

**Fifteenmile Action to
Stabilize Temperatures
(FAST)
2019**

Prepared by:

Fifteenmile Watershed Irrigators

In cooperation with:

The Freshwater Trust

Fifteenmile Watershed Council

Oregon Water Resources Department

Oregon Department of Fish & Wildlife

Confederated Tribes of Warm Springs

Wasco County Soil & Water Conservation District

Wy'East RCD

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I. Background

In addition to supporting a robust agricultural community, the Fifteenmile watershed provides key habitat for many aquatic species including threatened winter steelhead, Coho, Chinook, Pacific lamprey and other native fish. During mid-late summer months, irrigation withdrawals exacerbate naturally low base flows, reducing available habitat and hindering mobility for juvenile and adult fish. Decreased water levels also raise water temperature and diminish dissolved oxygen levels, increasing aquatic species' susceptibility to disease and predation.

All major Fifteenmile watershed planning documents list low streamflow as a primary limiting factor for viable fish populations and prioritize specific actions to restore the natural hydrograph to the Fifteenmile watershed in order to provide sufficient flows during critical periods. Recommended restoration actions include 1) *reducing irrigation withdrawals* through on-farm efficiency projects, instream water right transfers and leases, retirement of low-yield irrigated acreage, and source-switches from surface water to groundwater irrigation; and 2) *increasing natural water storage* through the adoption of no-till farming practices and implementation of floodplain restoration projects. The Middle Columbia Steelhead Recovery Plan also identifies a specific flow-related objective for the watershed that includes meeting a flow target of about 7 cubic feet per second (cfs) at the mouth of Fifteenmile Creek for the month of August.

Led by the efforts of the Fifteenmile Watershed Council and its members, and with the support of local restoration groups, tribes, and state and federal agencies, the Fifteenmile watershed is taking a comprehensive and cooperative approach to tackling the recommended actions identified in the planning documents. With funding from OWEB, the Watershed Council with partners installed 9 flow gages and metered all significant irrigation diversions as part of its Fifteenmile Watershed Flow Monitoring Project. This will promote efficient and fair regulation of irrigation withdrawals and help paint a complete picture of water movement throughout the watershed. The Flow Monitoring Project also assessed water savings from irrigation efficiency upgrades and, together with partners from Wasco County Soil & Water Conservation District, Natural Resources Conservation Service and Wy'East Resource Conservation & Development Area Council, offered irrigators a variety of assistance programs for implementing these improvements. Using this assistance, Fifteenmile irrigators reduced water withdrawals—and saved energy—by installing new pumps and sprinkler hardware and by upgrading to center pivot systems. In addition, The Freshwater Trust continues to

offer financial compensation to Fifteenmile irrigators who lease part or all of their water rights for instream use through the Fifteenmile Creek Instream Lease Program.

In 2009, amid these efforts, low flows and extended high air temperatures combined to kill an unknown but significant number of juvenile fish in Fifteenmile Creek, including threatened steelhead. As a result, an enforcement official from the National Oceanic and Atmospheric Administration (NOAA) investigated claims that the watershed violated the Endangered Species Act (ESA), an offense that carries both civil and criminal penalties. Although NOAA's investigation did not result in an enforcement action, the official strongly recommended that irrigators develop a strategy to address future low-flow/high air temperature events. The official also cautioned that NOAA must enforce the provisions of the ESA regardless of climate conditions and that persons involved would be held accountable if a similar event occurs in the future. Since then, the Watershed Council has prioritized raising awareness of irrigator liability under the ESA, including working with NOAA representatives to determine how best to reduce this liability. While restoration actions have increased in the watershed since 2009, low flows are still a primary limiting factor for fish, and the potential for another fish kill remains high.

The goal of the Fifteenmile Action to Stabilize Temperatures (FAST or the "Plan") is to reduce irrigator liability under the ESA by preventing future fish kills in the Fifteenmile watershed. Although low flows present multiple problems for aquatic species in the watershed (e.g., dewatering critical rearing and spawning habitat, and cutting off fish passage), this Plan is aimed solely at reducing stream temperatures lethal to fish by temporarily restoring streamflow to Fifteenmile Creek and its tributaries under the specific circumstances outlined below. FAST is a contingency plan that provides only a bare amount of relief for aquatic species. The Fifteenmile watershed recognizes that it must continue to pursue the restoration actions recommended in the planning documents in order to permanently realize long-term streamflow restoration and restore the natural hydrograph to the subbasin.

Section II of this document explains the underlying criteria and predictive model that will trigger the initiation of the Plan. Section III outlines the actions the Fifteenmile watershed will take when a low-flow/high air temperature event triggers this Plan.

II. Predictive Model

While the Fifteenmile watershed supports at least 18 species of fish, the implementation of FAST during any given year is contingent on the presence of specific conditions tied to the biological needs of two focal species: threatened steelhead and Pacific lamprey. The watershed chose these two species primarily because of their legal status in the watershed; the ESA lists steelhead as a threatened species, and the Oregon Department of Fish and Wildlife (ODFW) identifies Pacific lamprey as a vulnerable species. However, these species have particularly sensitive habitat requirements, and management strategies aimed at benefitting these species will likely improve the habitat for all aquatic species.

Derrek Faber, ODFW steelhead research project leader for Fifteenmile watershed, used streamflow and air temperature data collected in the watershed to develop a model to make near-term predictions of stream temperature for four stations on Fifteenmile and one on Eightmile at the mouth. Faber based the model on current flow measurements, air temperature, and predicted weather conditions from the National Weather Service. The model predicts water temperatures for seven days using location-specific climate predictions generated by the National Weather Service (NWS [BA-N-TD01]). The model pulls localized climate predictions (including air temperature, dew point, and humidity) from the NWS website daily, in addition to instantaneous Fifteenmile Creek discharges posted on the Oregon Water Resources Division website, and uses these data in a mixed-model framework (McLean et al, 1991) to generate the daily average water temperature prediction. Each measurement site has a unique set of covariates (including geology, riparian cover, groundwater penetration, and water sources), and while the mixed-model framework is an excellent tool for predicting long-term data with various inputs, it is ultimately bound to weather predictions.

Faber will monitor the accuracy of the model over time by validating model predictions of water temperature measured by temperature-loggers at each site. If model predictions do not accurately represent actual water temperature, model covariates can be adjusted to produce more reliable predictions. Initially, this model made stream temperature predictions for two sites on lower Fifteenmile Creek: Fifteenmile Creek at the mouth of Eightmile Creek (200 ft elevation) and the Fifteenmile valley near Emerson-Roberts Market Road crossing (900 ft elevation). To date, the model effectively predicted water temperatures for these two sites to within one-half of a

degree. In 2013, Faber refined the model and applied it to two additional Fifteenmile Creek monitoring sites in the Dufur valley: one at the city of Dufur (1300 ft elevation) and another at the Fifteenmile Creek confluence with Ramsey Creek (1525 ft elevation). Modeling these four different sites on Fifteenmile Creek will yield a comprehensive forecast for water temperature gradients throughout the watershed. At the end of the 2014 irrigation season Faber added a water temperature forecast site on Eightmile Creek near the mouth at the 200-foot elevation as an observation site for water temperatures, but the site was not included in the trigger for the FAST alert. Upon the conclusion of the 2018 season, the monitoring site at Eightmile Creek was included as part of the FAST alert trigger, within the grouping of 'Lower Fifteenmile Sites'. The temperature at the Eightmile creek mouth appears to track closely with the lowest Fifteenmile site. Acreage along the Eightmile watershed corridor is eligible for both FAST and instream leasing, leading to the inclusion of the Eightmile site in the FAST ALERT threshold.

The watershed will use this predictive model to determine when high stream temperatures will increase risk of salmonid and lamprey mortality. The literature on critical temperatures for steelhead finds a range between 22°C-24°C (71°F-75°F) causes mortality, not accounting for cold water refugia. From field observations in the Fifteenmile watershed by ODFW, it is likely that the 900 ft elevation has very low densities of juvenile steelhead during the summer. Instead, steelhead migrate to higher elevations with lower stream temperatures or into areas of upwelling such as the Dufur Valley. In these areas, the high densities of fish may be more vulnerable to higher stream temperatures. For example, during the 2009 fish kills, the average water temperature in the Dufur Valley (1200 ft elevation) was between 21.5°C-22.5°C (71°F- 72°F), at the lower end of the lethal range.

For this reason, the Plan articulates a low-range temperature trigger. When the model predicts that water temperatures will exceed 22°C (71.6°F) in upper Fifteenmile Creek or 23°C (73.4°F) at two or more sites for more than one day, the watershed will follow the implementation steps outlined in the next section.

Starting in the 2019 Season, a mandatory three day minimum shut-off time period would be implemented once a trigger is reached to prevent the confusion in the 2018 FAST season. During the 2018 season, ALERTS were triggered on-and-off when weather conditions hovered at the threshold for the alert. This caused the ALERT to be triggered every other day for a week, causing

confusion among the irrigators. Additional ALERT days during the mandatory three-day minimum will not add additional days onto the ALERT. The ALERT will be terminated ONLY if/when the average daily temperature at the Pine Creek temperature logger (https://apps.wrd.state.or.us/apps/sw/hydro_near_real_time/display_hydro_graph.aspx?station_nbr=14104190) falls below the temperature threshold for that site (22° C), after the mandatory three day minimum time period.

Fifteenmile Stream Temperature Logger Sites & Temperature Triggers

Fifteenmile Ck at eightmile Ck confluence (200' elevation)	23° C (73.4°F)
Fifteenmile Ck at Emerson-Roberts Market Rd. (900' elevation)	23° C (73.4° F)
Fifteenmile Ck at Dufur (1300' elevation)	22° C (71.6° F)
Fifteenmile Ck at Ramsey Ck confluence (1525' elevation)	22° C (71.6° F)

The Fifteenmile Watershed Council will operate and maintain a computer dedicated to running the predictive model and issuing reports.

III. Plan Components

The following steps represent actions Fifteenmile irrigators will take to prevent fish mortality in the Fifteenmile watershed. The primary goal of the watershed is to reduce the occurrence of high stream temperature events through planning and appropriate reduction of water use. The secondary goal is to develop a practical action plan based on irrigators' land management plans.

A. Voluntary Self-Regulation

A planning meeting in early spring will focus on signing up landowners interested in instream leasing and FAST, and on reviewing and potentially refining the Action Plan. While it is important to note that each forecast alert will have a unique set of circumstances shaping the watershed's response (time of season, priority date regulation, land-use management, warning location, etc.),

some variables are fairly consistent and predictable from season to season. Data from 2004 to present show that high stream temperatures and water availability share an inverse relationship. As stream temperatures rise, water use regulation tightens and the number of irrigators able to use water declines, indicating less water is available for diversion. During the 2009 fish kills, for instance, stream temperatures at the 1300' elevation gage spiked to between 71-72°F from July 28-August 3. During this same time period, the Watermaster's priority date regulation proportionally increased from 1912 on 7/29 to 1909 on 7/31, and finally to 1908 on 8/3. Prior to 7/28, the Watermaster regulated for 1960 priority dates.

This represents a traditional regulation pattern where priority date regulation is responsive to flows in real time. Under Oregon law, Watermasters have little flexibility on when to begin regulation—when water is physically flowing, the law requires the Watermaster to distribute that water according to priority. However, traditional regulation practices are not responsive enough to achieve the goals laid out in this document. The predictive model gives irrigators in the watershed the ability to proactively regulate themselves to help avoid or lessen the intensity of low-flow/high air temperature events. Because the Watermaster does not have legal authority to regulate proactively according to the predictive model, this manner of regulation must be voluntary. As a supplement to instream leasing designed to increase the volume of water flowing through the system, voluntary self-regulation will form the backbone of the yearly FAST Plan and represents the watershed's initial response to a forecasted alert, year-to-year.

The planning meeting may culminate in the identification of other specific actions irrigators may take to temporarily restore flow to the Creek, in the event that voluntary self-regulation does not avert high stream temperatures. If identified, the watershed will draft a year-specific action plan (i.e. 2015 Action Plan). The watershed may draft several plans for implementation depending on the projected circumstances of the alert. The following are examples of possible tools to include in the year-specific action plans:

1. Rotation Agreements

Irrigators coordinate with neighbors and take turns bypassing water.

2. Minimum Flow Agreements

Irrigators agree to jointly manage water use and delivery systems to ensure that a specified volume of water remains instream at a specified point during a specified period of time.

3. Curtailed Use

Irrigators agree to forego the use of their water for a specified period of time.

The year-specific action plan will also identify how other, non-irrigating water users can support these actions, particularly by agreeing not to divert bypassed water. Although the burden of implementing these year-specific action plans will fall heavily on more senior water users, all irrigators have a role to play.

The Fifteenmile Watershed Council representative will draft the year-specific action plan, if one is created, which participants can elect to sign to indicate their voluntary willingness to abide by the actions identified in the document. The Fifteenmile Watershed Council representative will distribute this plan at the Council's regular meeting and via email and website. The Fifteenmile Watershed Council representative will also make a good faith effort to distribute the year-specific action plan to any irrigators who did not attend the meeting.

IV. Plan Implementation

The FAST Plan consists of four key steps: a) initiation of a stream temperature alert when lethal temperatures are predicted, b) monitoring of streamflow and temperature, c) compensation for irrigators who enroll in FAST, and d) annual reporting to document streamflow response.

A. Stream Temperature Alert & Irrigator Notification

Interested parties can sign-up to receive a daily email message with the 7-day predicted stream temperature, in addition to the daily weather forecast and current Fifteenmile Creek discharge measurements (Fifteenmile Creek Water Temperature Forecast or "Forecast") by contacting the Fifteenmile Flow Restoration Coordinator at 541-296-6178 x117, tatiana.taylor@wascoswcd.org or Fifteenmile Watershed Council at 541-296-6178 x102, Abigail.Forrest@or.nacdnet.net. Forecast emails will be sent between June 1st through the end of the irrigation season around the beginning of October.

In addition, the Fifteenmile Watershed Council representative will add the phone numbers of Fifteenmile irrigators and Watershed Council members to a database that automatically calls and leaves a pre-recorded message when the FAST temperature thresholds are met, triggering a stream temperature alert. Participants can also opt-in to receiving text-messages through the same system. Voluntary self-regulation will initiate upon receipt of this message and will continue until the creek realizes a temperature benefit, at which point an automated end-alert voice and text message will be sent out. The Fifteenmile Watershed Council will host a "post-alert" meeting to review alert specifics, discuss the success of implementation, and identify areas for improvement. This meeting can be combined with the pre-scheduled Watershed Council Meeting as an item on the agenda.

B. Compliance

If irrigators have legal entitlement to use water, the Watermaster has no authority to shut them off for instream benefit to cool the stream. For this reason, participation in FAST is strictly voluntary, and individual compliance, in the absence of any instream leases or transfers, must be an irrigator-driven process. Fortunately, Fifteenmile's system of gages allows for tight monitoring of instream and out-of stream water use, which will aid in the efficient and targeted implementation of the Plan.

All major diversions from Fifteenmile and Eightmile Creeks have totalizing flow meters installed. This will allow for independent verification of an irrigator's compliance with the voluntary self-regulation and any identified year-specific actions. Furthermore, there are four continuously recording gages on Fifteenmile and two on Eightmile Creek that will allow for the tracking/accounting of water movement downstream. Finally, irrigators who opt for per-gallon compensation will be required to document and report their actual curtailment on a worksheet provided at the time of contract signing.

Although all participation is voluntary, the Flow Restoration Coordinator has a responsibility to help implement the plan during an ALERT. As an additional protection for participants, the Flow Restoration Coordinator is responsible for monitoring irrigators before, during, and after an ALERT. Pre-monitoring will be especially beneficial in understanding flow results, and trying to discern the amount of water saved through the program. Photographic evidence of fields enrolled will be taken to demonstrate the validity of the program.

C. Compensation

The Freshwater Trust has secured funding from the Oregon Watershed Enhancement Board (OWEB) to compensate irrigators who sign up for FAST and then voluntarily shut off or curtail their water use as a result of Plan implementation. Payments are modest and aimed at alleviating the inconvenience of interrupting water use. **The primary benefit to irrigators modifying water use during times of critical low flow is reducing personal liability under the ESA.** Furthermore, the watershed anticipates this Plan will raise awareness of critical low-flow events, encouraging irrigators to proactively manage their water use in ways that reduce the occurrence of these events.

See Appendix B, Compensation Options for 2019 Irrigation Season.

D. Yearly Report

The appointed representative will produce a yearly FAST report summarizing the implementation of the FAST Plan for the given year. Any year-specific action plan(s) implemented for the year will be included in the report. The Fifteenmile Watershed Council representative will be responsible for distributing copies of this report to participating irrigators, agencies (including NOAA), and restoration groups, as well as posting the report on the watershed council website.

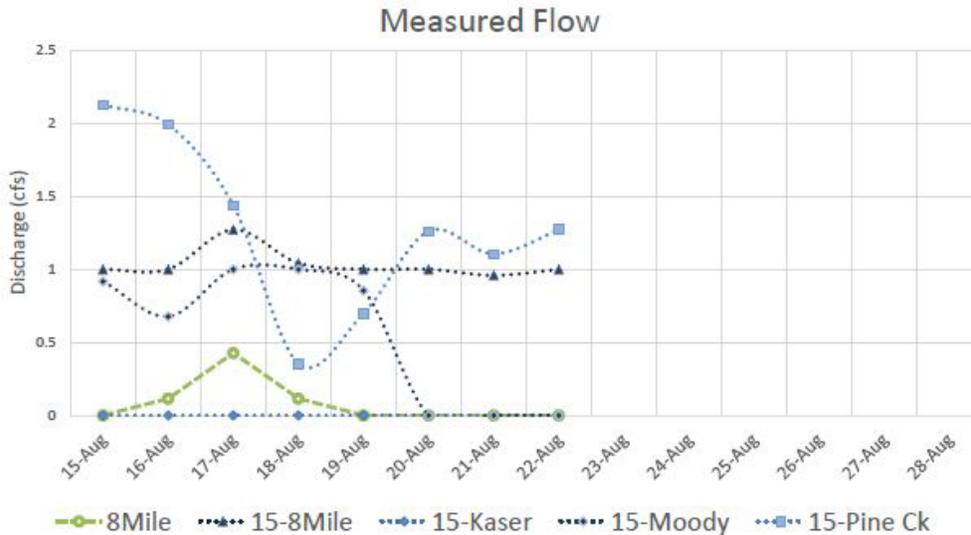
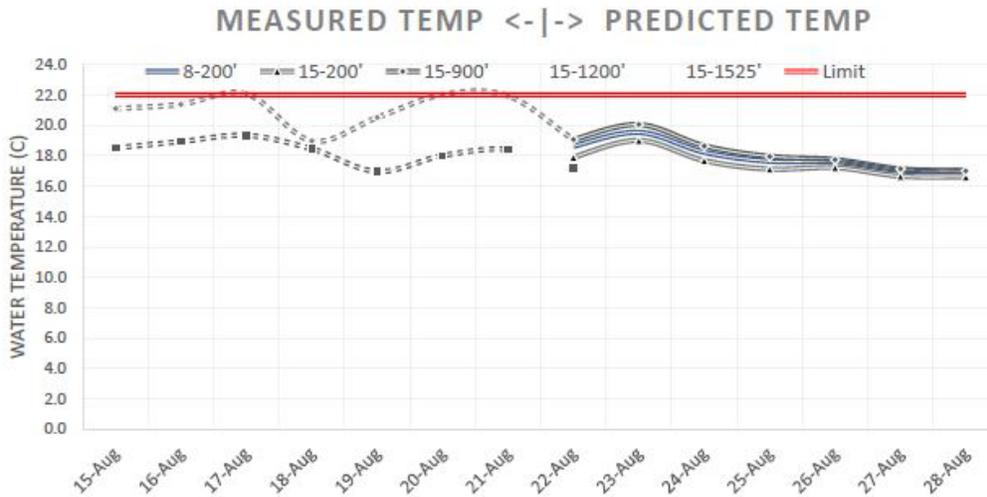
In subsequent years, the pre-irrigation season meeting can also serve as a forum to review the Action Plan of the previous year and share any lessons learned.

Appendix A. Sample Forecast

Water Temperature Below Thresholds

Alert issued when 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.

8/22/2018	Measured	Today	Water Temperature Forecast (°F)					
Elevation	21-Aug	22-Aug	23-Aug	24-Aug	25-Aug	26-Aug	27-Aug	28-Aug
Eightmile Ck: 200 ft		65.6	67.2	64.9	63.8	63.7	62.7	62.7
Fifteenmile Ck: 200 ft	72	64.3	66.2	63.8	62.8	63.0	62.0	61.9
900 ft		66.3	68.1	65.6	64.3	64.0	62.9	62.6
1200 ft	65	63.0	63.9	62.6	61.3	61.2	60.8	60.6
1525 ft		58.7	59.0	58.8	58.1	57.9	57.8	57.4



Appendix B. Compensation Options for 2017 Irrigation Season

FOR ALL OPTIONS:

- Landowners must notify the Wasco County Soil and Water Conservation District of 2019 participation by February 15th.
 - Tatiana Taylor, Wasco County SWCD, 541-296-6178 x117
- Landowners must sign a contract with Wasco County Soil and Water Conservation District to receive compensation for FAST participation (note: not every option obligates irrigators to curtail irrigation; see below).
- Contract signing will take place by March 1st 2019.
- Landowners will be required to submit documentation to show their level of participation in FAST. Information on acceptable documentation will be provided at contract signing.

Option 1: Full Commitment

Landowners receive an upfront payment (per acre) for committing to curtail *all* water use for the specified water right(s) during a temperature alert. Commitment is for up to the number of baseline temperature alert days indicated for the priority date range of the water right. If there are days of temperature alert beyond the number of baseline temperature alert days, landowners have the option of receiving added compensation for the additional amount of water curtailed. This additional payment is based on documented volume and is disbursed at the end of the irrigation season.

- The landowner determines what water right(s) to enroll in this option.
- Upfront payment will be disbursed as soon as funding is received (anticipated date: end of June).
- Baseline temperature alert days are the average number of temperature alert days for a specific priority date range over a 9-year period of record.

Seniority	Price per acre	Baseline Days (curtailment commitment)	Payment Timing	Payment/Gallon for curtailment beyond baseline days	
1856-1865	\$60.00	19	Upon receipt of funding by TFT	Payment varies by month of alert	
1866-1909	\$45.00	15		June	\$0.0004
1910-1959	\$20.00	6		July/Aug./Sept.	\$0.0003

Option 2: No Commitment

Landowners decide on their level of FAST participation per temperature alert but make no upfront commitment to curtail water use. The amount of water curtailed, if any, is at the discretion of the landowner. Payment is based on proof of the actual amount of water curtailed, measured in gallons, and is disbursed at the end of the irrigation season. Compensation under Option 2 is limited to the amount of compensation Landowners would receive for the same water rights under Option 1.

- Landowners can decline to participate during a temperature alert with no penalty when enrolling in this option.
- Payment per gallon of water curtailed differs from month to month.

Payment Timing	Payment/Gallon for Water Actually Curtailed	
After irrigation season, upon proof of actual amount of water curtailed	Payment varies by month of alert	
	June	\$0.0004
	July	\$0.0003
	Aug.	
	Sept.	