



NOAA
FISHERIES

West Coast
Region

Federal Columbia River Power System Biological Opinion Adaptive Management Implementation Plan: Biological Indicator and Triggers Update

PURPOSE

In 2009, the Administration commissioned an independent, scientific peer review of the 2008 Biological Opinion for the Federal Columbia River Power System (FCRPS) and created the Adaptive Management Implementation Plan (AMIP) as an “insurance policy” for threatened and endangered salmon and steelhead affected by the FCRPS. The review concluded that the science underlying the FCRPS Biological Opinion was fundamentally sound and validated the many actions designed to improve fish passage, restore tributary habitat, control predators, and reform hatcheries. The AMIP added special precautionary measures in case climate change or other uncertainties lead to sudden or sharp declines in fish numbers.



Spring chinook salmon in fish ladder. Photo: Lance Kruzic, NOAA Fisheries

AMIP BIOLOGICAL INDICATOR AND TRIGGERS

NOAA Fisheries developed a specific biological indicator and two triggers to detect substantial departures from the expectations in the 2008 FCRPS Biological Opinion. The Early Warning Indicator and Significant Decline Trigger (page 2) focus on fish numbers, setting specific fish abundance thresholds. A third trigger focuses on sharp rates of declines in annual abundance trends over a 5-year period. The species tracked under the AMIP are Upper Columbia spring Chinook salmon, Upper Columbia steelhead, Snake River spring/summer Chinook salmon, Snake River steelhead, Snake River fall Chinook salmon, and the Yakima Major Population Group of Mid-Columbia steelhead (collectively, AMIP indicator species). Each trigger is defined as follows:

- **Early Warning Indicator:** The indicator is reached if the 4-year average abundance of naturally produced adult fish falls into the lowest 20 percent of fish returns during the Base Period (i.e., if 80 percent of the prior 4-year averages were higher than this number). The Base Period covers available data from 1908 through 2007 or 2008, depending on the AMIP indicator species.
- **Significant Decline Trigger:** This trigger is reached if the 4-year average abundance of naturally produced adult fish falls into the lowest 10 percent of fish returns during the Base Period ending in 2009 (i.e., if 90 percent of the prior 4-year averages were higher than this number).
- **Abundance Trend Trigger:** This trigger is reached if the 4-year average abundance of naturally produced adult fish falls into the lowest 50 percent of returns during the Base Period (i.e., if 50 percent of the prior 4-year averages were higher than this number); AND the trend in abundance (defined as the slope of the last 5 years of annual abundance estimates) falls into the lowest 10 percent of abundance trends in the Base Period (i.e., if 90 percent of the prior 5-year trends or slopes were higher than this number). This trigger could prompt either an Early Warning Indicator or a Significant Decline Trigger.

For more information on how the triggers are calculated, see [AMIP Appendix 4, Development Concepts for the Significant Decline Triggers and Early Warning Indicators](#).

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State and tribal fish and wildlife authorities report the abundance of naturally produced adult salmon and steelhead to NOAA Fisheries annually. NOAA Fisheries then compares the figures to the AMIP trigger metrics described above and reports the results to the agencies and the FCRPS Biological Opinion Regional Implementation Oversight Group (RIOG), a group of federal, state, and tribal sovereigns.

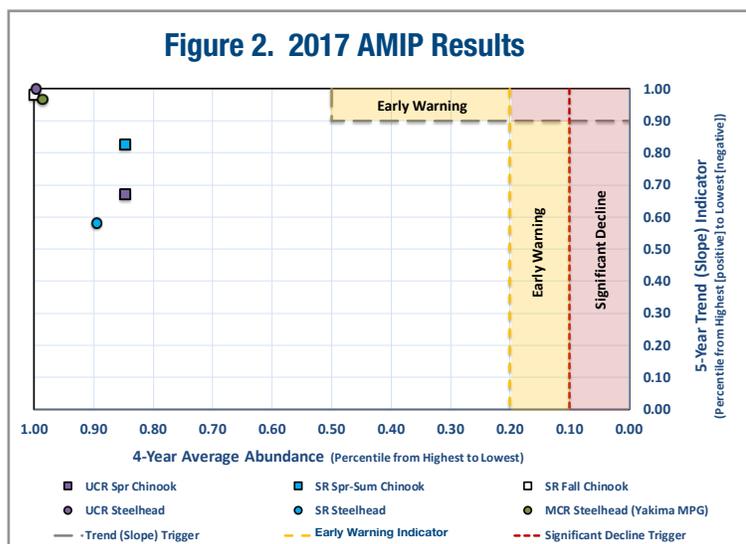
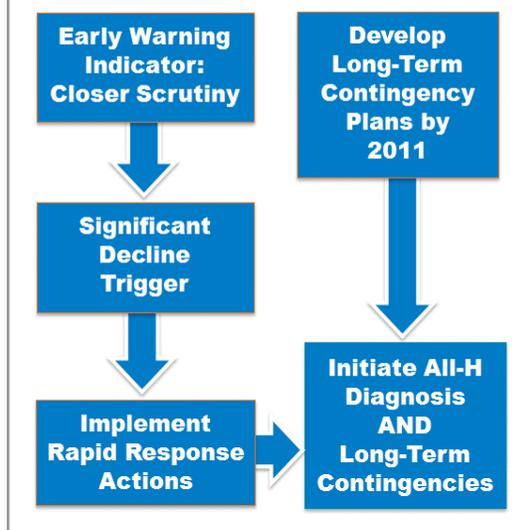
AMIP CONTINGENCY PROCESS

For AMIP indicator species, salmon and steelhead numbers that reach an indicator or trigger would prompt additional scientific scrutiny to determine the causes of declines in the abundance of naturally produced fish. Based on the particular species and conditions, potential Rapid Response Actions could include increased predator controls, certain harvest controls, safety net hatcheries, and modifications to hydrosystem operations, as well as an in-depth study within four to six months to determine if longer-term actions are warranted. See Figure 1 for an outline of this process. For more information on potential Rapid Response Actions, see [AMIP Appendix 5: Rapid Response Actions](#).

- **Reaching an Early Warning Indicator** would prompt an assessment of whether a future Significant Decline is likely to occur in the next one to two years and, if so, which Rapid Response Actions should be readied for possible implementation.
- **Reaching the Significant Decline Trigger** would prompt Rapid Response contingency actions; initiate an “All-H Diagnosis” to consider habitat, hatchery, harvest, and hydropower actions across the salmon life-cycle; and an evaluation of which potential Long-term Contingency Actions would be beneficial to the species in question. Potential Long-Term Contingency Actions include a study of Snake River dam breaching as a contingency of last resort.

See the agencies’ [Rapid Response and Long-Term Contingency Plan \(2011\)](#) for more information on this evaluation process and potential actions.

Figure 1. Adaptive Management Implementation Plan (AMIP) Biological Indicator and Triggers Process



CURRENT CONDITIONS FOR SALMON AND STEELHEAD

Decades of agency, state, tribal, and partnership efforts, such as completed habitat restoration projects, hydropower passage improvements, and improvements to hatchery practices, contributed to an overall upward trend in adult returns of salmon and steelhead through 2014. Favorable ocean conditions also benefited the fish. In the last few years, some salmon and steelhead populations have experienced declines as unusually warm ocean conditions affected much of the West Coast. Salmon and steelhead usually fare poorly during warm ocean conditions because the plankton that forms the base of the food web during such periods has less of the lipids, or fatty acids that help juvenile fish grow quickly. Recent research surveys have found that juvenile salmon numbers are low, and the fish are skinnier than usual. While recent salmon numbers have declined, they have not

dropped low enough, or sharply enough, to activate the AMIP early warning indicator, significant-decline trigger, or abundance-trend trigger.

2018 UPDATE ON AMIP BIOLOGICAL INDICATOR AND TRIGGERS

Figure 2 above shows current 4-year average abundance and 5-year trends for these AMIP indicator species relative to the Base Period metrics. The vertical dotted lines indicate the Significant Decline Trigger (red) and Early Warning Indicator (yellow). The dashed grey line indicates the combination of 4-year abundance and 5-year annual trends that would meet either an Early Warning Indicator or Significant Decline Trigger. As of 2017, none of the species activate the Early Warning Indicator, Significant-Decline Trigger, or Abundance-Trend Trigger.