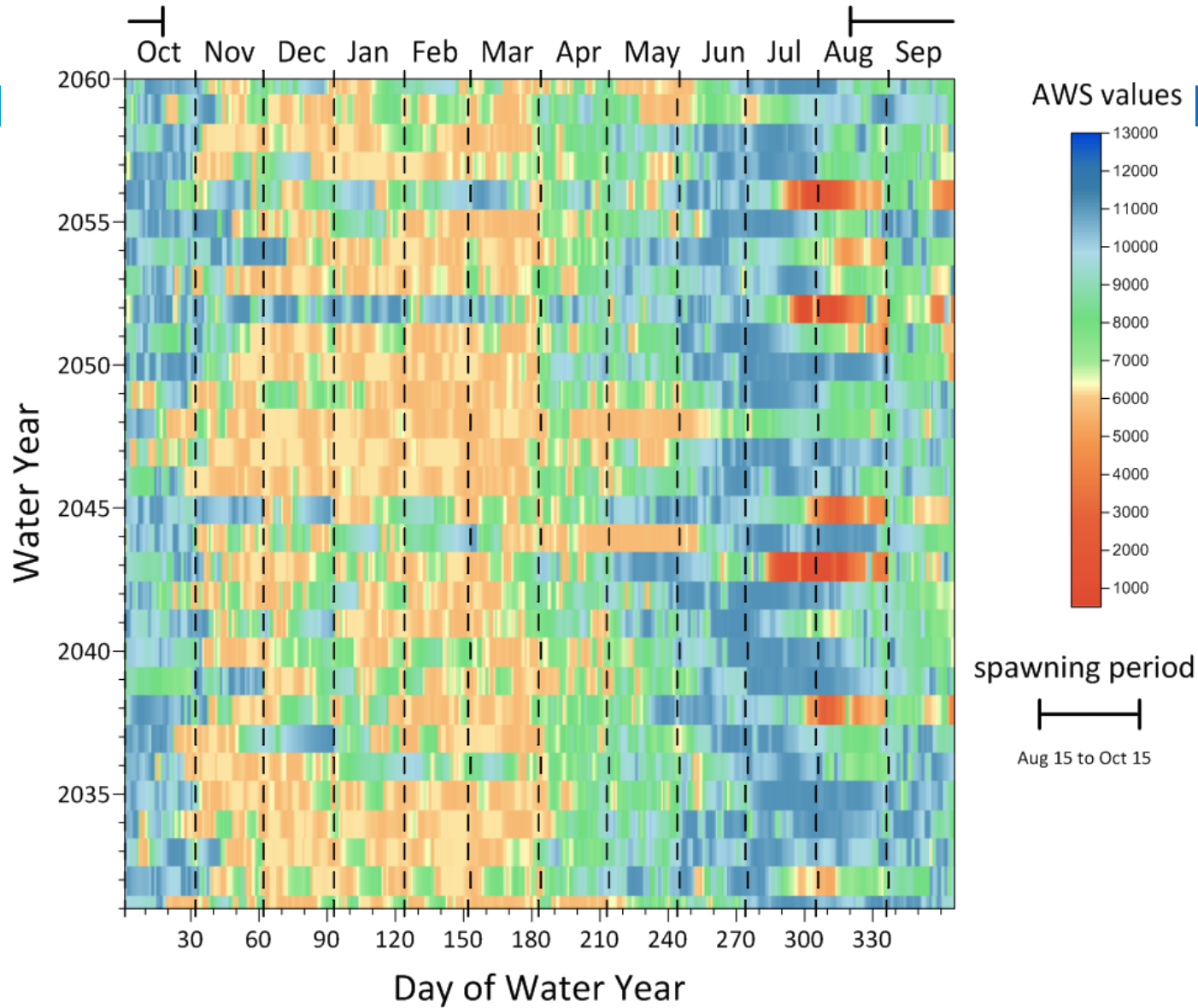
Upper East Fork Hood River, OR  
Spawning Chinook Salmon AWS values  
Future Simulation 4.1 (WY 2031 to 2060)

Conservation (WY 2031-2060)



Upper East Fork Hood River, OR  
Spawning Chinook Salmon AWS values  
Future Simulation 5.1 (WY 2031 to 2060)

Conservation & Storage (WY 2031-2060)



# Water Conservation Potential & Cost-effectiveness

	Type	Savings (CFS)	Cost (\$M)	Cost per CFS	Notes
Potable	Toilet Retrofit	0.4	\$ 2.6 M	\$ 7.2M/cfs	\$225 rebate/home
	Shower Retrofit	0.2	\$ 0.8 M	\$ 4.0 M/cfs	\$50 rebate/home
	Outdoor	0.5	n/a	n/a	-25% of current outdoor
	Change Rates	1.8 (1.0)	n/a	n/a	25% rate increase
Sprinkler Upgrade	DID	0.5	\$ 0.2 M	\$ 0.4 M/cfs	<b>Assumes 1/2 remaining landowners convert to high efficiency irrigation equipment</b>
	<b>EFID</b>	<b>7.6</b>	<b>\$2.7 M</b>	<b>\$ 0.4 M/cfs</b>	
	FID	1.3	\$ 0.6 M	\$ 0.4 M/cfs	
	MFID	6.0	\$ 2.5 M	\$ 0.4 M/cfs	
	MHID	0.5	\$ 0.2 M	\$ 0.4 M/cfs	
New Pipe	DID	1.5	\$ 1.4 M	\$ 0.95 M/cfs	
	<b>EFID</b>	<b>21+</b>	<b>\$28 M</b>	<b>\$ 1.3 M/cfs</b>	
Storage	<b>EFID (new)</b>	<b>14</b>	<b>\$20 M</b>	<b>\$ 1.4 M/cfs</b>	<b>2,560 ac-ft</b>
	FID (expand)	3	\$1.8 M	\$ 0.6 M/cfs	560 ac-ft
	MFID (expand)	1.3	\$ 0.3 M	\$ 0.22 M/cfs	270 ac-ft



# Acknowledgements



- Les Perkins, Mike Benedict, Mattie Bossler, Hood River County
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- Terrence Conlon, USGS
- Bob Wood & Josh Hackett, OWRD
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- Chris Brun, Confederated Tribes of the Warm Springs
- Tim Hardin & Rod French, ODFW
- Craig DeHart, Middle Fork Irrigation District
- Jer Camarata, Farmers Irrigation District
- John Buckley, East Fork Irrigation District
- Hugh McMahon & Jason Keller, Watershed Residents