Icicle Strategy
Draft PEIS overview

Icicle Workgroup

July 27, 2017

Dan Haller, PE

Aspect Consulting

Presentation Overview

- **What are you going to see in the Draft PEIS?**
  - 5 Chapters
  - Incorporation of Other Studies and Previous Work by Reference
- **What is the rollout strategy?**
- **How can you help?**
- **What questions should you be asking yourself?**
- **Where do we go after the PEIS is done?**

Draft PEIS Overview

- **Chapter 1:** Introduction, Purpose and Need, Guiding Principles
- **Chapter 2:** Project Descriptions by Alternative
- **Chapter 3:** Resource Descriptions, Affected Environment
- **Chapter 4:** Projected Impacts by Alternative
- **Chapter 5:** Consultation and Coordination Information

Draft PEIS Overview

- **Chapter 1:** Introduction, Purpose and Need, Guiding Principles
  - Icicle Subbasin Background
  - How was IWG Formed?
  - Guiding Principles
  - Purpose and Need
  - Prior Investigations and Studies (Watershed Plan, BiOp, Habitat Studies, Climate Change, Federal Studies)
  - Permits, Laws, Rules, and Actions Overview
  - SEPA Overview, Public Involvement

Background

- **Co-Conveners:** Ecology OCR and Chelan County DNR
- **Process:** Assembled Icicle Workgroup (IWG) Stakeholders
- **Timeline:**
  - 2012 to 2015: Guiding Principles adopted, studies completed, and alternative projects considered
  - 2015 to 2016: Icicle Strategy (base package) endorsed by IWG and SEPA scoping
  - 2016 to 2017: Programmatic Environmental Impact Statement and feasibility studies ongoing
  - 2017 to 2022: Individual project environmental review checks, permitting, design and implementation
- **Goals:** Meet instream and out-of-stream objectives in Icicle Creek Basin, provide an alternate pathway for conflict resolution other than litigation

IWG Members

- Office of Columbia River
- Chelan Co Board of Commissioners
- Conf Tribes of the Yakama Indian Nation
- WA State Dept of Fish & Wildlife
- Conf Tribes of the Colville Reservation
- WA State Dept of Ecology
- Icicle & Peshastin Irrigation District
- USFWS – Leavenworth Fish Hatchery
- City of Leavenworth
- NOAA Fisheries
- Chelan County
- Cascade Orchard Irrigation Co
- Icicle Creek Watershed Council
- WA Water Trust
- US Forest Service
- Trout Unlimited
- Agricultural Representative Mel Weythman
- Agricultural Representative Daryl Harnden
- City of Cashmere
- US Bureau of Reclamation
- Cascadia Conservation District

Icicle Strategy Overview

Guiding Principles for the Icicle Strategy

Icicle Strategy Overview

Guiding Principles for the Icicle Strategy

Guiding Principle	Metric	
Improve Instream Flows	Icicle Creek Historic Channel: • 60 cfs minimum flows (drought years) • 100 cfs minimum flows (non-drought years), short-term goal • 250 cfs minimum flows (non-drought years), long-term goal • 2,600 cfs maximum flow to preserve habitat function	Flow improvement needed (in projects) to meet total minimum flows: 40 cfs[1]
Improve sustainability of LNFH	• Meet *U.S. v. Oregon* and other agreements specifying fish production requirements • 57 cfs supply protected long-term (at least 20 cfs conservation goal) • Diverse source availability (temperature, pathogen-free) to maximize fish health • Structures minimize unintended fish passage impediments	
Protect Tribal and Non-Tribal harvest	• Catch per unit of effort (CPUE) improved • Maintain multi-species harvest opportunities • Tribal Impacts Assessment and Adaptive Management Plan being implemented, addressing attraction flows, sediment transport, fish migration/straying, site access and amenities	
Improve Domestic Supply	• 1,750 acre-feet of reliable year-round supply (2.5 cfs average, 5 cfs peak)	
Improve Agricultural Reliability	• Automate / Optimize Alpine Lakes Reservoirs for improved reliability (plus instream flow benefit) • Restore/repair Eightmile Lake Reservoir up to 2,500 acre-feet (1,125 ac-ft additional instream flow/domestic benefit) • Current interruptible agricultural users have firm supply in average water years / agriculture water bank (2 to 4 cfs)	
Enhance Icicle Creek Habitat	• Improve passage in Icicle Creek including to Upper Icicle Creek • Make investments in physical habitat improvement with consideration for high flow habitat and low flow refuge, minimize fish passage impediments, and improve limiting factor spawning/rearing • Offset project-related terrestrial impacts with land acquisition/easements	
Comply with State and Federal Law, and Wilderness Acts	• Identify and engage regulators in the process • Environmental review completed (project check) • All projects appropriately permittable (project check) • All diversions (LNFH, IPID, COIC) appropriately screened (project check)	

Where Have We Been?

- **What Does the Public Need to Know About What Has Already Been Done?**

- **What Do the Guiding Principles Represent?**

What Does Flow In Icicle Creek Look Like?

Low flow in late 2001 was about 20 cfs (and 16.4 cfs in 2015)

Icicle Creek Looking Upstream of Structure 2

148 cfs
August 30, 2016

85 cfs
Sept. 15, 2016

- Guiding Principle is 100 cfs in non-drought years and 60 cfs in drought years

Icicle Creek Looking Upstream of Structure 5 Near LNFH

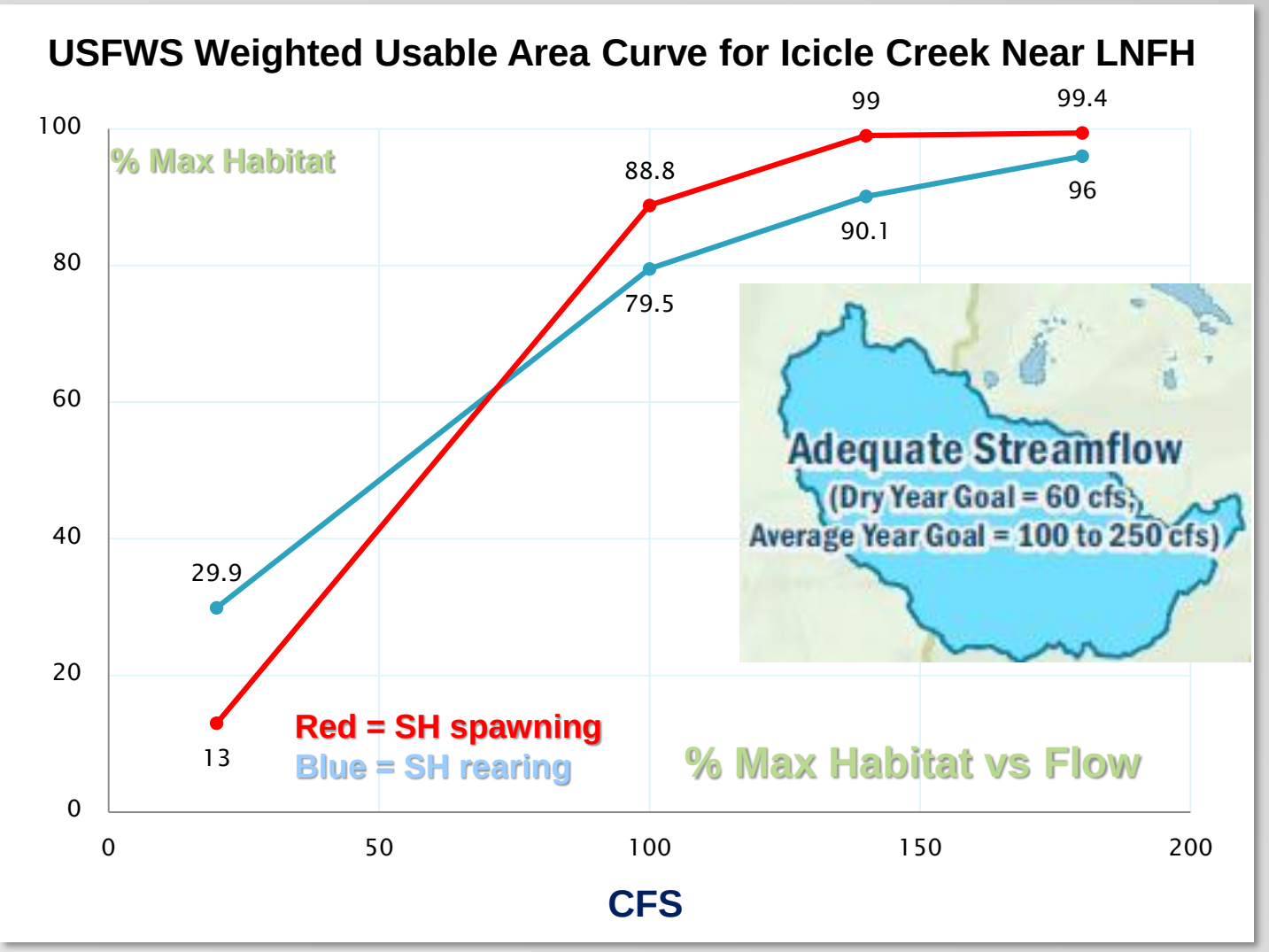
1800 cfs
July 6, 2016

107 cfs
August 23, 2016

- Guiding Principle is 100 cfs in non-drought years and 60 cfs in drought years

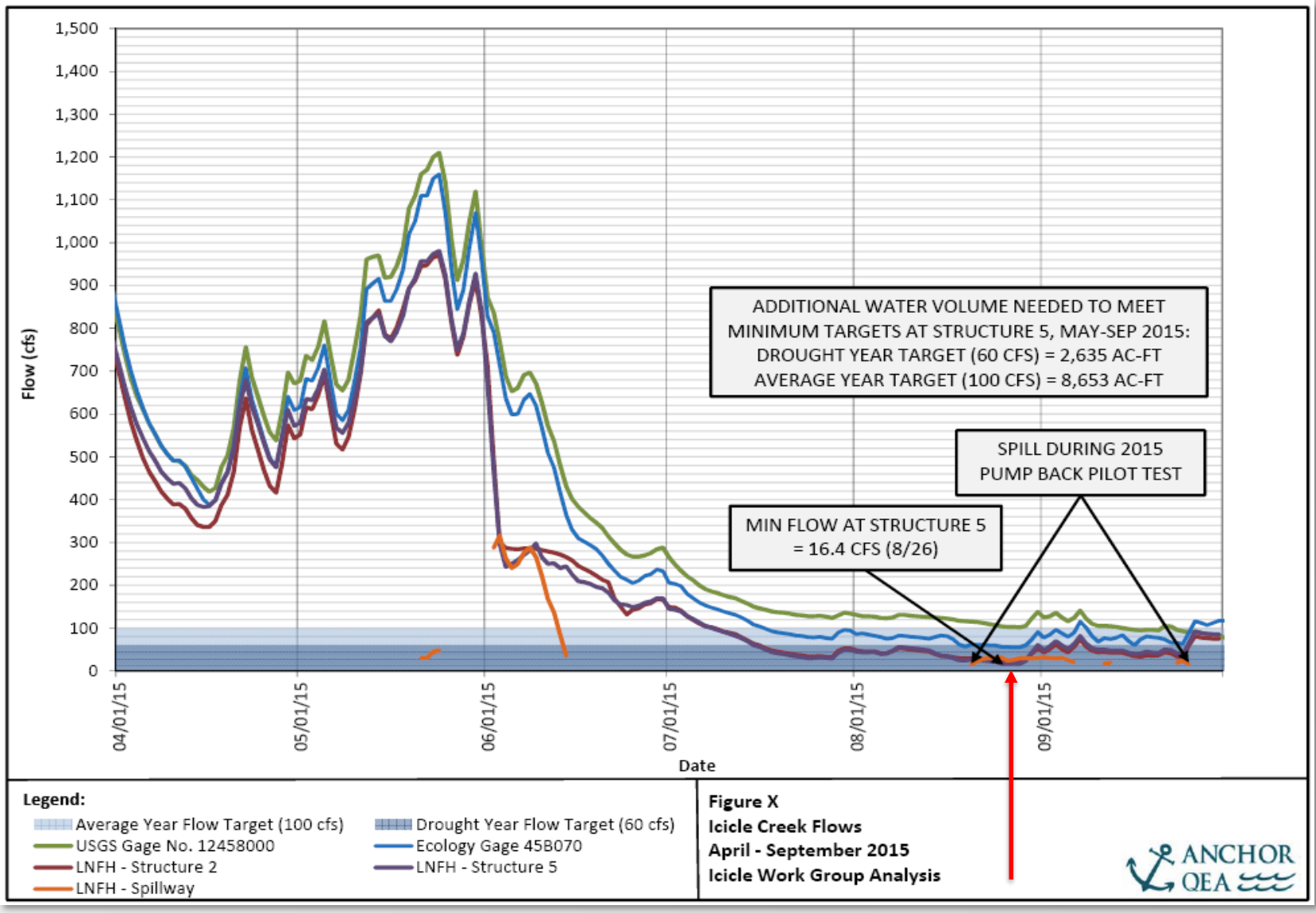
Icicle Strategy Overview

Where Did the Flow Numbers Come From? Does It Help Fish?

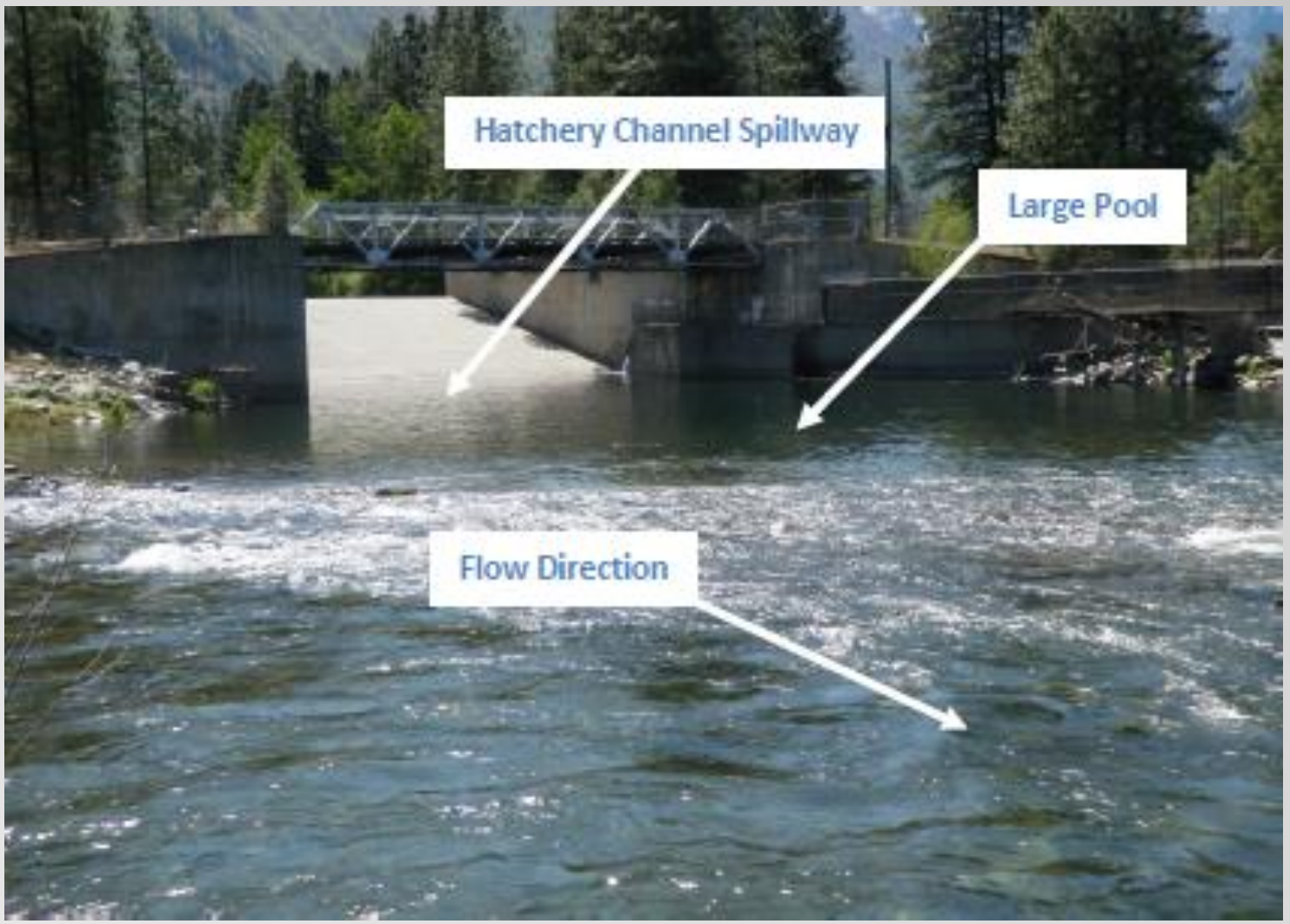


2015 Drought Icicle Creek Flow

How Bad Does Instream Flow in Icicle Creek Get?



Protect Tribal / Non-Tribal Harvest



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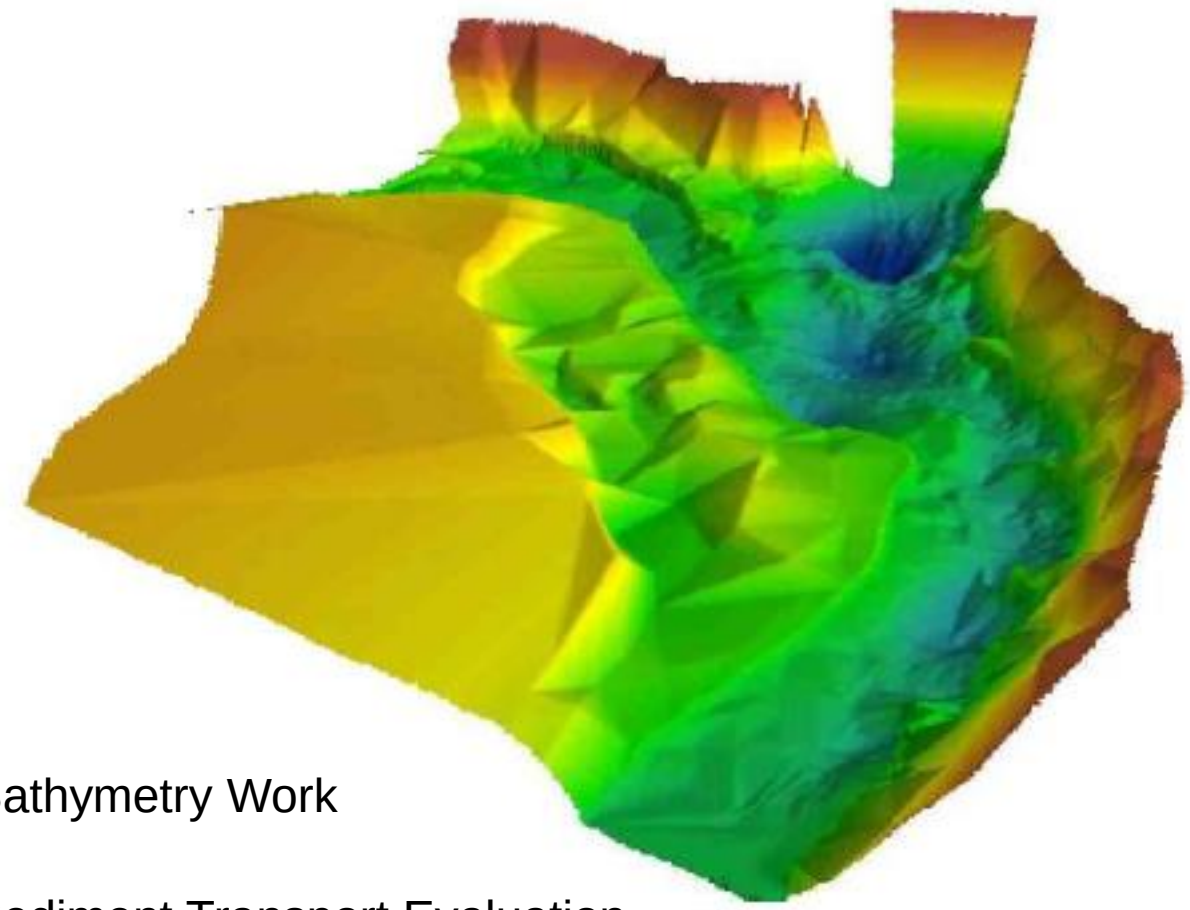
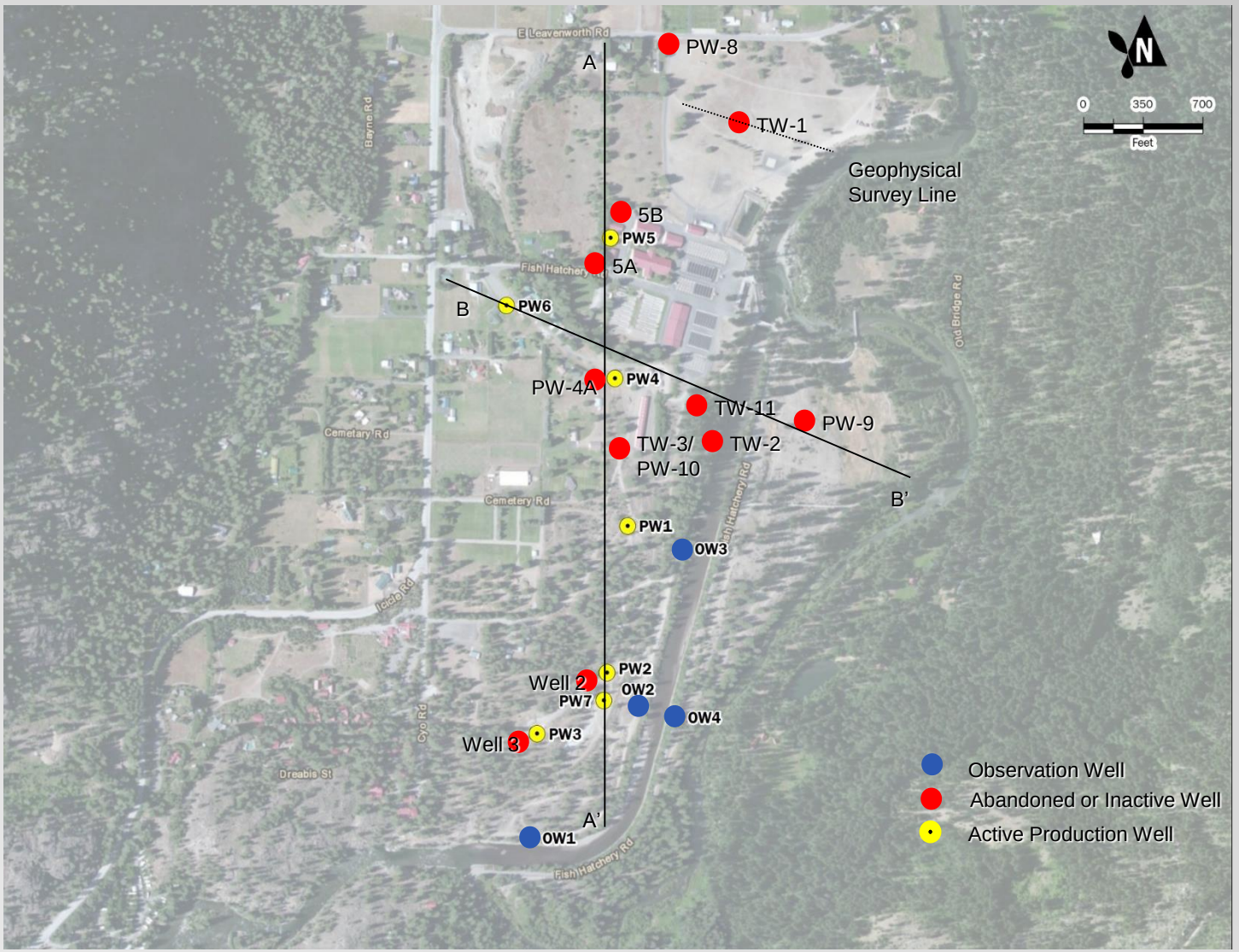
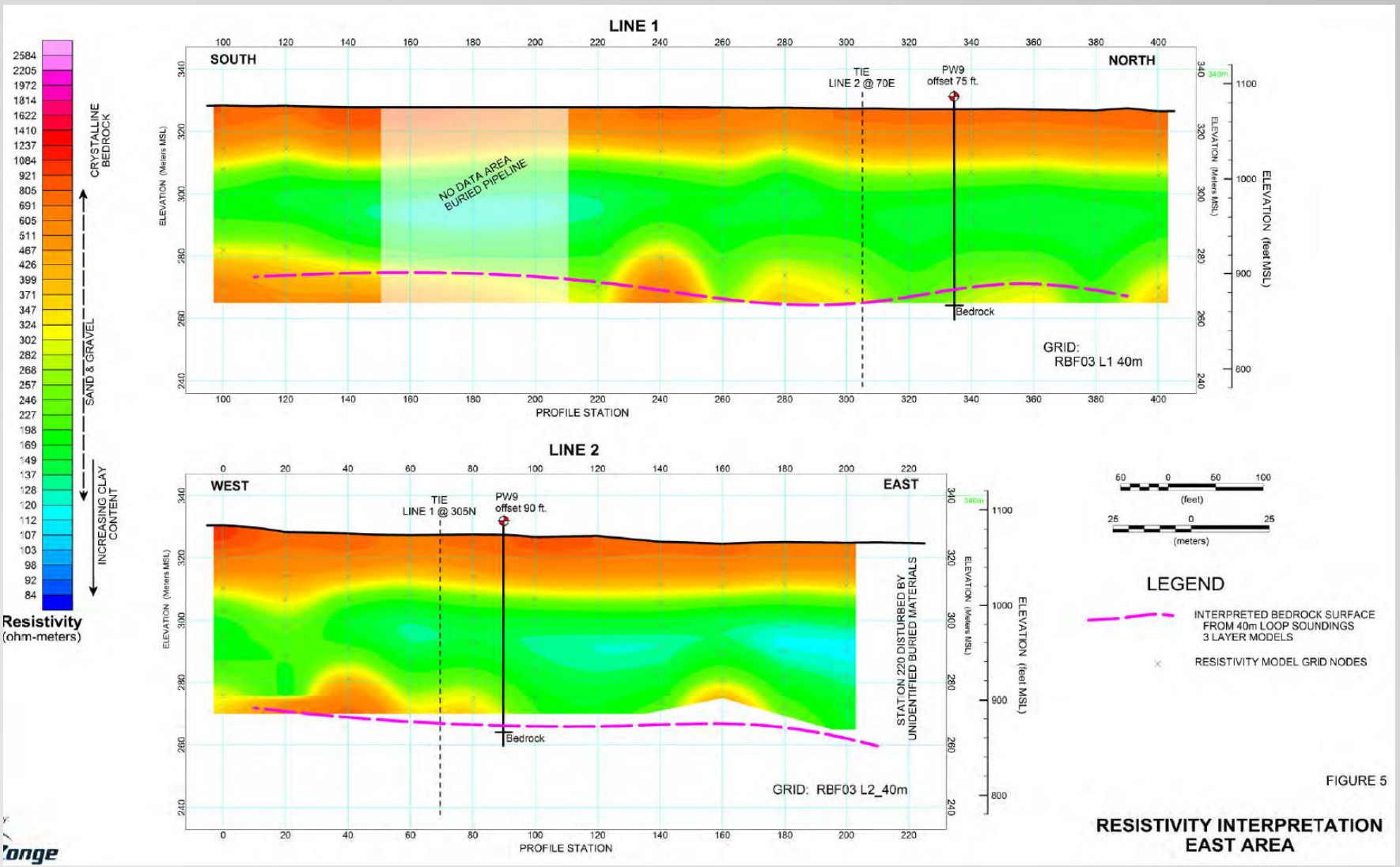


- Bathymetry Work
- Sediment Transport Evaluation

LNFH Sustainability



LNFH Sustainability



LNFH Pumpback – 2015 Pilot

- Low water
- High water temps (70s)
- Disease, potential to lose 1.2 mil juveniles, 1,000 adults, 2 year classes
- 160,000K Euthanized
- 250K moved to Chief Joseph Hatchery
- Reduce numbers on station, better flow-through rate
- Fish on station are doing much better
- Worked with Corps and DOE to do effluent pumpback pilot study

Water behind and below rubber dam

2015: Generator, fish ladder, 20 cfs pumps, piping into hatchery channel

2015 Effluent Pumpback

Previous Studies--compiled

FINAL

WENATCHEE WATERSHED MANAGEMENT PLAN

Developed by:
The WRIA 45 Planning Unit

APPRAISAL STUDY
EIGHTMILE LAKE STORAGE RESTORATION

Prepared for
Chelan County Natural Resources Department
316 Washington Street, Suite 401
Wenatchee, Washington 98801

Icicle and Peshastin Irrigation Districts
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March 2015

CHELAN COUNTY NATURAL RESOURCES

www.co.chelan.wa.us

APPRAISAL STUDY
Alpine Lake Optimization and Automation
Prepared for: Chelan County Natural Resources Department

Project No. 120045-007-007A • March 20, 2015

earth + water

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

ICICLE IRRIGATION DISTRICT
HELICOPTER ACCESS

SEPA - Process

- **Pre-Scoping**
  - Co-Lead Agency Memorandum of Agreement
  - Identify cooperating agencies
  - NEPA integration strategy
  - Stakeholder meetings
  - Identify potential permits
- **Completed Expanded Checklist**
  - Assembled existing environmental documents
  - Assembled outreach materials
  - Issued Determination of Significance
- **Public Notice / Open House / Comment Period**
- **Evaluated Comments**
  - Is there sufficient information? How address data gaps?
  - Respond to comments
- **Threshold Determination**
  - Retained Determination of Significance (begin EIS process)

SEPA Process Overview

Icicle Strategy SEPA

- **Proposal: Guiding Principles and "base package"**
- **Scoping: What should be addressed in the PEIS?**
  - Alternatives
  - Mitigation measures
  - Impacts
  - Approvals
- **Will Project Environmental Review Occur?**
  - Yes, if new substantial environmental impacts are found.
  - No, just the Programmatic EIS if no new substantial impacts.

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- **Chapter 2:** Project Descriptions by Alternative
  - Development and Analysis of Alternatives
  - Summary of 4 Alternatives and No Action Alternative
  - Costs and Benefits
  - Pairing and Phasing
  - Alternatives Eliminated From Further Study

How Were Alternatives Created?

Problem	Scope / Parameters (e.g. location and quantity)	Data	Tools	Project Name	Project ID #	Description	Project Cost	Icicle River Project Benefit		
Inadequate Flow (F)	RM 0 to 2.7 (68,000 ac-ft deficit in WAC 173-545 flow in average years). WAC 173-545 minimum flows on the order of 267 cfs to 550 cfs (Aug-Oct), actual low flow in September 150-200 cfs. RM 2.7 to 4.5 (20 cfs minimum via BiOp + 1,200 ac-ft/month); IFIM study in historic channel. RM 4.5 to 5.8 (flowmead uncertain)	IFIM (estimated completion July 2013) Water re-use pilot LNFH (2013 – 2016?) Leavenworth National Fish Hatchery Water Re-Use Pilot (Draft due March 2013) BiOps (Bull Trout, New NOAA) Boulder field study (estimated completion April 2013). Irrigation Efficiency studies for Icicle, Peshastin, Cascade Orchard Lower Icicle IFIM (Reclamation, 2006) Snow and Nada Lakes Optimization (USFWS) Climate Change Analysis (UW Climate Impacts Group) 401 Cert studies	Pump Exchange/Diversion Change (P)	Icicle-Peshastin Irrigation District Pump Exchange Project	FH-PH-01	Pump on Wenatchee River at Dryden to pump to Peshastin Canal, reduces InterBasin transfer from Icicle to Peshastin (40 cfs for 8 weeks total project savings, 15 cfs to Icicle, 25 cfs to Peshastin)	$3.9 M (construction), $300K (design), $4.7 M (50-year O&M)	15	cfs	RM 0.0 to 5.7
				Icicle-Peshastin Irrigation District Pump Exchange Project	FH-PH-02	Pump on Wenatchee River at Dryden to pump to Peshastin Canal and Booster Pump to Icicle Canal (40 cfs for 8 weeks total project savings, 20 cfs to Icicle, 20 cfs to Peshastin)	$5 M (construction), $300K (design), $4.7 M (50-year O&M)	20	cfs	RM 0.0 to 5.7
				Icicle Pump Exchange 1	F-P-01	Pump on Wenatchee River at Leavenworth (Safeway) to pump to ID canal on north side of Wenatchee River (8 weeks total project savings to Icicle River)	$4 M total (construction, design, O&M), 250K (feasibility)	15	cfs	RM 0.0 to 5.7
				Icicle Pump Exchange 2	F-P-02	Pump on Wenatchee River at Leavenworth (Safeway) to pump to ID canal on north & south side of Wenatchee River (15 cfs each, 8 weeks total project savings to Icicle River)	$6 M total (construction, design, O&M), 250K (feasibility)	30	cfs	RM 0.0 to 5.7
			Optimization / Modernization / Automation of Existing Storage (O)	Alpine Lakes Optimization Study	FMA-O-1	Evaluation of Alpine lakes recharge for varying water years/climate change, and identification of opportunities to optimize timing of storage release. Assume 2,000 acre-feet of additional water could be released in non-drought years (16.8 cfs for 75 days).	$100K (feasibility/design), $10,000/ year Lake Management Workgroup	2000	ac-ft	RM 0.0 to 5.7
				Alpine Lakes Automation (IPID)	F-O-1	Automation of lake release for remote operation (likely tied to optimization project)	$200K (feasibility/design), $200K (construction)	0	ac-ft	RM 0.0 to 5.7
				Alpine Lakes Automation (USFWS)	F-O-2	Automation of lake release of Snow and Nada Lakes for remote operation. Assume 2,000 acre-feet of additional water optimized (16.8 cfs for 75 days).	$200K (feasibility/design), $200K (construction)	2000	ac-ft	RM 0.0 to 5.5
				Eight-Mile Lake Restoration	F-O-3	Restore 1,000 acre-feet of storage to Eight-Mile Lake normal permitted pool elevation (6.7 cfs for 75 days).	$100K (feasibility/design), $100K (construction)	1,000	ac-ft	RM 0.0 to 5.7
			Conservation (Demand-Side Strategies) (D)	Icicle Irrigation District Efficiencies	F-D-01	Update Icicle Irrigation District management plan, presume 1,500 acre-feet at $1,000 / acre-foot in projects implemented (or 5 cfs over 150 days).	$1.5 M (construction), $100,000 (plan update)	1,500	ac-ft	RM 0.0 to 5.7
				Peshastin Irrigation District Efficiency Project	F-D-02	Irrigation Efficiency Scoping Study and Infrastructure Improvements, presume 1,000 acre-feet at $1,000 / acre-foot in projects implemented (or 3.3 cfs over 150 days).	$1.5 M (construction), $50,000 (plan update)	1,000	ac-ft	RM 0.0 to 5.7
				Cascade Orchard Efficiency Project	F-D-03	Irrigation Efficiency Scoping Study and Infrastructure Improvements, presume 500 acre-feet at $1,000 / acre-foot in projects implemented (or 1.6 cfs over 150 days).	$500K (construction), $50,000 (feasibility)	500	ac-ft	RM 0.0 to 4.5
			New Storage (Surface or Aquifer) (S)	Mountain Home Off-Channel Reservoir (USFS Land)	FMA-S-01	Surface storage on USFS land, including potential land exchange of 1,700 acres	$250K (feasibility/design), $TBD (construction)	1,500	ac-ft	RM 5.0 (est)
				Mountain Home Off-Channel Reservoir (private land)	FMA-S-02	Small surface storage reservoir(s) on private property, identified in Wenatchee Watershed Plan (2006)	$250K (feasibility/design), $TBD (construction)	250	ac-ft	RM 5.0 (est)
				Eight-Mile Lake Pool Raise	F-S-01	Increase capacity of Eight-Mile Lake by 5,000 acre-feet, which equates to 17 cfs over 150 days. Presume $1,000 / acre-foot for small storage.	$500K (feasibility / design / permitting), $15 M (construction)	5,000	ac-ft	RM 0.0 to 5.4
			Water Banking / Water Markets (W)	Icicle Creek Water Quantity Projects	FHMA-B-01	Icicle Basin water acquisition projects, leasing, buying (presume $1,000 / acre-foot acquisition, 500 acre-feet is 1.67 cfs for 150 days).	$500K	500	ac-ft	RM 0 to 5.7
			Leavenworth National Fish Hatchery Optimization / Conservation (N)	Leavenworth National Fish Hatchery Water Effluent Pump Back	F-N-04	Reduce current hatchery diversions through pump back of effluent to recharge wellfield, presumes reduction in recharge of wellfield by 10 cfs.	$5 M (placeholder)	10	cfs	RM 2.7 to 4.8
				Leavenworth National Fish Hatchery Wellfield Enhancement	F-N-03	Study and develop wellfield in communication with historic channel to reduce hatchery channel rehydration needs	$5 M (placeholder)	10	cfs	RM 2.7 to 4.8
				Leavenworth National Fish Hatchery Water Re-Use Project	F-N-02	Reduce current hatchery diversions through on-site reuse, presumes hatchery use diminished by approximately half.	$10 M (placeholder)	20	cfs	RM 2.7 to 4.5
				Leavenworth National Fish Hatchery Pump Exchange	F-N-01	Pump exchange from Icicle River below historic channel confluence, presumes 42 cfs savings in historic channel and future peak surface diversions of 20 cfs for hatchery.	$20 M (placeholder)	42	cfs	RM 2.7 to 4.5
Habitat Improvements (H)	RM 0 – RM 2.7 RM 2.7 – RM 4.5 RM 4.5 and above Icicle Basin	RTT Biological strategy revisions Icicle Creek Minimum Roads Analysis (USFS) 2013-2015 IFIM (estimated completion July 2013). USFS Info. Ecology Qual 2K	Habitat Improvements (H)	Habitat Improvements in RM 0 - RM 2.7	H-H-01	Riparian plantings, engineering log jams, conservation easements, and other habitat projects	$100K (placeholder)	2.7	miles	RM 0 to 2.7
				Habitat Improvements in RM 2.7-4.5	H-H-02	Riparian plantings, engineering log jams, conservation easements, and other habitat projects	$100K (placeholder)	1.8	miles	RM 2.7 to 4.5
				Icicle Creek Water Quantity Projects	FHMA-B-01	Icicle Basin water acquisition projects, leasing, buying (presume $1,000 / acre-foot acquisition). 500 acre-feet is 1.6 cfs for 75 days.	$500K	500	ac-ft	RM 0 to 5.7
				Wenatchee Lands Plan	H-H-03	Acquire private land as part of a package of projects benefiting instream and out-of-stream uses	$2 M (placeholder)	7,000	acres	Reservoir
				All Inadequate Instream Flow Project Above (F)	See projects FH-PH-01, F-P-01, F-P-02, FMA-O-1, F-O-1, F-O-2, F-O-3, F-D-01, F-D-02, F-D-03, FMA-S-01, FMA-S-02, F-S-01, FHMA-B-01, F-N-01, F-N-02, F-N-03, and F-N-04 above.					
Fish Passage, Impediments, Distribution, and Movement Issues (P)	Structure 5 @ RM 2.7 (movement) Structure 2 @ RM 3.7 (impediment and distribution) Hatchery Intake @ RM 4.5 (impediment) Boulder field @ RM 5.8 (impediment)	Boulder field study (estimated completion April 2013) 401 Cert studies Wild Fish Conservancy studies US F&W Service studies.	Fish Passage Improvements (F)	Leavenworth National Fish Hatchery Intake Replacement (Jacob's Design)	F-F-01	Replace hatchery intake with a new pump diversion at RM 4.8 (pump, controls, screen, intake, and weir)	$6M (2009 dollars)	Improve hatchery operations & reliability		RM 2.7 to 4.5
				Rehabilitate existing LNFH intake	F-F-02	Replace delapidated sections of intake piping	$5 M (placeholder)	Improve hatchery operations & reliability		RM 2.7 to 4.5
				Resolve Structure 2 Passage Needs	F-F-03	Modify Structure 2, likely in combination with one of the hatchery improvement projects	$500K (placeholder)	Improve fish passage		RM 2.7 to 4.5
				Resolve Structure 5 Passage Needs	F-F-04	Replace Structure 5 with an access bridge	$500K (placeholder)	Improve fish passage		RM 2.7 to 4.5
				Boulder Field Construction Project	F-F-05	Presuming anthropogenic fish barriers are determined by study	$500K (placeholder)	Improve fish passage		RM 5.8+
				Tribal fisheries maintenance / improvements	F-F-06	Maintain / improve tribal fishery access, avoid conflicts with other alternatives	$500K (placeholder)	Meet treaty obligations		RM 2.7 to 4.5
Screening (S)	LNFH/CCRC intake structure City of Leavenworth intake Structure Icicle/Peshastin ID intake	Studies complete per WDFW, USFWS, and NOAA criteria.	Habitat and Screening Improvements (H)	LNFH/CCRC Screening Improvements	S-H-01	Improve existing screen to current standards, likely additive with intake projects	$1-2 M	Meet current fish screen standards		RM 4.5
				Cascade Orchard Screen Improvements	S-H-03	Improve existing screen to current standards, likely additive with intake projects	$200 K	Meet current fish screen standards		RM 4.5
				Icicle / Peshastin Irrigation District Intake and Screening Improvements	S-H-02	Improve existing screen to current standards	$1.3 M +	Meet current fish screen standards		RM 5.7
Municipal and domestic needs (M)	0.1-0.5 cfs (73-365 ac-ft) in reserve through 2035 City of Leavenworth 600 ac-ft need Municipal/domestic 1,400 ac-ft need through 2050.	Established in or extrapolated from existing planning documents.	Conservation (Demand-Side Strategies) (D)							
			Legislative (L)	Instream Flow Rule Amendment	M-L-01	Modify instream flow rule to increase interim level of 0.1 cfs on reserve (0.5 cfs permanent rule quantity following habitat improvements)	($50K placeholder, rule amendment)	365	ac-ft	RM 0.0 to 5.4
			Reoperation / Optimization of Existing Storage (O)	Alpine Lakes Optimization Study	FMA-O-1	Evaluation of Alpine lakes recharge for varying water years/climate change, and identification of opportunities to optimize timing of storage release. Assume 2,000 acre-feet of additional water could be released in non-drought years (16.8 cfs for 75 days).	$100K (feasibility/design)	2000	ac-ft	RM 0.0 to 5.4
				Alpine Lakes Automation (USFWS)	F-O-2	Automation of lake release of Snow and Nada Lakes for remote operation. Assume 2,000 acre-feet of additional water optimized (16.8 cfs for 75 days).	$200K (feasibility/design), $200K (construction)	2000	ac-ft	RM 0.0 to 5.4
				Eight-Mile Lake Restoration	F-O-3	Restore 1,000 acre-feet of storage to Eight-Mile Lake normal pool.	$100K (feasibility/design), $100K (construction)	1,000	ac-ft	RM 0.0 to 5.4
			New Storage (Surface or Aquifer) (S)	Mountain Home Off-Channel Reservoir (USFS Land)	FMA-S-01	Surface storage on USFS land, including potential land exchange of 1,700 acres	$250K (feasibility/design), $TBD (construction)	1,500	ac-ft	RM 5.0 (est)
				Mountain Home Off-Channel Reservoir (private land)	FMA-S-02	Small surface storage reservoir(s) on private property, identified in Wenatchee Watershed Plan (2006)	$250K (feasibility/design), $TBD (construction)	250	ac-ft	RM 5.0 (est)
				Eight-Mile Lake Pool Raise	F-S-01	Increase capacity of Eight-Mile Lake by 5,000 acre-feet, which equates to 8.8 cfs over 75 days. Presume $1,000 / acre-foot for small storage.	$500K (feasibility / design / permitting), $15 M (construction)	5,000	ac-ft	RM 0.0 to 5.4
			Water Banking / Water Markets (W)	Icicle Creek Water Quantity Projects	FHMA-B-01	Icicle Basin water acquisition projects, leasing, buying (presume $1,000 / acre-foot acquisition). 500 acre-feet is 1.67 cfs for 150 days.	$500K	500	ac-ft	RM 2.7 to 5.7
Agricultural needs (A)	Restore 1,000 ac-ft additional storage, increased automation and reliability.	Continue the optimization storage study. Perform a reservoir refill and climate change resiliency study.	Conservation (Demand-Side Strategies) (D)	Icicle Irrigation District Efficiencies	F-D-01	Update Icicle Irrigation District management plan, presume 1,500 acre-feet at $1,000 / acre-foot in projects implemented (or 5 cfs over 150 days).	$1.5 M (construction), $100,000 (plan update)	1,500	ac-ft	RM 0.0 to 5.7
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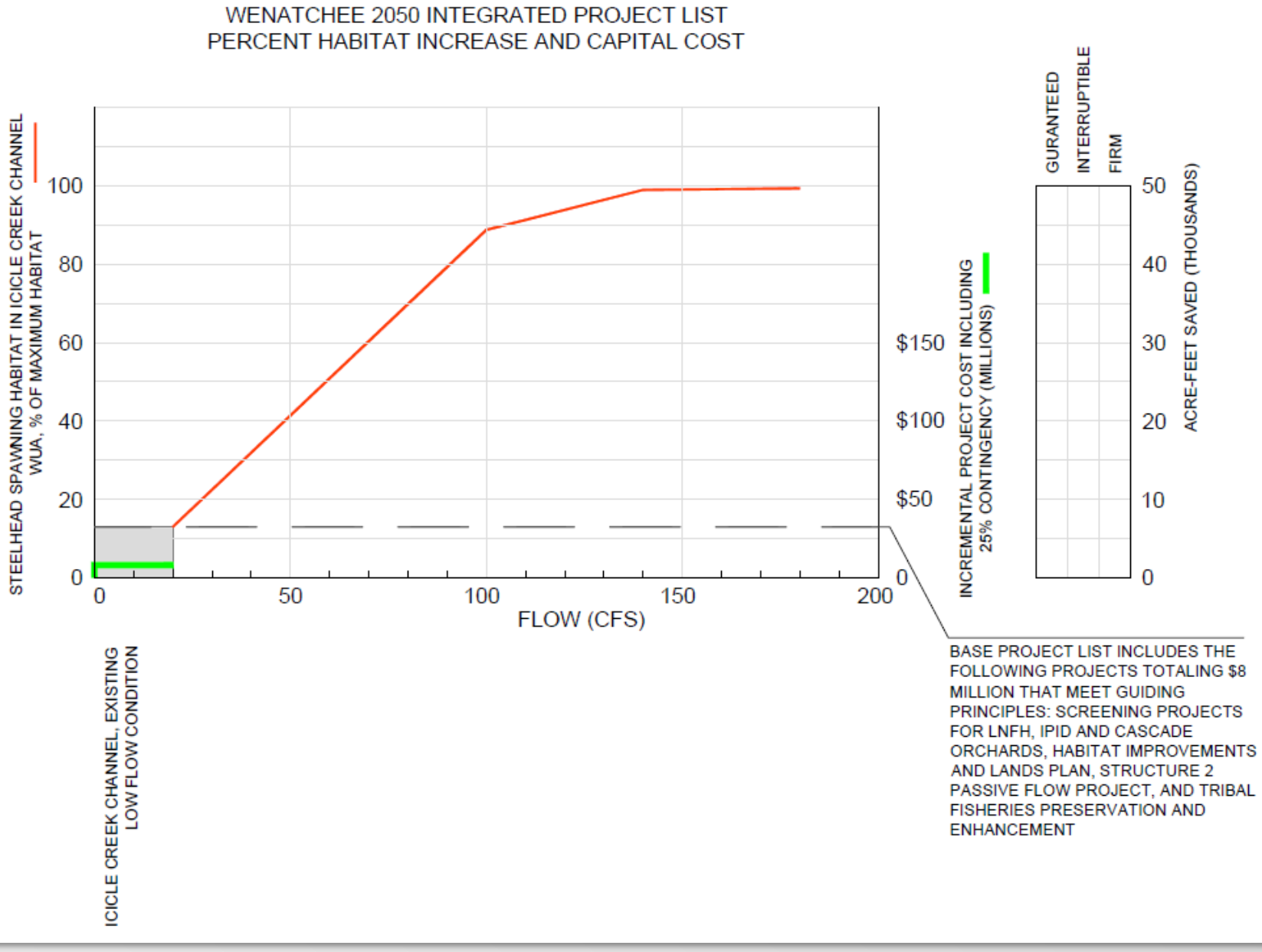
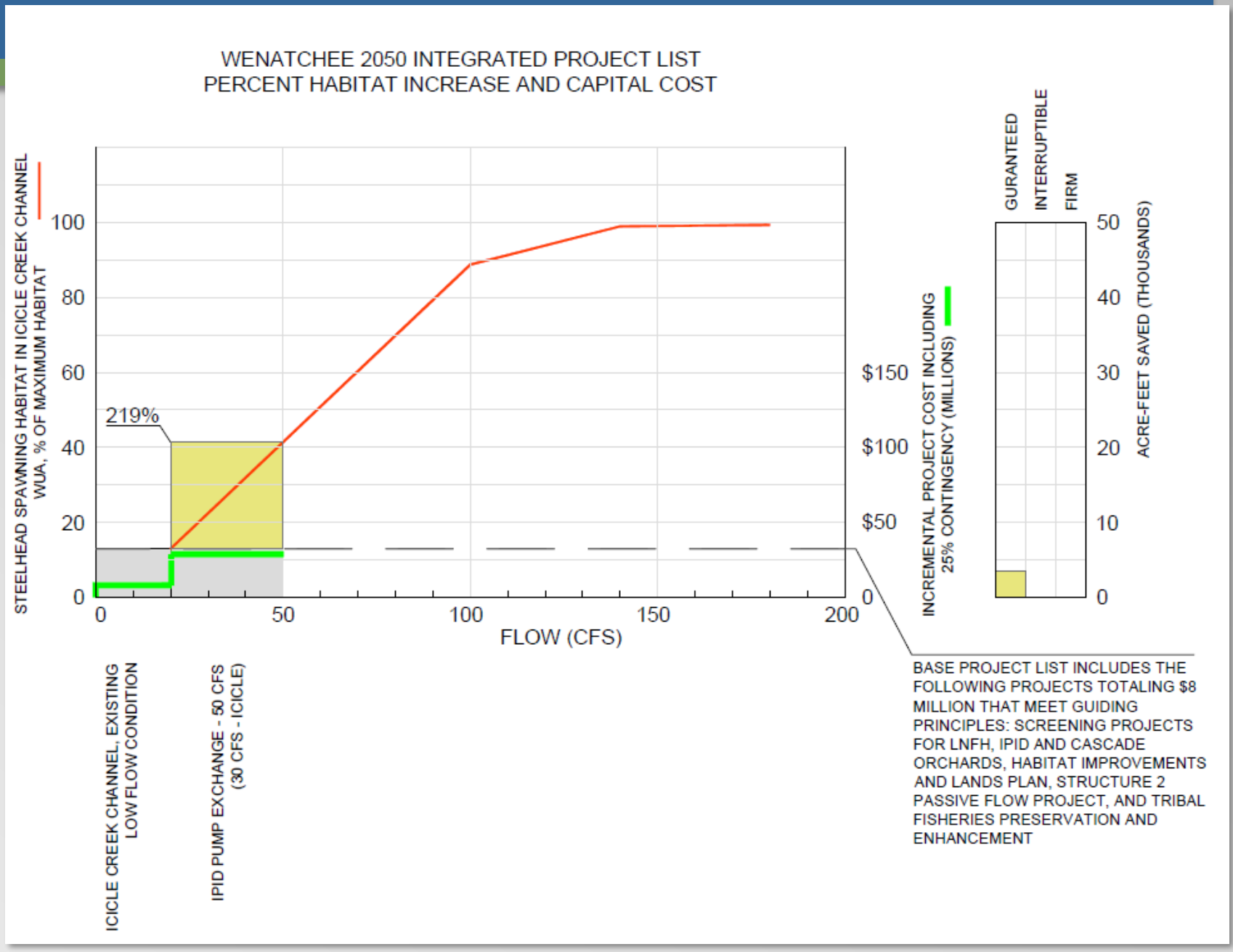
			New Storage (Surface or Aquifer) (S)	Mountain Home Off-Channel Reservoir (USFS Land)	FMA-S-01	Surface storage on USFS land, including potential land exchange of 1,700 acres	$250K (feasibility/design), $TBD (construction)	1,500	ac-ft	RM 5.0 (est)
				Mountain Home Off-Channel Reservoir (private land)	FMA-S-02	Small surface storage reservoir(s) on private property, identified in Wenatchee Watershed Plan (2006)	$250K (feasibility/design), $TBD (construction)	250	ac-ft	RM 5.0 (est)
				Eight-Mile Lake Pool Raise	F-S-01	Increase capacity of Eight-Mile Lake by 5,000 acre-feet, which equates to 8.8 cfs over 75 days. Presume $1,000 / acre-foot for small storage.	$500K (feasibility / design / permitting), $15 M (construction)	5,000	ac-ft	RM 0.0 to 5.4
			Water Banking / Water Markets (W)	Icicle Creek Water Quantity Projects	FHMA-B-01	Icicle Basin water acquisition projects, leasing, buying (presume $1,000 / acre-foot acquisition). 500 acre-feet is 1.67 cfs for 150 days.	$500K	500	ac-ft	RM 2.7 to 5.7


WENATCHEE 2050 INTEGRATED PROJECT LIST
PERCENT HABITAT INCREASE AND CAPITAL COST
STEELHEAD SPAWNING HABITAT IN ICICLE CREEK CHANNEL
WUA, % OF MAXIMUM HABITAT
0
20
40
60
80
100
0
50
100
150
200
FLOW (CFS)
ICICLE CREEK CHANNEL, EXISTING
LOW FLOW CONDITION
$0
$50
$100
$150
INCREMENTAL PROJECT COST INCLUDING
25% CONTINGENCY (MILLIONS)
GURANTEED
INTERRUPTIBLE
FIRM
0
10
20
30
40
50
ACRE-FEET SAVED (THOUSANDS)
BASE PROJECT LIST INCLUDES THE
FOLLOWING PROJECTS TOTALING $8
MILLION THAT MEET GUIDING
PRINCIPLES: SCREENING PROJECTS
FOR LNFH, IPID AND CASCADE
ORCHARDS, HABITAT IMPROVEMENTS
AND LANDS PLAN, STRUCTURE 2
PASSIVE FLOW PROJECT, AND TRIBAL
FISHERIES PRESERVATION AND
ENHANCEMENT


WENATCHEE 2050 INTEGRATED PROJECT LIST
PERCENT HABITAT INCREASE AND CAPITAL COST
STEELHEAD SPAWNING HABITAT IN ICICLE CREEK CHANNEL
WUA, % OF MAXIMUM HABITAT
100
80
60
40
20
0
219%
0
50
100
150
200
FLOW (CFS)
$150
$100
$50
0
INCREMENTAL PROJECT COST INCLUDING
25% CONTINGENCY (MILLIONS)
GURANTEED
INTERRUPTIBLE
FIRM
50
40
30
20
10
0
ACRE-FEET SAVED (THOUSANDS)
ICICLE CREEK CHANNEL, EXISTING
LOW FLOW CONDITION
IPID PUMP EXCHANGE - 50 CFS
(30 CFS - ICICLE)
BASE PROJECT LIST INCLUDES THE
FOLLOWING PROJECTS TOTALING $8
MILLION THAT MEET GUIDING
PRINCIPLES: SCREENING PROJECTS
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ORCHARDS, HABITAT IMPROVEMENTS
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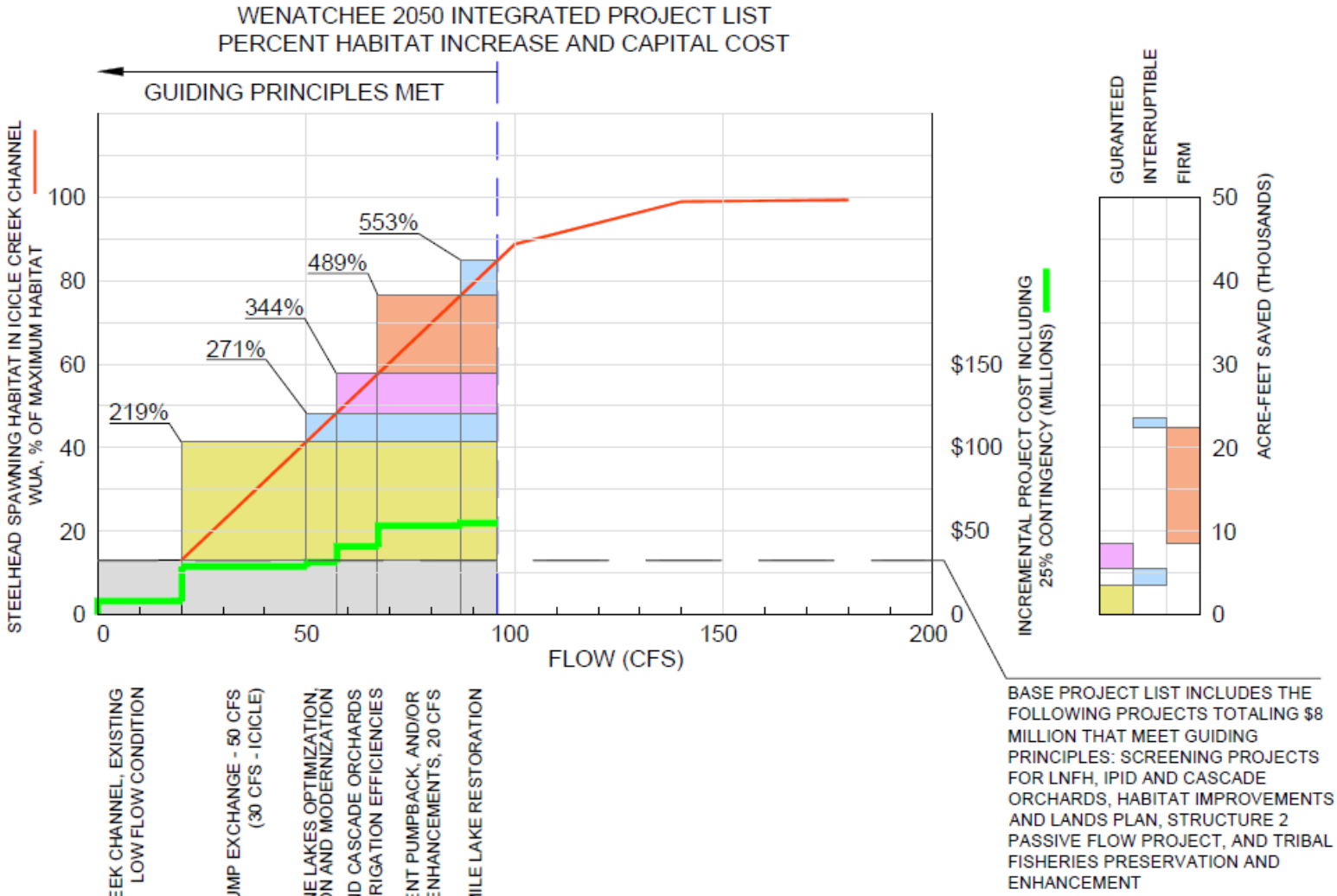
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PERCENT HABITAT INCREASE AND CAPITAL COST
GUIDING PRINCIPLES MET
STEELHEAD SPAWNING HABITAT IN ICICLE CREEK CHANNEL
WUA, % OF MAXIMUM HABITAT
100
80
60
40
20
0
219%
271%
344%
489%
553%
0
50
100
150
200
FLOW (CFS)
$150
$100
$50
0
INCREMENTAL PROJECT COST INCLUDING
25% CONTINGENCY (MILLIONS)
GURANTEED
INTERRUPTIBLE
FIRM
50
40
30
20
10
0
ACRE-FEET SAVED (THOUSANDS)
ICICLE CREEK CHANNEL, EXISTING
LOW FLOW CONDITION
IPID PUMP EXCHANGE - 50 CFS
(30 CFS - ICICLE)
ALPINE LAKES OPTIMIZATION,
AUTOMATION AND MODERNIZATION
IPID AND CASCADE ORCHARDS
IRRIGATION EFFICIENCIES
LNFH REUSE, EFFLUENT PUMPBACK, AND/OR
WELLFIELD ENHANCEMENTS, 20 CFS
EIGHT MILE LAKE RESTORATION
BASE PROJECT LIST INCLUDES THE
FOLLOWING PROJECTS TOTALING $8
MILLION THAT MEET GUIDING
PRINCIPLES: SCREENING PROJECTS
FOR LNFH, IPID AND CASCADE
ORCHARDS, HABITAT IMPROVEMENTS
AND LANDS PLAN, STRUCTURE 2
PASSIVE FLOW PROJECT, AND TRIBAL
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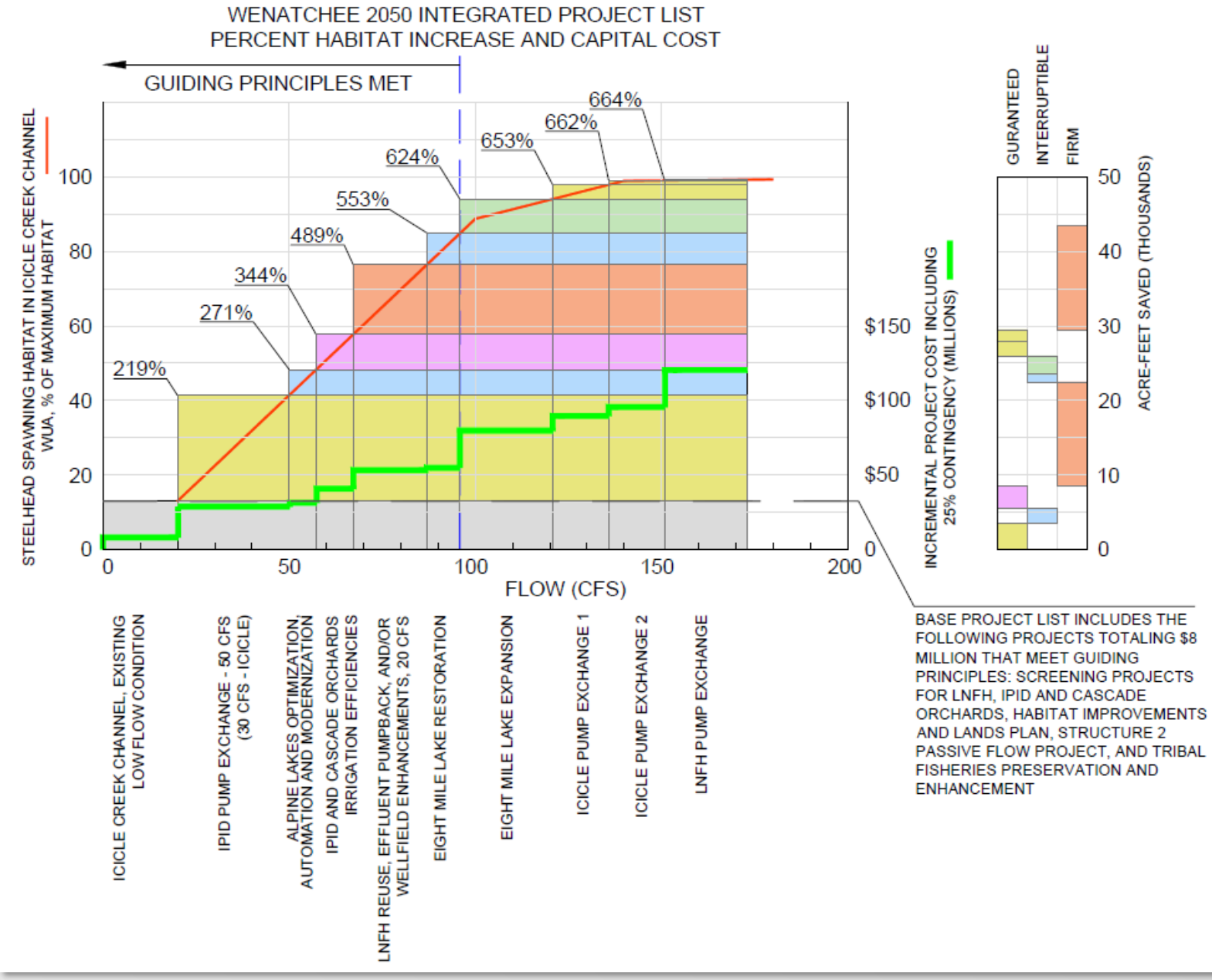
ENHANCEMENT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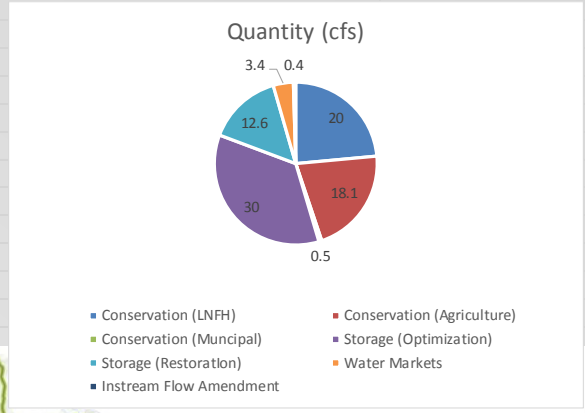
PERCENT HABITAT INCREASE AND CAPITAL COST
GUIDING PRINCIPLES MET
STEELHEAD SPAWNING HABITAT IN ICICLE CREEK CHANNEL
WUA, % OF MAXIMUM HABITAT
219%
271%
344%
489%
553%
624%
653%
662%
664%
0
20
40
60
80
100
0
50
100
150
200
FLOW (CFS)
INCREMENTAL PROJECT COST INCLUDING
25% CONTINGENCY (MILLIONS)
$150
$100
$50
0
GURANTEED
INTERRUPTIBLE
FIRM
ACRE-FEET SAVED (THOUSANDS)
50
40
30
20
10
0
ICICLE CREEK CHANNEL, EXISTING LOW FLOW CONDITION
IPID PUMP EXCHANGE - 50 CFS (30 CFS - ICICLE)
ALPINE LAKES OPTIMIZATION, AUTOMATION AND MODERNIZATION
IPID AND CASCADE ORCHARDS IRRIGATION EFFICIENCIES
LNFH REUSE, EFFLUENT PUMPBACK, AND/OR WELLFIELD ENHANCEMENTS, 20 CFS
EIGHT MILE LAKE RESTORATION
EIGHT MILE LAKE EXPANSION
ICICLE PUMP EXCHANGE 1
ICICLE PUMP EXCHANGE 2
LNFH PUMP EXCHANGE
BASE PROJECT LIST INCLUDES THE FOLLOWING PROJECTS TOTALING $8 MILLION THAT MEET GUIDING PRINCIPLES: SCREENING PROJECTS FOR LNFH, IPID AND CASCADE ORCHARDS, HABITAT IMPROVEMENTS AND LANDS PLAN, STRUCTURE 2 PASSIVE FLOW PROJECT, AND TRIBAL FISHERIES PRESERVATION AND ENHANCEMENT

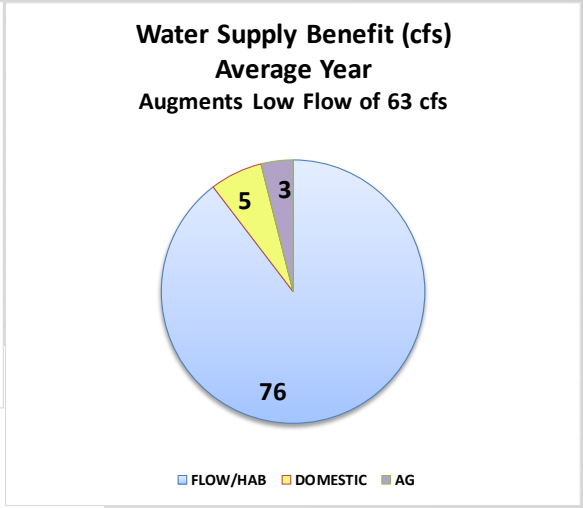
Integrated Base Package

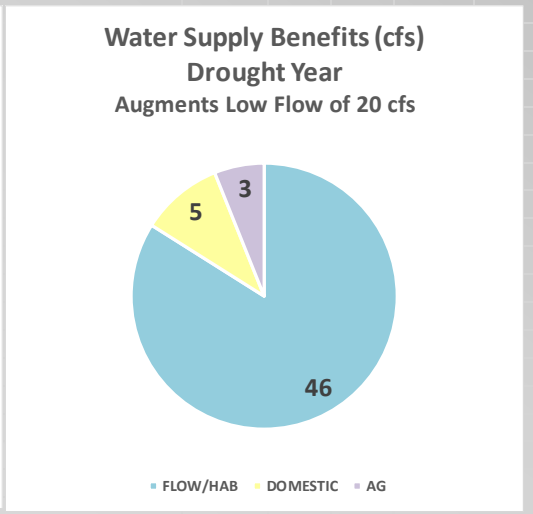
Icicle Working Group Integrated Base Package						
September 9, 2016						
Total Project Benefit ≈84 cfs & 30,500 acre-feet, Total Investment including 25% contingency ≈ $81.7 M, Cost/acre-foot ≈ $2,700 / acre-foot (85%+ to instream flow)						
This Integrated Package is characterized by a project list meeting all Icicle Subbasin Guiding Principles with substantive flow benefit in the late summer/early fall in the historic channel. Key features include retaining the existing hatchery facilities with aggressive multiple-source augmentation and conservation measures, modernization of the Alpine Lakes, restoration of Eight-Mile Lake, and habitat/screening projects. IPID Pump Exchange at Dryden (50 cfs) could increase benefits by up to 25 cfs in Icicle Creek, total cost would increase to about $100 M ($2,800 / acre-foot).						
Project Name (Guiding Principle Met)	**Description**	**Cost**	**Integrated Plan Benefits**			
Alpine Lakes Reservoir Optimization, Modernization, and Automation (FLOW) (HAB)	Automate/optimize releases of the 6 Alpine Lakes (flow benefit estimated over 92 days), but can be adapted to shorter duration / higher peak flows (and winter flow benefit). Flow benefit to instream and out-of-stream uses in normal years, to IPID in drought years. **INTERRUPTIBLE, REACH BENEFITS BELOW LAKES TO PACIFIC OCEAN**	$680K	30	cfs	5,465	ac-ft
IPID Irrigation Efficiencies (FLOW) (HAB)	Update Irrigation Comprehensive Plans and fund efficiency projects, assumes savings of 3,000 ac-ft (about 10%) at an average cost of $2,500/ac-ft. Flow benefit is non-consumptive, reach specific, and during the irrigation season. **GUARANTEED, REACH BENEFITS FROM IPID DIVERSION TO WENATCHEE RIVER**	$7.5 M	10.1	cfs	3,000	ac-ft
Cascade Orchards Irrigation Efficiencies (FLOW) (HAB)	Update Irrigation Comprehensive Plans and fund efficiency projects, assumes savings of 2,100 to 3,500 ac-ft and 8 to 11.9 cfs. Flow benefit is non-consumptive, reach specific, and during the irrigation season. **GUARANTEED, REACH BENEFITS FROM IPID DIVERSION TO WENATCHEE RIVER**	$4.5 M	8.0	cfs	2,100	ac-ft
Domestic Conservation Efficiencies (DOM)	Fund domestic conservation for City of Leavenworth and Chelan County consisting of metering, pipe replacement, and rural conservation designed to achieve domestic savings at $2,500/ac-ft. **GUARANTEED**	$2 M	0.5	cfs	400	ac-ft
Leavenworth National Fish Hatchery Conservation, Water Quality Improvements (FLOW) (HAB) (LNFH) **(LAWS)**	Combination of on-site reuse, effluent pump-back, and wellfield enhancements. Flow benefit is nonconsumptive and reach-specific. **FIRM, REACH BENEFITS IN HISTORIC CHANNEL**	$20 M	20	cfs	14,454	ac-ft
Eight-Mile Lake Reservoir Restoration Project (FLOW) (HAB) (DOM) (AG)	Restore Eight-Mile Lake from existing 1,600 ac-ft to normal permitted pool volume of 2,500 ac-ft (900 ac-ft), 60-day flow benefit, adaptive, plus winter flows. Domestic permits based on CU mitigation up to 3,600 ac-ft and 5 cfs. **INTERRUPTIBLE/GUARANTEED, REACH BENEFITS FROM EIGHT-MILE LAKE TO WENATCHEE RIVER**	$1.6 M	12.6	cfs	3,600	ac-ft
Water Markets (AG)	Create an Icicle Water Bank, seed with an initial acqusition of 1,000 ac-ft at $3,000 / ac-ft for for interruptible ag users during times of shortage and instream flows. **INTERRUPTIBLE/GUARANTEED, IN ICICLE AND/OR WENATCHEE RIVER**	$3 M	3.4	cfs	1,000	ac-ft
Habitat improvements in Icicle Creek, land acqusition (HAB)	Riparian plantings, engineered log jams, conservation easements, and other habitat projects. Land acquisition coordinated with the Upper Wenatchee Community Lands Plan and opportunities identified in the Icicle Basin.	$2.5 M	2.7	miles	2000	acres
Rehabilitate Leavenworth Hatchery Intake, Operational Improvements at Structure 2, Icicle Creek Passage, Tribal Fisheries Improvements (HAB) (TRIBAL)	Replace delapidated sections of intake piping, improve passage in Icicle Creek including to Upper Icicle Creek, reoperation of Structure 2 and Hatchery Channel, increased tribal fishing access/amenities.	$6.5 M	Improve fish passage and hatchery operation			
LNFH / COIC Screening Improvements, IPID Screening, City of Leavenworth (HAB) **(LAWS)**	Improve screens to current standards. IPID &City screening project to be completed in advance of Boulder Field implementation. LNFH Screen could be in the range of $5 to $12 M depending on COIC and conservation.	$17 M	Improve fish passage and hatchery operation			
Instream Flow Rule Amendment (DOM)	Modify WAC 173-545 Icicle Reserve from interim level of 0.1 cfs to final level of 0.5 cfs	$50 K	0.4	cfs	400	ac-ft
Guiding Principles	**How Does This Integrated Plan Option Meet the Guiding Principles?**					
Improve Instream Flow (FLOW)	100 cfs average year goal met (≈140 cfs), 60 cfs drought year goal met (≈67 cfs).					
Sustainable Leavenworth National Fish Hatchery (LNFH)	Goal of source redundancy, restored capacity, fish rearing, water quality, and passage met.					
Protect Tribal Treaty and Non-Tribal Harvest (TRIBAL)	Instream flow improvement balanced by preservation of fishery, with adaptive management strategy in place, amenity and access increases.					
Improve Domestic Supply (DOM)	Peak domestic need of 2,300 ac-ft met (≈4,200 available), if storage releases mitgating consumptive use when instream flows are not met (credits for natural flow availability and return flow).					
Improve Agricultural Reliability (AG)	Automation for IPID, 1,000 ac-ft for agricultural interruptibles met.					
Enhance Icicle Creek Habitat/Passage/Screens (HAB)	Goal of additional habitat improvement met with adaptive management.					
Comply with State and Federal Law, Wilderness Acts **(LAWS)**	Goal met through project check requirement on all permits and environmental review.					
Long-term projects to achieve 250 cfs could include the IPID Dryden Pump Exchange, conservation and markets, Snow Creek diversion project, Upper Klonaqua storage,etc. Flow benefits based on storage can be shaped for further flow benefits based on seasonal releases. For example, if IPID Pump Exchange and Eight-Mile releases could be combined to increase drought year low-month benefit to approximately 102 cfs.						

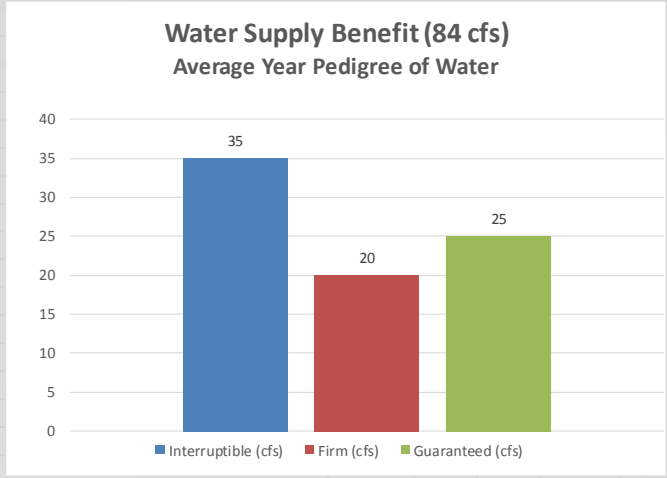
Icicle Strategy Overview

Who Benefits? Who Gets The Water?









So What Projects Moved to Environmental Review?

- **Base Package, PLUS . . .**

- **Variations on projects that had been studied**

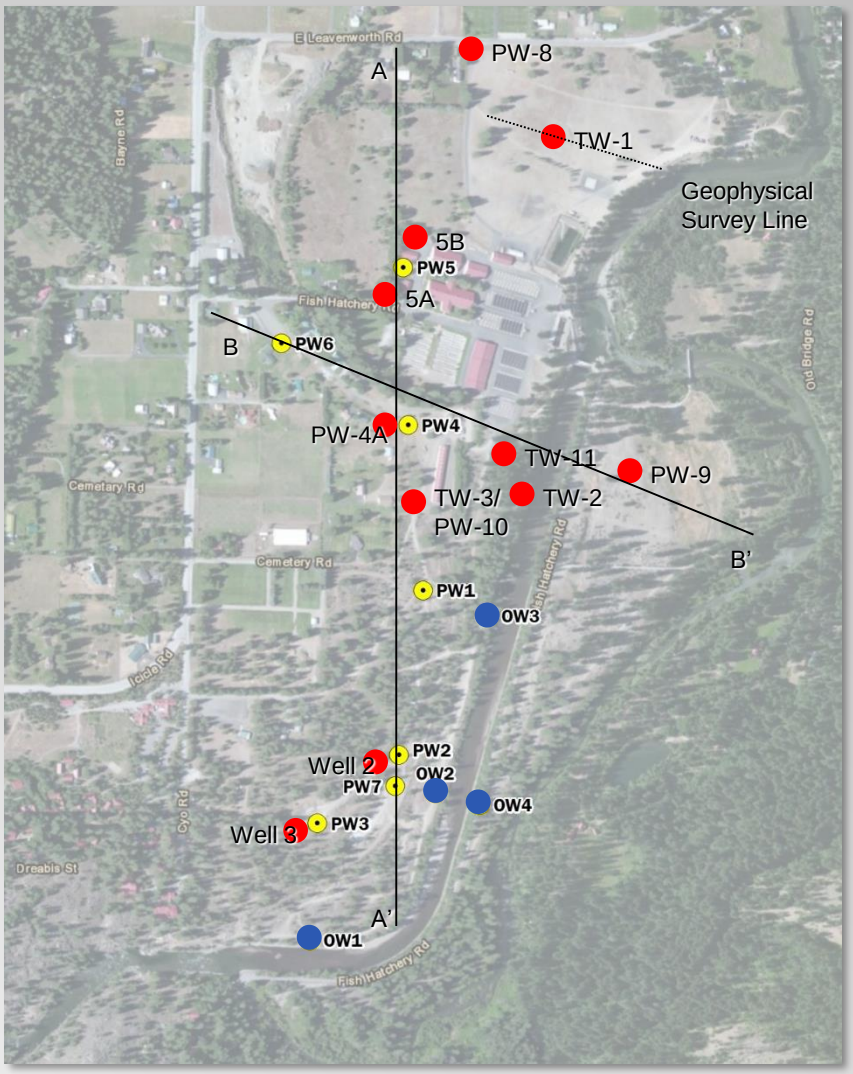
Here's a quick overview . . .

Conservation

- **Conservation Survey of IPID, COIC, and Leavenworth**
- **COIC likely best conservation opportunity for pipeline upgrades and pump station relocation**
- **IPID pipe upgrades more limited and costly**
- **Leavenworth use generally has declined per capita**
- **On-farm savings generally limited, highly efficient**
- **Guaranteed** (non-consumptive)

LNFH Groundwater Augmentation

- Expand groundwater supplies at LNFH
- 7+ cfs
- Firm
- Geophysical testing completed 12/2014
- Ranney well testing in 2015
- Production level shallow groundwater collectors planned

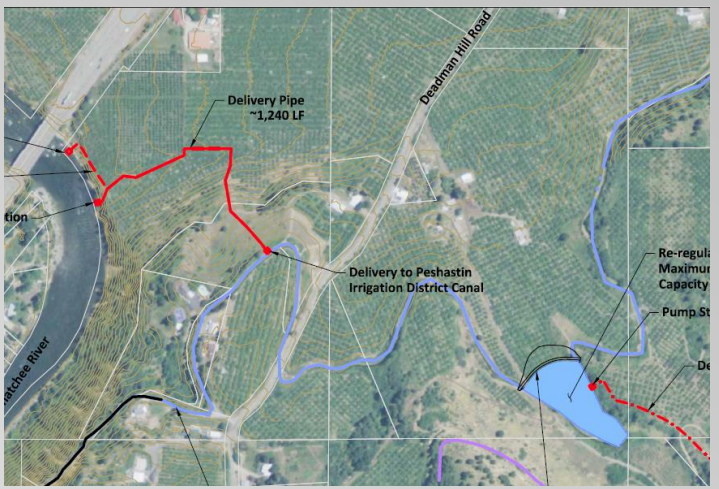


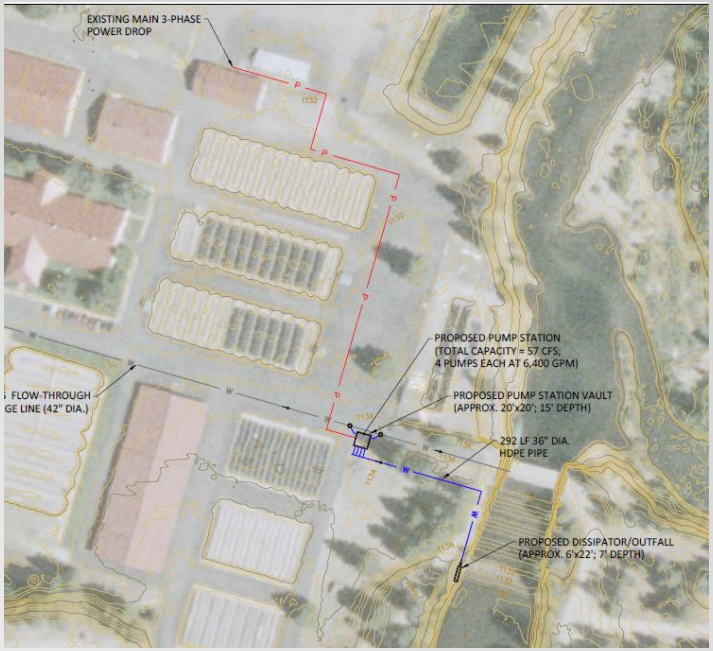
LNFH Reuse

- **Pilot evaluation of reuse at LNFH**
- **Up to 20 cfs savings anticipated**
- **Firm**
- **Reuse has been successful at other area hatcheries.**

Pump Exchanges

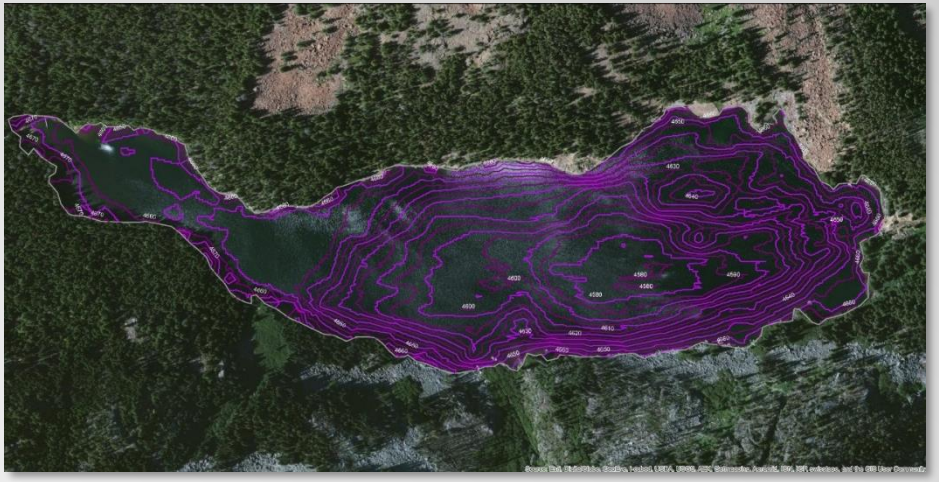
- **IPID**
  - 40 to 62 cfs
  - Guaranteed
  - Appraisal studies complete, O&M funding required
- **LNFH**
  - 28-57 cfs, piloted in 2015
  - Firm
  - Pilot retrospective study underway
- **COIC**
  - 8 to 11 cfs
  - Guaranteed
  - Design study next





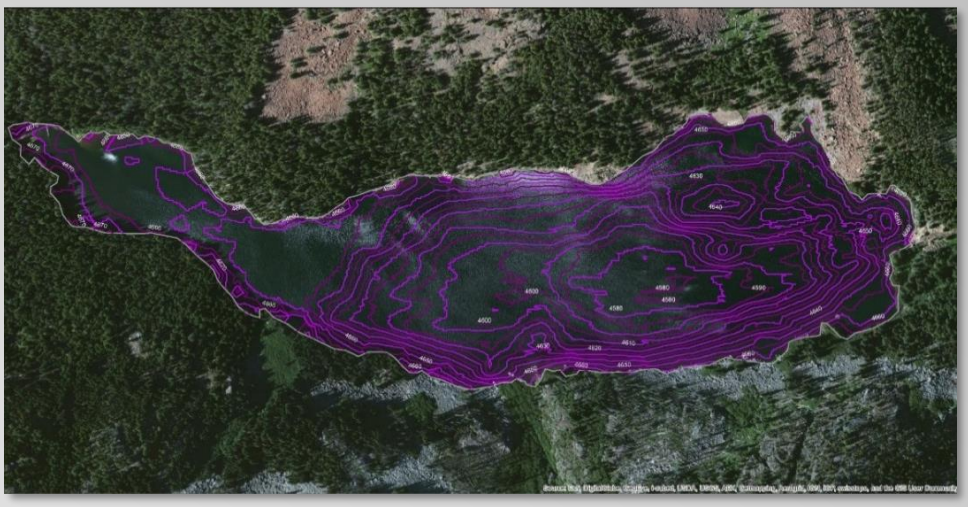
Modification of Existing Storage

- **Alpine Lakes Optimization**
  - Automate and re-operate Lakes
  - 30-42 cfs Interruptible
  - $86K - $3.5M
  - $16 - $450 /ac-ft
- **Eight-Mile Lake Restoration**
  - Restore up to 1125 ac-ft (2500 ac-ft total)
  - 5-10 cfs Guaranteed
  - Dam repair and/or siphon
  - $1.5 - $1.7M
  - $1400 - $2400 / ac-ft

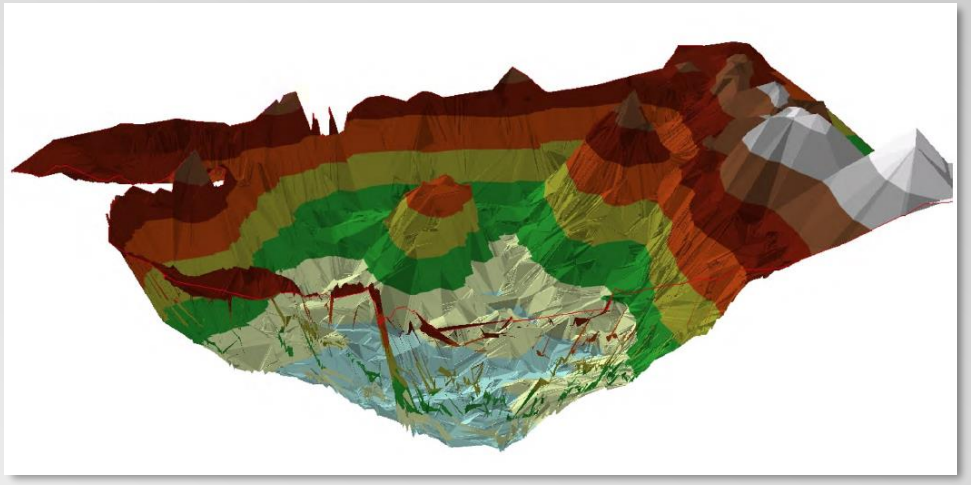


New Storage Alternatives in PEIS

- **Eight-Mile**
  - 1 ft pool raise and/or siphon
  - 1,000 ac-ft expansion
  - 11.6 cfs



- **Klonaqua**
  - Construct outlet tunnel
  - 10-50 ft drawdown
  - 600-2500 ac-ft
  - 5-20 cfs



Water Markets

- **Facilitate transactions between sellers and buyers**
- **Likely shift agricultural use to municipal or instream flow**
- **Season of use challenges exist**
- **500 ac-ft produces about 3 cfs for 90 days**
- **Valuations in the range of $1,000 - $2,000**
- **Purchase cost on the order of $500K to $1M**
- **Additional transaction and formation costs**

Supply

Sellers: Water right holders

Projects: Retime available water

Banking Functions

- Certifies validity of water rights
- Business rules for bank
- Establishes pricing
- Marketing
- Regulatory interaction

Demand

Buyers:

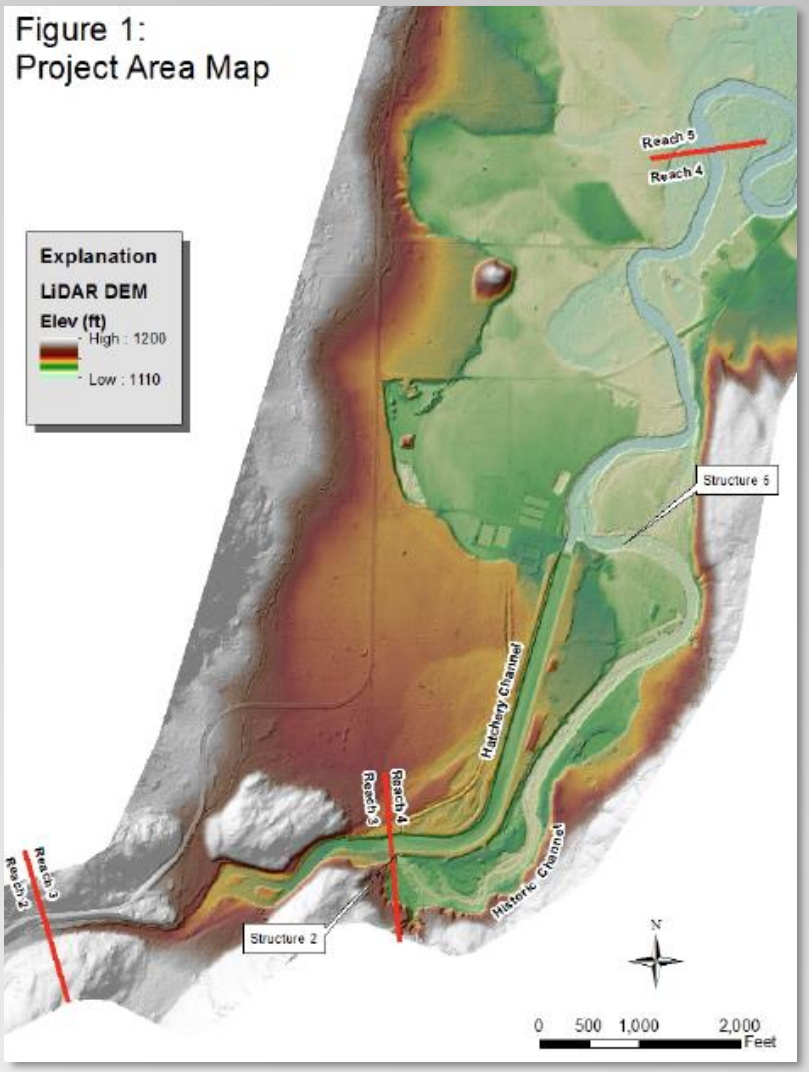
- Mitigation for new uses
- Reliability for existing uses

Fish Passage & Screening

- LNFH Structure 2 modifications
- LNFH Structure 5 modifications
- LNFH / COIC Intake and Fish Screen
- IPID Fish Screen
- WDFW Fish Screen and Diversion Inventory

Habitat Improvement

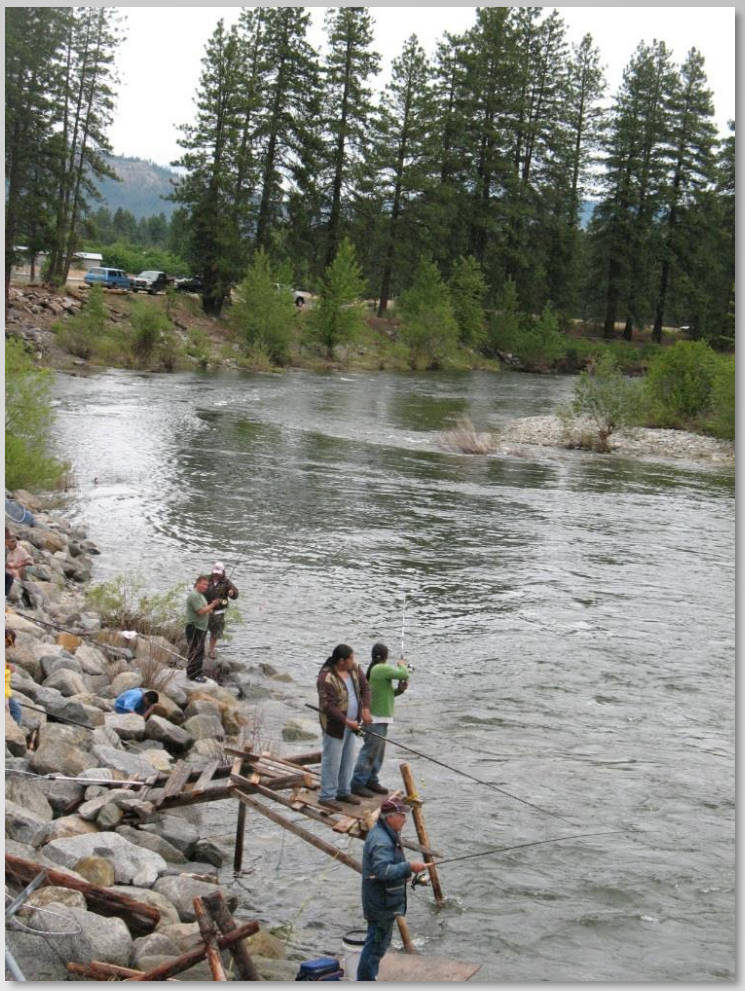
- **IWG Recommendation: no additional high flow through historic channel**
- **Additional high flow habitat improvements in other reaches**
- **Targeted habitat improvements in Icicle Creek pending IFC input and project development**



Tribal Fishery Enhancement

Tribal Impacts and Enhancement Study

- Protection measures for existing historic location
- Additional locations or access acquired?
- Different fishing methods permitted?
- Location amenities enhanced?
- Adaptive management and monitoring as projects implemented?



Was the Base Package Enough?

- **Asked That Question During Scoping . . .**

- **Public Wanted More Choices**

PEIS Alternatives

What Alternatives Are Being Considered?

- No Action
- Icicle Workgroup Base Package (conservation at LNFH, COIC, IPID, and City, Alpine Lake Automation, Eightmile Restoration, Water Markets, Screening & Passage, Habitat, Tribal Adaptive Management, Rule Amendment).
- Base Package without Alpine Lakes Automation but with IPID Pump Exchange at Dryden
- Base Package without any lake restoration or automation, but with IPID Pump Exchange at Dryden, and Legislative Change to waive instream flow impacts.
- Base Package with expansion of Eightmile Lake, Upper Klonaqua Storage Enhancement, Upper Snow Storage Enhancement

What Alternatives Are Not Being Considered?

- Removing Leavenworth National Fish Hatchery, decommissioning existing dams, selling District water rights, District point of diversion change out of Icicle Creek

Icicle Strategy Overview

Projects	Proposed Alternatives				
	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Conservation					
IPID Irrigation Efficiencies		●	●	●	●
COIC Irrigation Efficiencies (Piping)		●	●	●	●
Domestic Conservation Efficiencies		●	●	●	●
LNFH Conservation and Water Quality Improvements		●	●	●	●
Pump Exchange					
IPID Dryden Pump Exchange		O	●	●	
COIC Irrigation Efficiencies (Pump Exchange)		●	●	●	●
Modification/Restoration of Existing Storage					
Alpine Lakes Reservoir Optimization, Modernization and Automation		●			●
Eightmile Lake Storage Restoration		●	●		●
New Storage					
Eightmile Lake Storage Enhancement					●
Upper Klonaqua Lake Storage Enhancement					●
Upper and Lower Snow Lakes Storage Enhancement					●
Habitat/Fisheries Improvements					
Tribal Fishery Projection		●	●	●	●
Habitat Protection and Enhancement		●	●	●	●
Fish Passage		●	●	●	●
Fish Screening		●	●	●	●
Legislative/Administrative Tools					
Water Markets		●	●	●	●
Instream Flow Rule Amendment		●	●	●	●
OCPI legislative fix from instream flow impacts				●	

O *Represents a long-term project that could increase instream flow benefits if O&M funding is found*

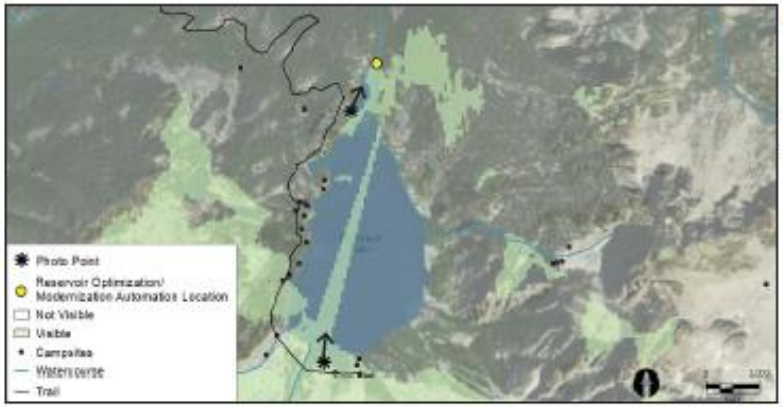
Draft PEIS Overview

- **Chapter 1:** Introduction, Purpose and Need, Guiding Principles
- **Chapter 2:** Project Descriptions by Alternative
- **Chapter 3:** Resource Descriptions, Affected Environment
- **Chapter 4:** Projected Impacts by Alternative
- **Chapter 5:** Consultation and Coordination Information

Draft PEIS Overview

- **Chapter 3:** Resource Descriptions, Affected Environment
  - Earth
  - Water Resources
  - Water Quality
  - Water Use/Water Rights
  - Fish and Wildlife
  - Vegetation
  - Aesthetics
  - Air Quality
  - Climate Change
  - Noise
  - Land Use
  - Wilderness
  - Shorelines
  - Transportation
  - Cultural Resources
  - Socioeconomics

Aesthetics



ALPINE LAKES OPTIMIZATION, MODERNIZATION AND AUTOMATION

COLCHUCK LAKE

- Representative photos of infrastructure and seasonal lake levels
- Simulation not warranted given sensitive viewpoint locations and minimal view changes

Draft PEIS Overview

- **Chapter 1:** Introduction, Purpose and Need, Guiding Principles
- **Chapter 2:** Project Descriptions by Alternative
- **Chapter 3:** Resource Descriptions, Affected Environment
- **Chapter 4:** Projected Impacts by Alternative
- **Chapter 5:** Consultation and Coordination Information

Draft PEIS Overview

- **Chapter 4:** Projected Impacts By Alternative
  - Example: Earth
    - No Action
    - Alternative 1
    - Alternative 2
    - Alternative 3
    - Alternative 4
  - Summary of Impacts
  - Cumulative Impacts
  - Unavoidable Impacts
  - Mitigation Options, short-term, long-term

Evaluation of Alternatives (example)

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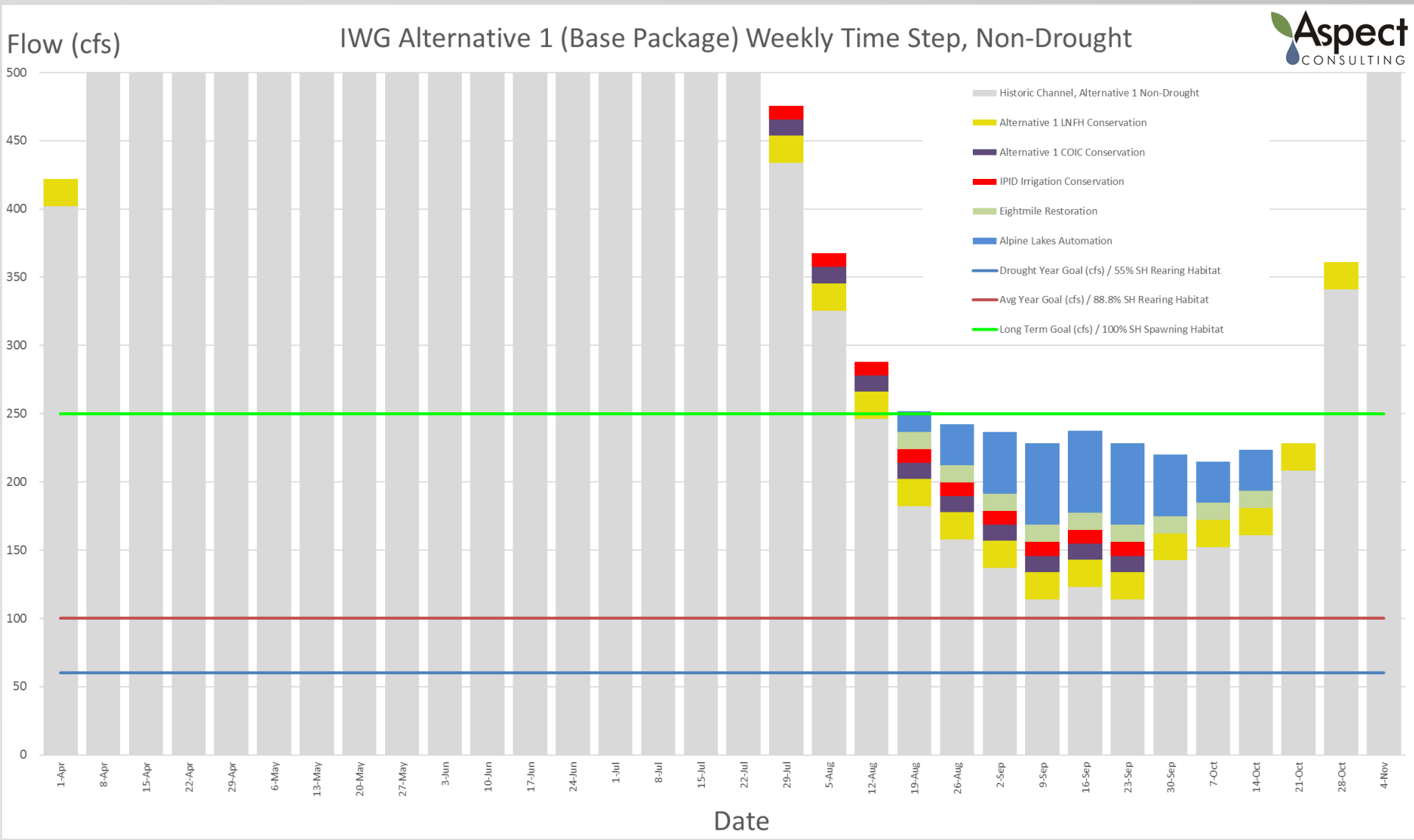
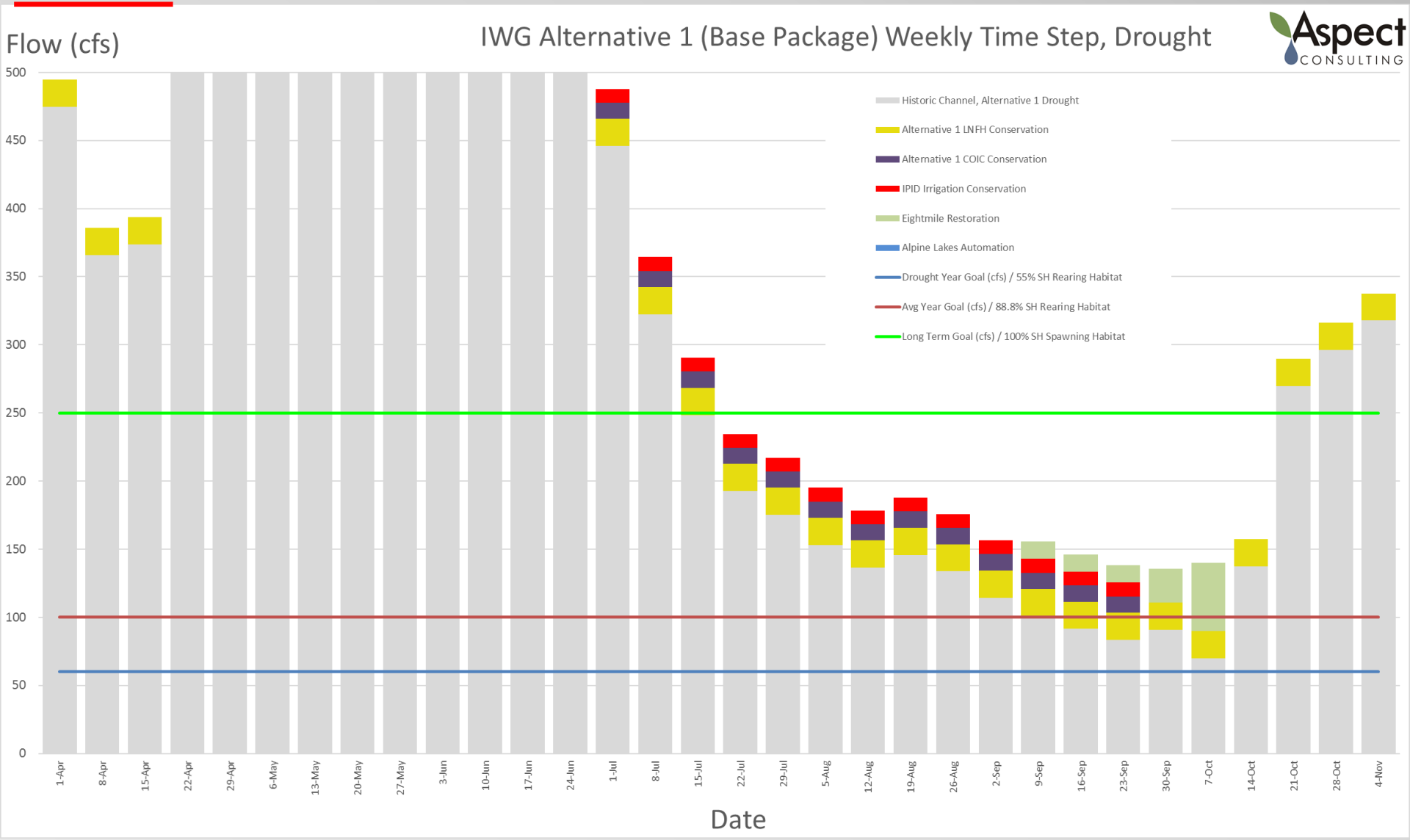


Evaluation of Alternatives (example)

DRAFT



Evaluation of Alternatives (example)

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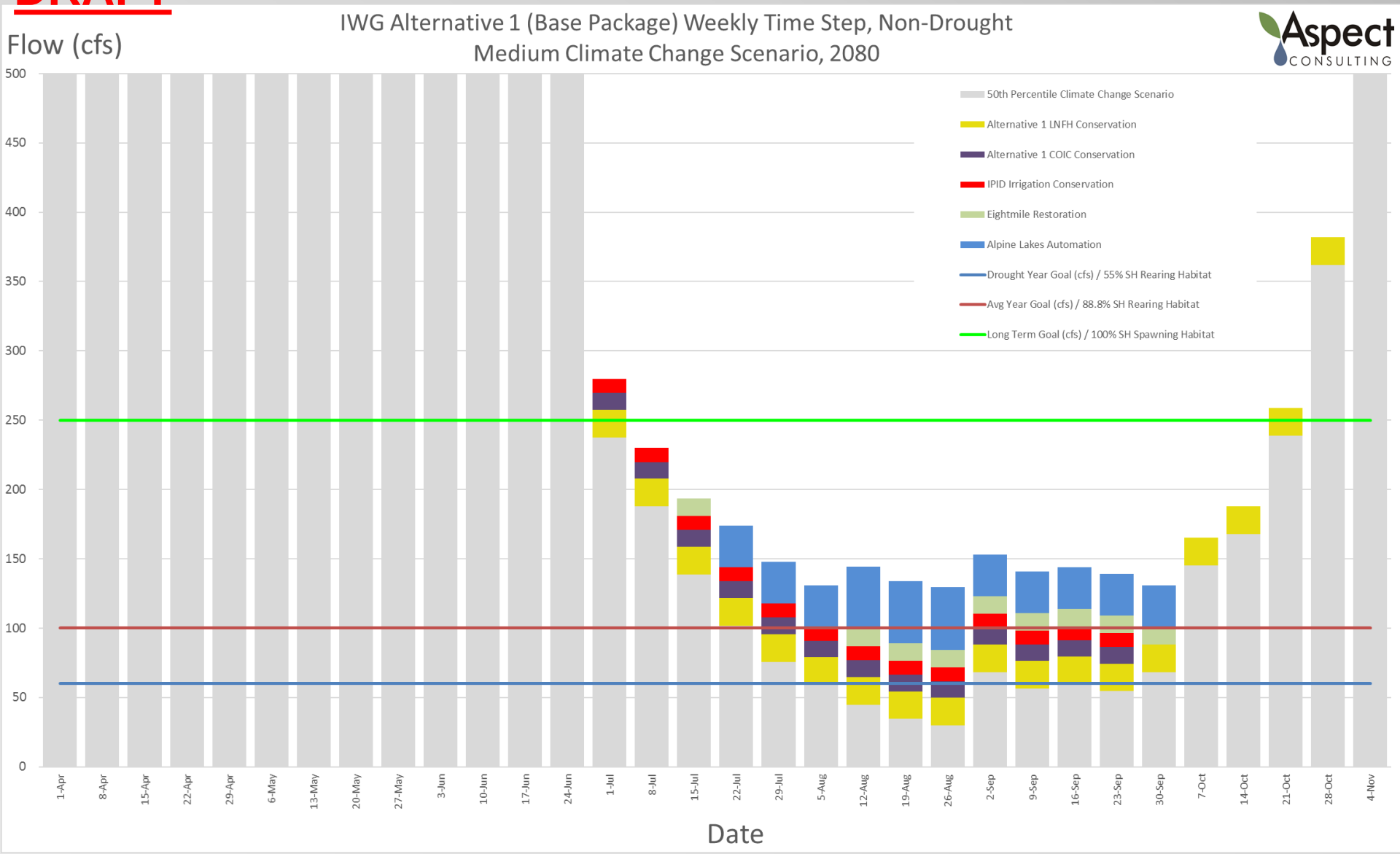

Evaluation of Alternatives (example)

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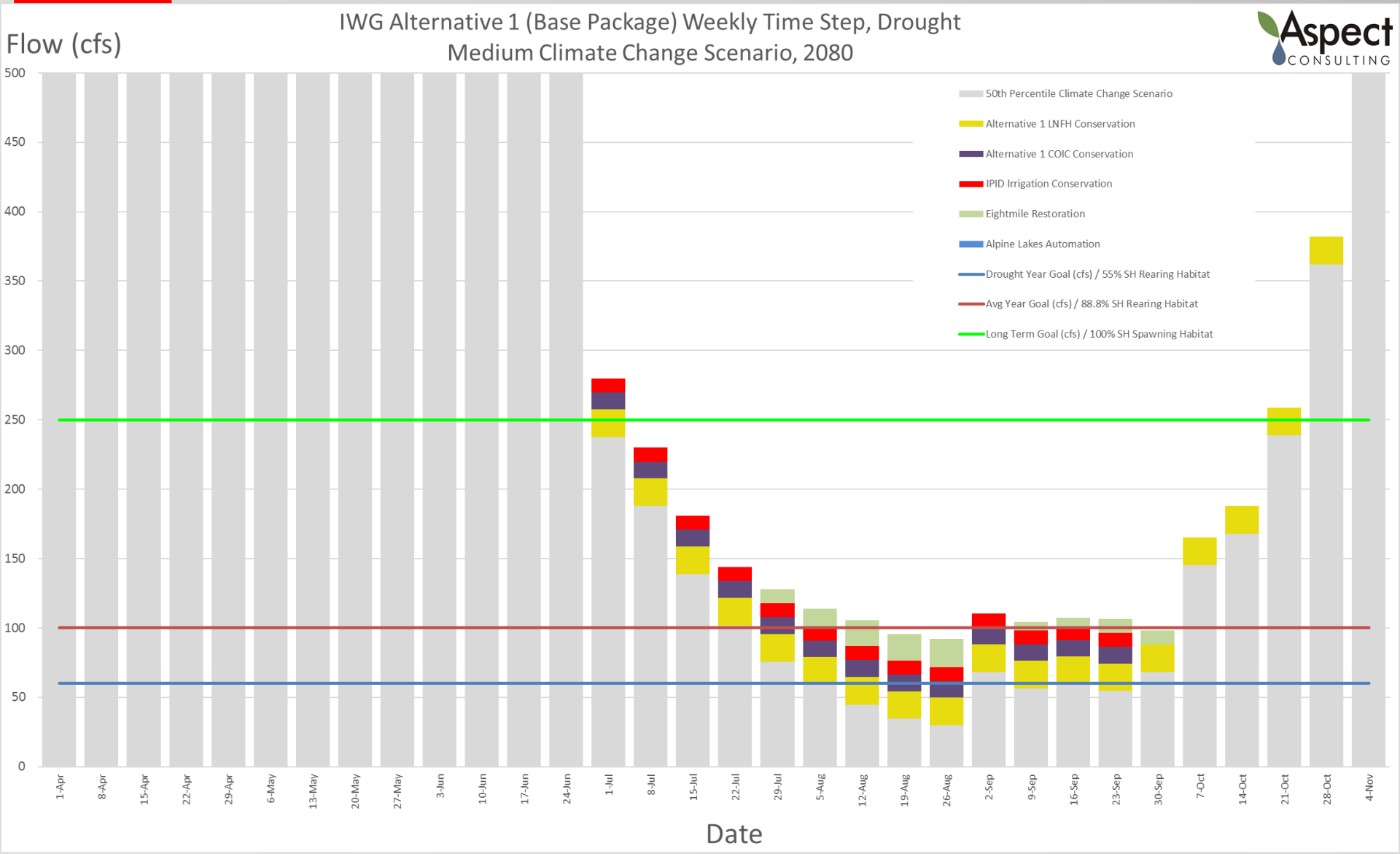

Evaluation of Alternatives (example)

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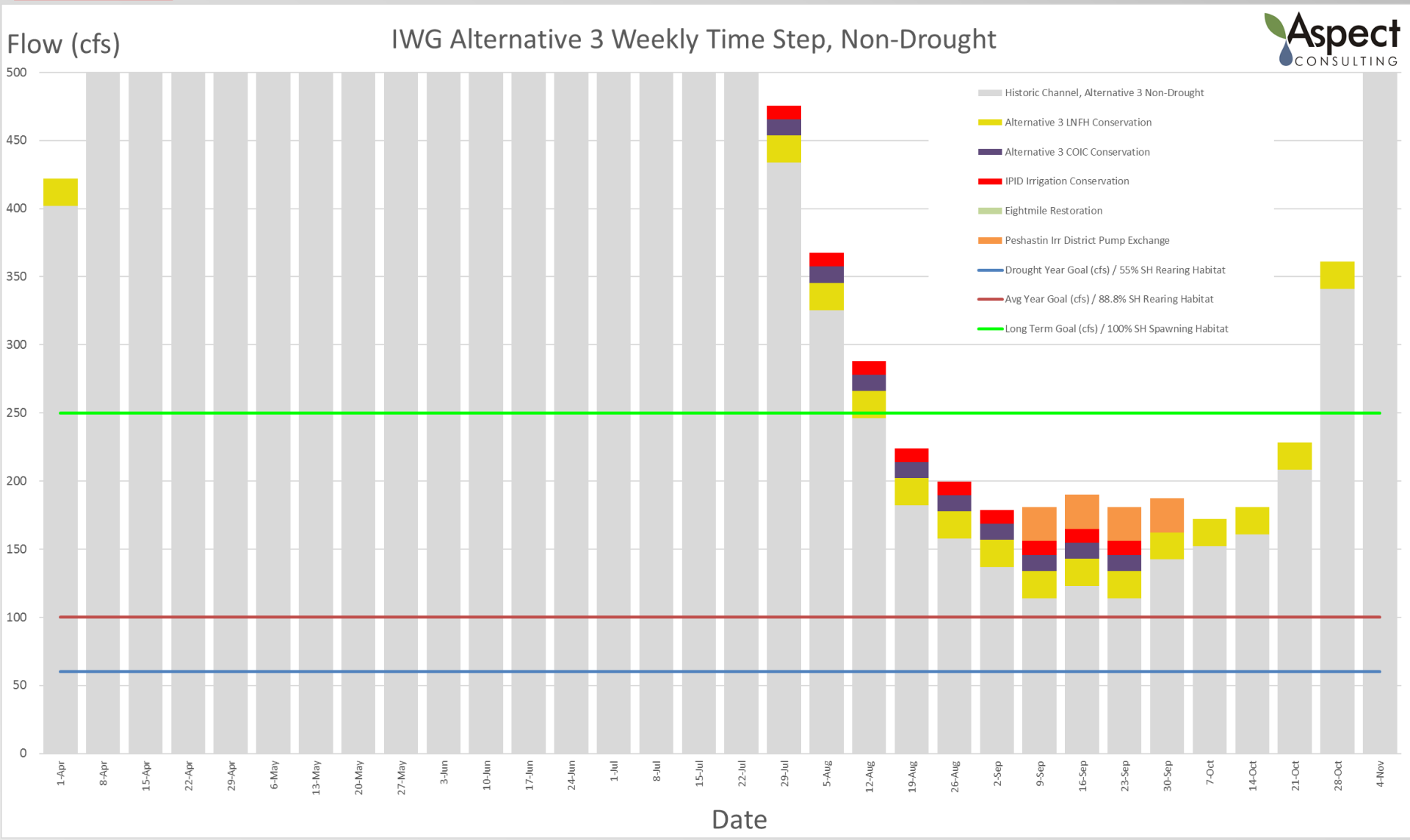

Evaluation of Alternatives (example)

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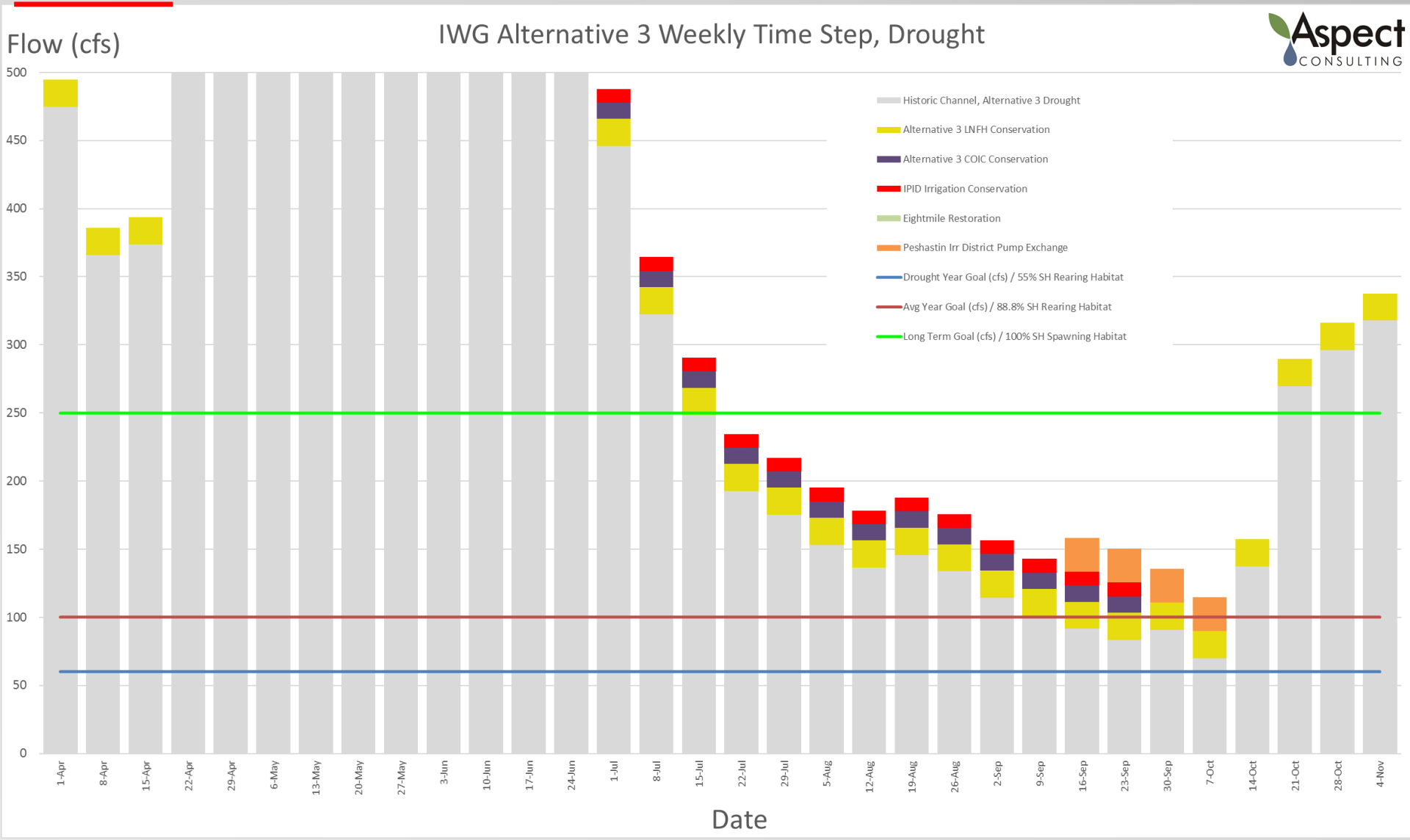

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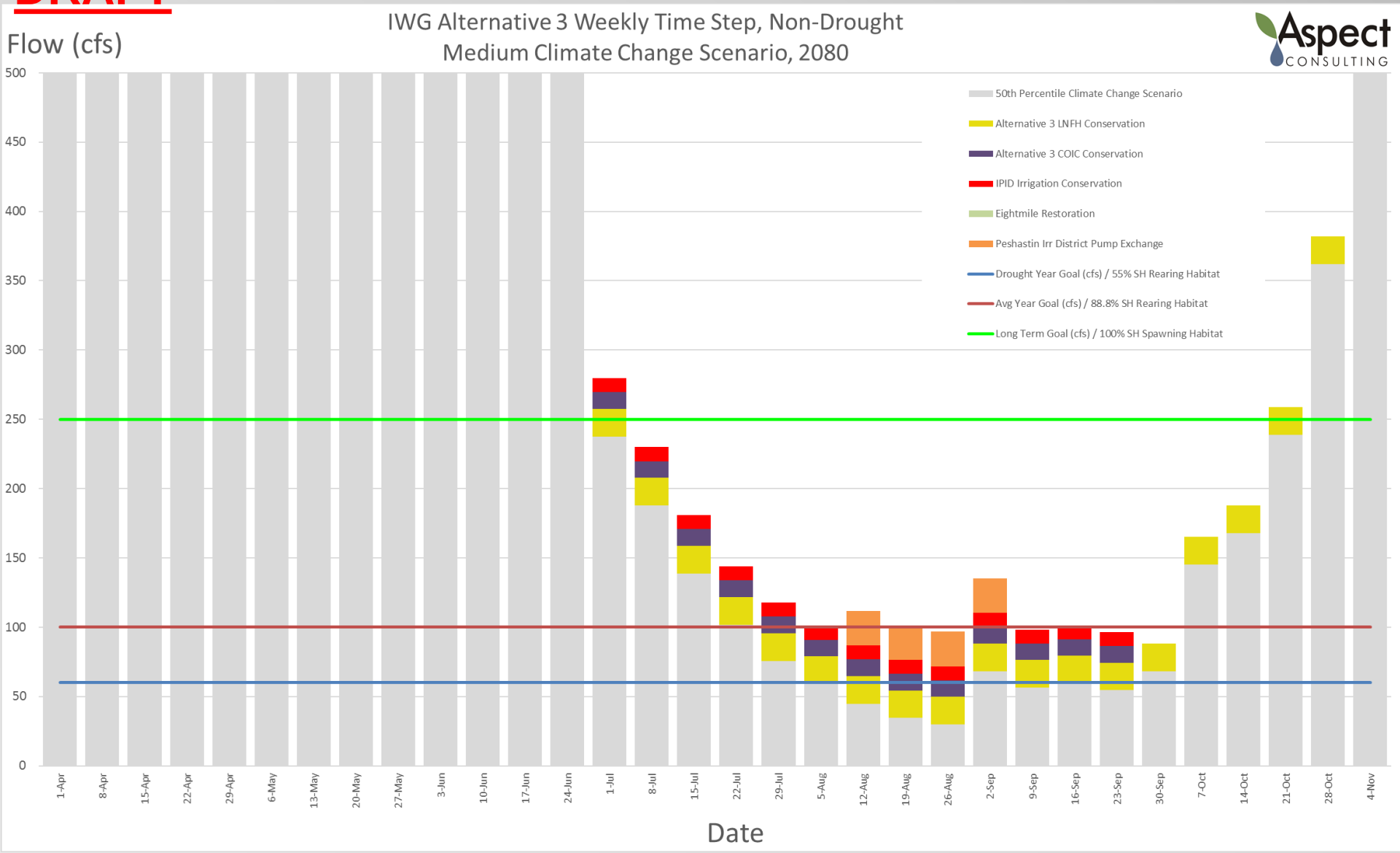

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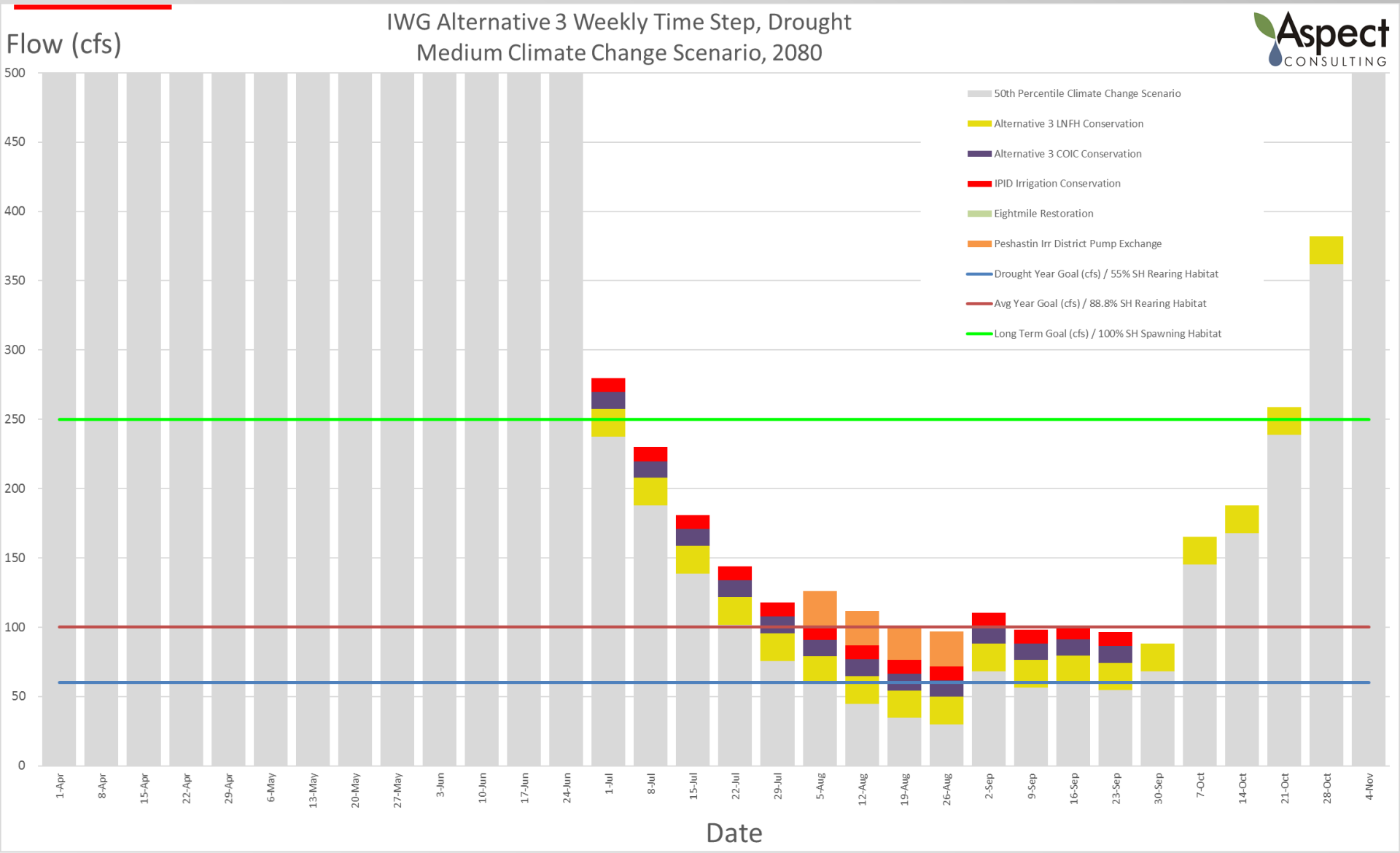

Evaluation of Alternatives

Summary of Findings (100 cfs Guiding Principle)

DRAFT

	Low Change	Medium Change	High Change
Alternative 1	Yes	Yes	Yes
Alternative 2	Yes	Yes	No
Alternative 3	No	No	No
Alternative 4	Yes	Yes	Yes

Evaluation of Alternatives

Summary of Findings (60 cfs Guiding Principle)

DRAFT

	Low Change	Medium Change	High Change
Alternative 1	Yes	Yes	Yes
Alternative 2	Yes	Yes	Yes
Alternative 3	Yes	Yes	Yes
Alternative 4	Yes	Yes	Yes

Draft PEIS Overview

- **Chapter 1:** Introduction, Purpose and Need, Guiding Principles
- **Chapter 2:** Project Descriptions by Alternative
- **Chapter 3:** Resource Descriptions, Affected Environment
- **Chapter 4:** Projected Impacts by Alternative
- **Chapter 5:** Consultation and Coordination Information

Draft PEIS Overview

- **Chapter 5:** Consultation and Coordination Information
  - Summary of SEPA Public Involvement
  - County Tracking of Outreach
  - Comment Response Approach
  - Agency Coordination
  - Permits and Actions Triggering Consultations

PEIS – Choose Your Own Adventure for COIC . . .

- **How Do I Focus One Thing In A Huge Document?**
  - Chapter 2—Use master alternative table to find what alternatives your project is in then go to project description in that alternative.
  - Chapter 3– Resource descriptions are organized by geographic area (e.g. Alpine Lakes, Icicle Creek, Wenatchee River).
  - Chapter 4—Short-term and long-term impacts are organized by resource, impact type, alternative, and project. For example, surface impacts associated with COIC would be under Surface Water, Alternative 1, Long-Term, and then COIC Project.

Presentation Overview

- **What are you going to see in the Draft PEIS?**
  - 5 Chapters
  - Incorporation of Other Studies and Previous Work by Reference
- **What is the rollout strategy?**
- **How can you help?**
- **What questions should you be asking yourself?**
- **Where do we go after the PEIS is done?**

Rollout Strategy

- **What is the rollout strategy?**
  - **Draft launch likely in October timeframe**
  - **Public meeting in Leavenworth**
  - **Comments received (likely 60 day comment period)**
  - **IWG briefed and asked for renewed consensus for preferred alternative to co-leads**

How Can You Help

- Participate in public meeting
- Brief elected officials/decision makers
- Be a champion for the Icicle Strategy
- Help deliver clear and accurate messages and correct inaccuracies
- Participate in the decision-making process for next steps

What Questions Should You Be Asking?

- Is the Base Package (Alternative 1) still the best choice?
- Should modifications be made?
- Is another alternative a better choice?
- How do we pair and phase projects?

Where Do We Go Next?

- What is the role of the IWG moving forward?
- How often do we meet?
- How do we stay informed?
- How will funding be coordinated?
- What political and outreach efforts are needed?

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