



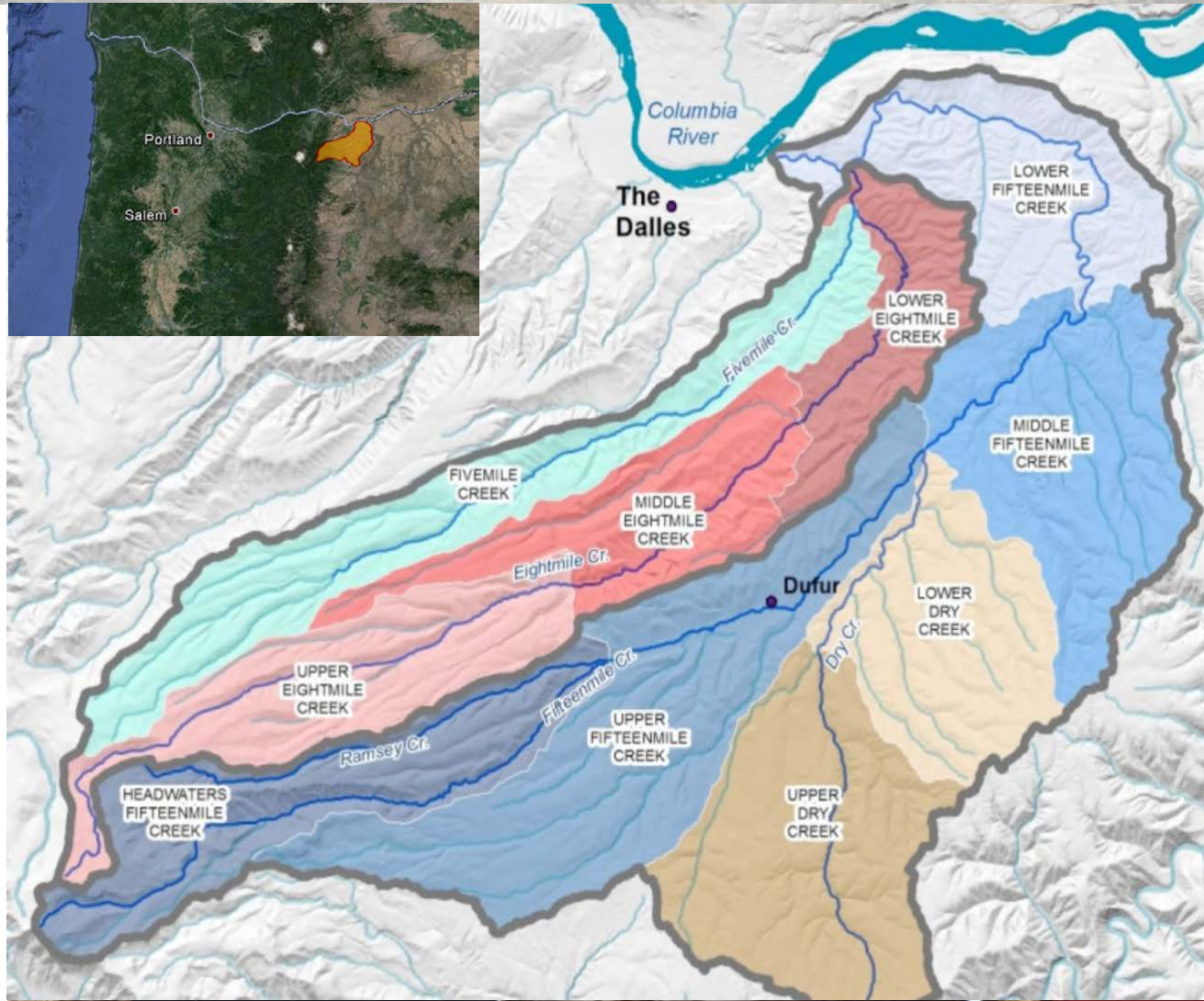
FAST (Fifteenmile Action to Stabilize Temperature): Use of Voluntary Landowner Agreements and a Predictive Stream Temperature Model to Reduce Steelhead Mortality and Irrigator Liability in Fifteenmile Creek, near The Dalles, Oregon

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Fifteenmile Watershed

- 54-mile tributary to Columbia River
- Eightmile, Fivemile, Ramsey Creeks
- Mid-Columbia summer steelhead, Pacific lamprey
- Irrigation diversions (70 landowners, 3400 acres with water rights)
- Flow limited June-Sept
- 303(d) list for temperature and sediment



Background: 2009 Fish Kill



- Prolonged period of high water temperatures
- Significant mortality of juvenile steelhead
- NOAA fisheries investigation
- Potential civil and criminal penalties under ESA
- Strategy needed to **avoid take, reduce liability, and maintain agricultural productivity**

Strategy: Fifteenmile Action to Stabilize Temperatures

Fifteenmile Watershed Irrigators

The Freshwater Trust

Fifteenmile Watershed Council

Oregon Department of Fish & Wildlife

Wasco Co. Soil & Water Conservation District

Oregon Water Resources Department

Confederated Tribes of Warm Springs

Wy'East RC&D

Oregon Department of Environmental Quality

National Oceanic & Atmospheric Administration

Oregon Watershed Enhancement Board

Columbia Basin Water Transactions Program



FAST Components

1. Predictive Stream Temperature Model

2. Daily Forecasts, FAST Alerts

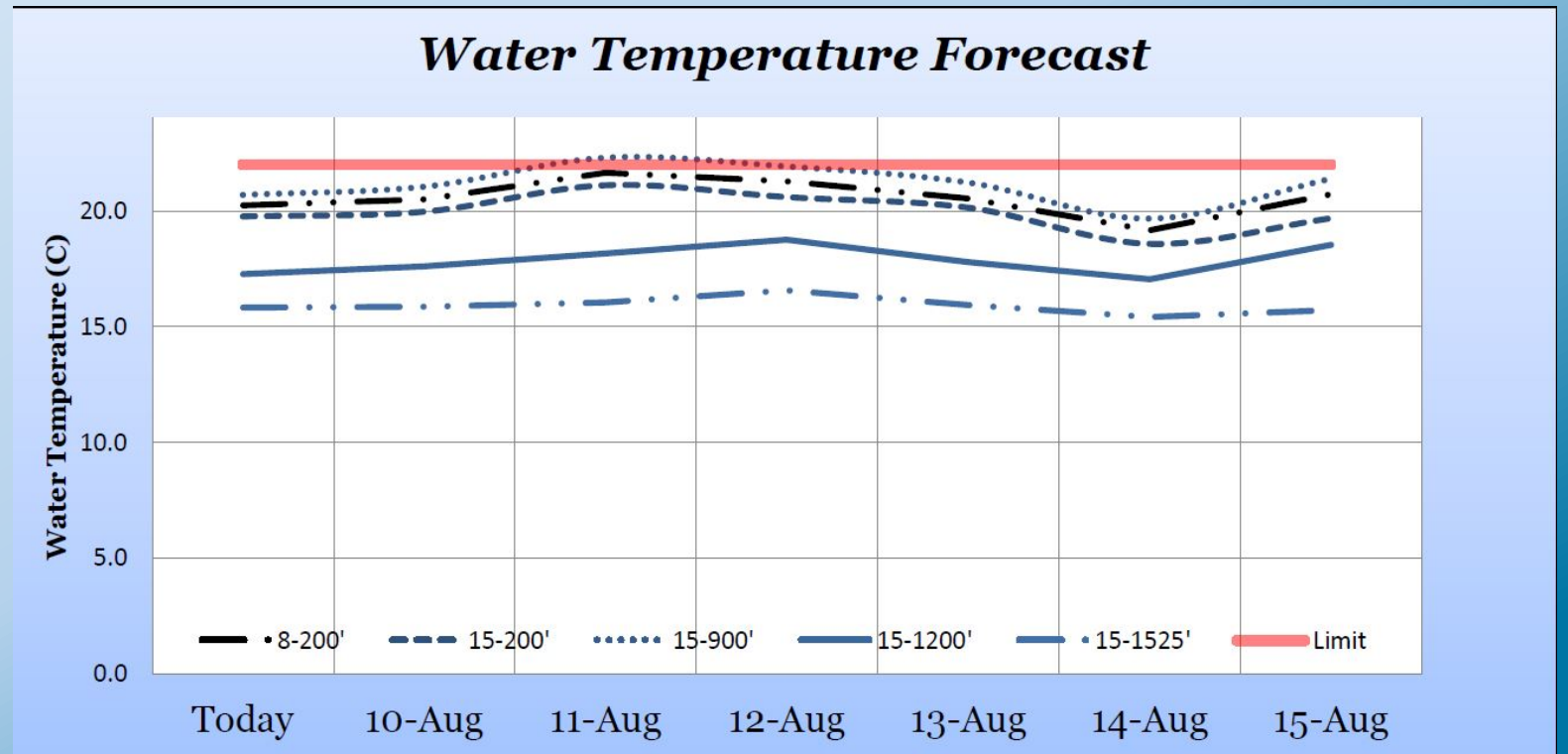
3. Compensation

4. Measurement / Monitoring

5. Adaptive Management

1. Predictive Stream Temperature Model

- Mixed model framework developed by ODFW for weir operation
- Near-instantaneous discharge, historic water temperature, climate data, weather forecast
- Predicts stream temperature for 7 days at 5 sites in watershed



2. Daily Forecasts, FAST Alerts

- Forecasts emailed daily 6/1-10/1
- FAST Alert trigger: lethal stream temperatures predicted at 2 or more sites for 2 or more days
 - 22°C Upper Fifteenmile
 - 23°C Lower Fifteenmile
- Recorded phone alert message notifies irrigators that fish kill conditions are likely and encourages diversion reductions

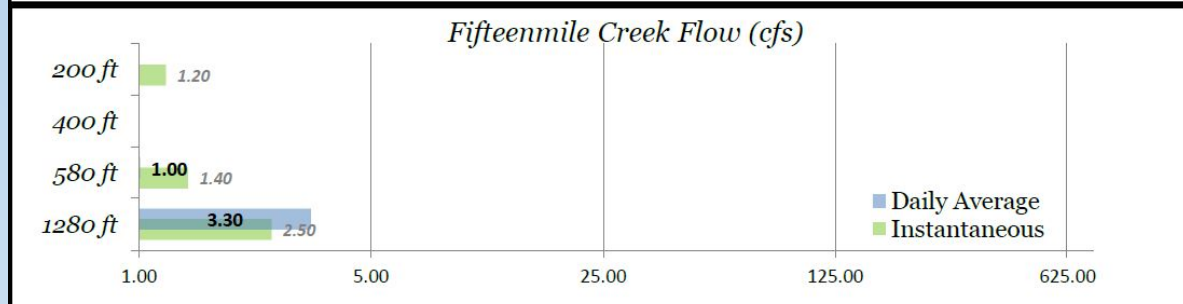
Water Temperatures will exceed thresholds: Not Predicted

Days exceeding thresholds: 0 days

Sites exceeding thresholds: 0 sites

Alert will be given if water temperatures exceed 71.6°F (22°C) in upper Fifteenmile Creek or 73.4°F (23°C) in lower Fifteenmile Creek, and at two sites for two or more days.

Elevation	Measured	Water Temperature Forecast (°F)						
	8-Aug	Today	10-Aug	11-Aug	12-Aug	13-Aug	14-Aug	15-Aug
Eightmile Ck: 200 ft		68	69	71	70	69	66	69
Fifteenmile Ck: 200 ft		68	68	70	69	68	65	67
900 ft		69	70	72	71	70	67	70
1200 ft	65	63	64	65	66	64	63	65
1525 ft		60	61	61	62	61	60	60



Weather Forecast

The Dalles - Weather Forecast					Dufur - Weather Forecast			
Temp (L/H)	Precip	Snowlvl	Dewpt (F)	Wind (mph)	Temp (L/H)	Precip	Snowlvl	Dewpt (F)
64/89	13%	10,690	54	6	55/77	19%	10,625	52
64/92	17%	11,633	53	6	55/81	21%	11,556	51
67/99	16%	12,173	55	7	58/83	18%	12,032	51
67/96	14%	12,689	52	6	57/88	18%	12,724	52
64/85	22%	10,954	52	10	54/77	23%	10,837	49
59/80	9%	10,009	49	8	53/72	11%	10,037	46
67/86	5%	11,329	44	4	59/78	6%	11,416	42

8/9/2015

5:32 AM

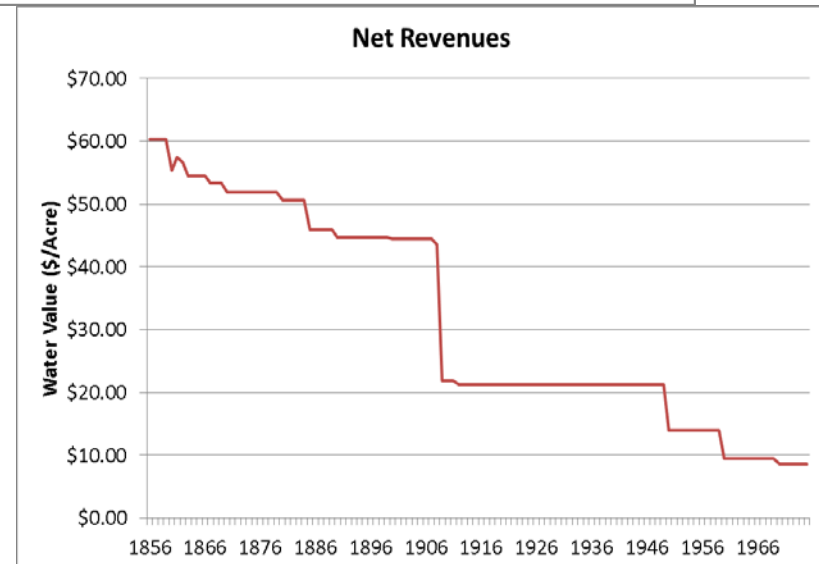
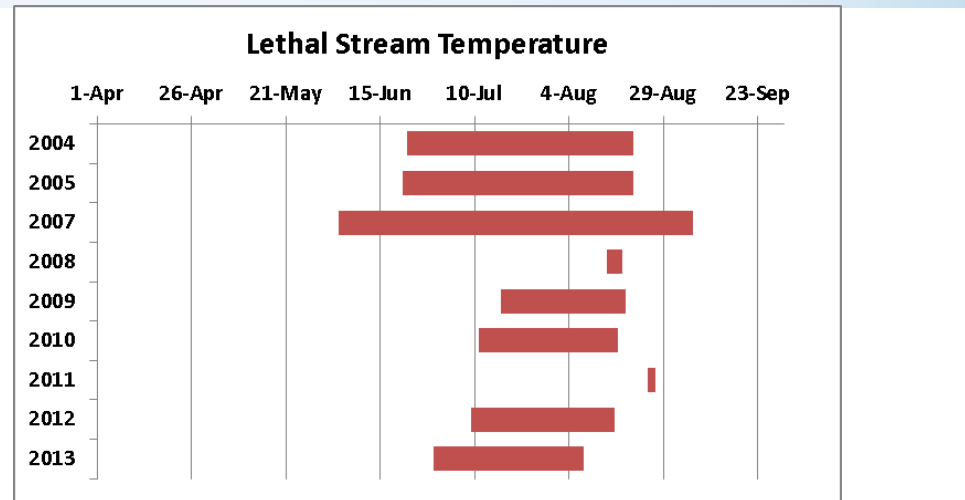


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3. Compensation – Establishing Cost of Water

- Water right reliability analysis
- Baseline alert days based on historical water temperature
- Economic valuation of impact to net agricultural revenues

Priority Date	Baseline Alert Days
1856-1896	19
1897-1909	15
1910-1949	6
1950-1959	4
1960-1985	2



3. Compensation – Two Contractual Options

Option 1

- Contractually required to shut off diversions during all alerts
- Upfront compensation based on seniority of water right

Priority Date	Payment per acre enrolled
1856-1896	\$51.25
1897-1909	\$44.42
1910-1949	\$22.24
1950-1959	\$13.88
1960-1985	\$9.45

Option 2

- Complete flexibility whether to reduce diversions during alerts
- Post-season compensation based on actual curtailment (capped at Option 1 payment)

Month of Alert	Payment per gallon curtailed
June	\$0.0004
July	\$0.0003
August	
September	



Comparison: Certainty, Conservation Value, Cost Effectiveness

Option 1 – pay upfront for shutoff

- 100% certainty of payment amounts and participation for seller and buyer
- Conservation value high, if can attract senior water rights for bad water years
- Cost effectiveness lower at margins

Option 2 – pay after per gallon

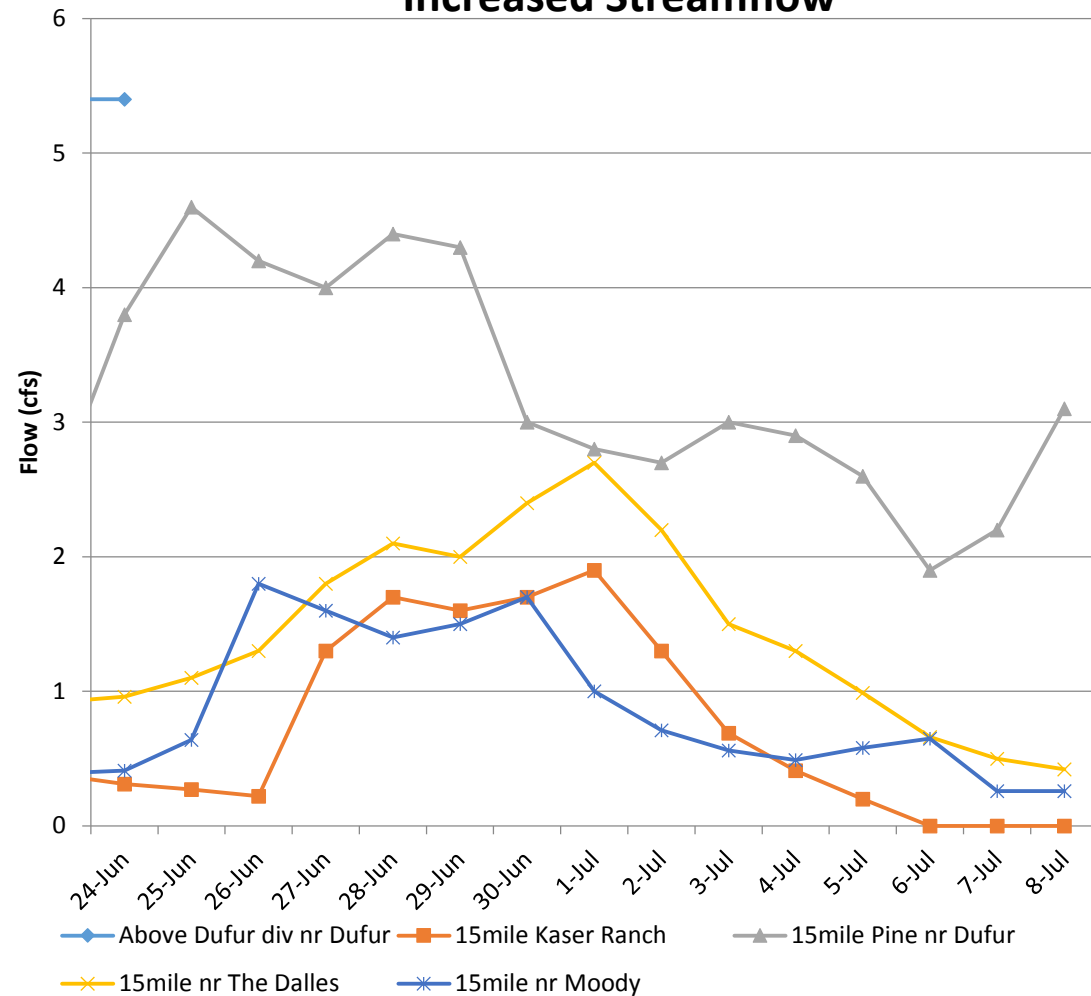
- 0% certainty of payment amounts and participation
- Conservation value high (participation always means “wet water” for alert)
- Always costeffective

4. Measurement & Monitoring

- Flowmeters on almost every diversion
- Photo monitoring
- Irrigators report diversion reductions
- Watermaster regulation records
- OWRD streamgages and telemetered temperature stations



OWRD Mean Daily Flow During 2015 Alert – Increased Streamflow



4. Measurement & Monitoring, cont'd

Option 1

	2013	2014	2015
Acres Enrolled	n/a	383.7	200.2
CFS Protected	n/a	4.84	2.5
Number of Landowners Participating	n/a	5	4
Cost	n/a	\$11,205.60	\$6,897.63

Option 2

	2013	2014	2015
Acres Enrolled	231.7	984.03	401.3
CFS Protected	4.5	1.72	1.39
Number of Landowners Participating	7*	5*	6*
Cost	n/a	\$2,340.15	\$1,222.10

* These numbers do not count the additional landowners who have reported voluntary reductions in response to FAST alerts even though they have not contracted for compensation. Drivers: ESA liability, community pressure, conservation ethos.

5. Adaptive Management

- Annual review, modification, and ratification of FAST plan by WC
- Ongoing calibration of stream temperature model based on historical performance in predicting actual temps
- Addition of Eightmile Creek site into temperature model
- Addition of near-real-time telemetered temperature gages
- Hiring of full-time FAST Coordinator at Wasco Co SWCD: improved local capacity to recruit landowners, monitor participation, administer alerts



Quantifying Impacts

- No fish kills since implementation of FAST
- Water Temperature Transaction Tool (W3T)
 - Models the impact of flow restoration on stream temperature based on increased volume and velocity
 - 2014 alert lasting 7 days (July 7 to 14)
 - 4.5 cfs restored instream during alert, doubling the stream's flow
 - Modeled average temperature reduction of 1.6°F (0.9°C) during alert
- 2013 Certificate of Appreciation presented by National Marine Fisheries to the Fifteenmile Watershed Council

FAST Success Factors

1. Historical Flow & Climate Data
2. Real-time Measurement
3. Regulatory Risk
4. Close-knit Community
[Funding Availability]



Proactive, Cooperative, Data-driven Solution

- Give irrigators information they need to manage resource to sustain agriculture *and* protect instream flows
- Operates outside prior appropriation system
- Optimizes conservation dollars for maximum ecological return



Questions?

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