

TO: Margaret Filardo, Fish Passage Center

FR: Nez Perce Tribe Department of Fisheries Resources Management and the Idaho Fish and Wildlife Conservation Office, U. S. Fish and Wildlife Service

RE: Fall Chinook Salmon Fry Emergence Timing along the Clearwater River lower reach

DATE: September 26, 2016

As per your request, we have put together of a range of fry emergence timing estimates for fall Chinook salmon in the Clearwater River lower reach. That reach extends from the confluence of the North Fork Clearwater to the upper end of the east arm of Lower Granite Reservoir. We also estimated fry emergence timing within the North Fork Ahsahka Islands stretch that extends from Dworshak Dam to the Ahsahka Island complex that is situated at the mouth of the North Fork Clearwater River and the upper end of the Clearwater River lower reach. It should also be noted that spring/summer Chinook salmon spawning in North Fork Clearwater River has been documented; their emergence would be 30 -45 days earlier than the fall Chinook production. In addition, steelhead spawning occurs in the North Fork Clearwater River in the spring.

Clearwater River Lower Reach

Spawn timing.—The number of flights made to count redds and the flight dates varied across the years 1991–2015. To provide a standard method for evaluating spawn timing among the primary spawning areas, the annual counts were placed into six survey intervals: 09/21–10/04 (the first, etc.), 10/05–10/18, 10/19–11/01, 11/02–11/15, 11/16–11/29, and 11/30–12/13. Within each survey interval, the median number of redds was calculated and those medians were plotted against the mid-date of each interval (Figure 1).

Emergence timing.—Temperature data were downloaded from the USGS Peck and Spalding gages located along the upper and lower ends of the Clearwater River lower reach when complete data sets were available ($N = 21$ years). The temperature regimes at those two locations were nearly identical, thus the Spalding data that were more complete were used here. To estimate emergence date for each survey interval, daily mean water temperature ($^{\circ}\text{C}$) was summed starting on the mid-date of each interval until the date that 1,000 temperature units were accumulated. That provided 21 emergence date estimates for each survey interval. Those 21 dates were used to calculate estimated emergence date distributions for each interval including the minimum, 5th percentile, 25th percentile, median, 75th percentile, 95th percentile, and maximum emergence date estimates (Figure 2). The redds counted during the first survey interval made up less than 1% of the total number of redds counted during 1991–2015. The earliest estimated emergence date for fry produced by spawning during the first survey interval

was 03/03 (Figure 2). See Figure 2 for the estimated emergence date distributions for the other five survey intervals.

North Fork Ahsahka Island Stretch

Spawner use.—The North Ahsahka Island stretch has been occupied by spawners every year since 1996. The majority of the redds counted have been counted within the Ahsahka Island complex (Figure 3). On average since 1996, the redds counted in the North Fork Ahsahka Island stretch have made up 14% of the total redds counted in the Clearwater River lower reach and North Fork Clearwater River. The amount of influence water released from Dworshak Dam has on developing embryos is dependent on where the redds are located. Redds located along the north channel of the islands are highly affected by Dworshak Dam operation compared to the redds located on southern, eastern, and western portions of the islands. The actual temperatures the embryos are exposed to have not been measured. For the purpose of this analysis, the redds were treated as one group and it was assumed that water temperature measured in the tailrace of Dworshak Dam represented the incubation temperatures in the redds.

Spawn timing.—See Figure 4.

Emergence timing.— The redds counted during the first survey interval made up 2.5% of the total number of redds counted during 1996–2015. The earliest estimated emergence date for fry produced by spawning during the first survey interval was 01/14 (Figure 5). See Figure 5 for the estimated emergence date distributions for the other five survey intervals.

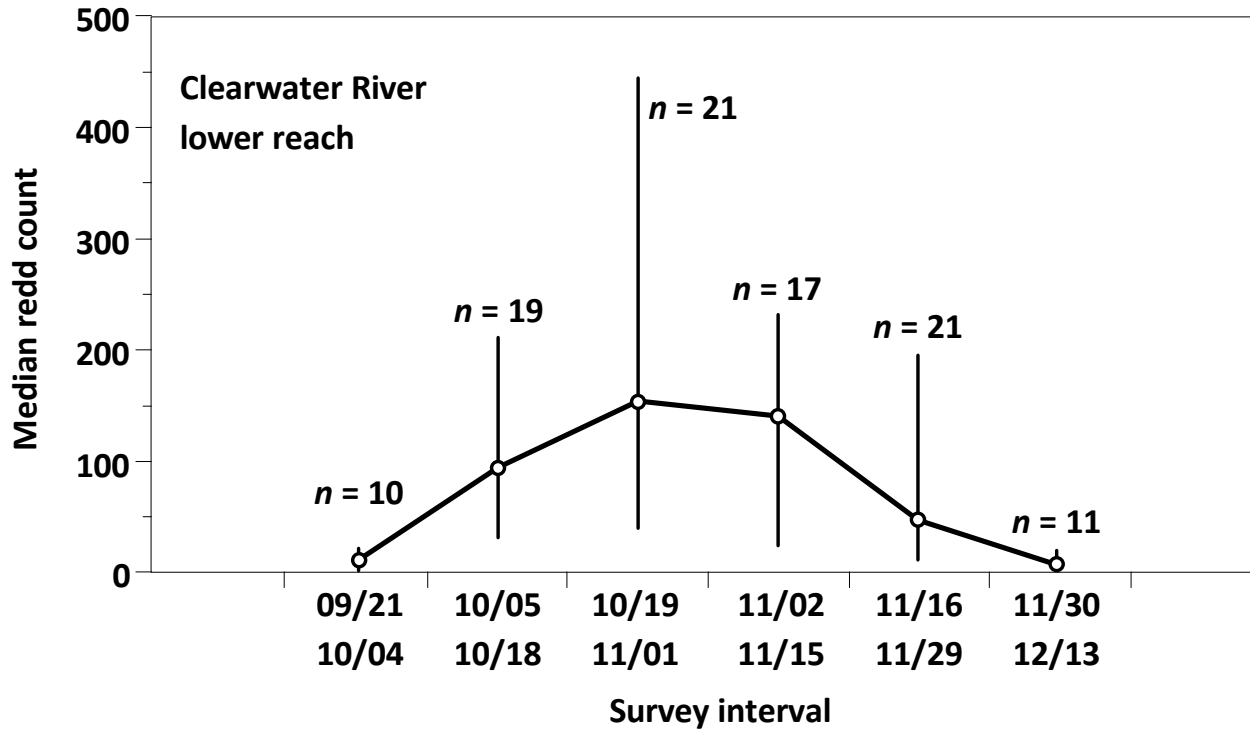


Figure 1.—The median number of newly constructed fall Chinook salmon redds counted in the Clearwater River lower reach during six survey intervals, 1991–2015. The whiskers span the 25th and 75th percentiles. The number years a helicopter flight was made during each interval (*n*) is also given. The data were collected by the Nez Perce Department of Fisheries Resources Management.

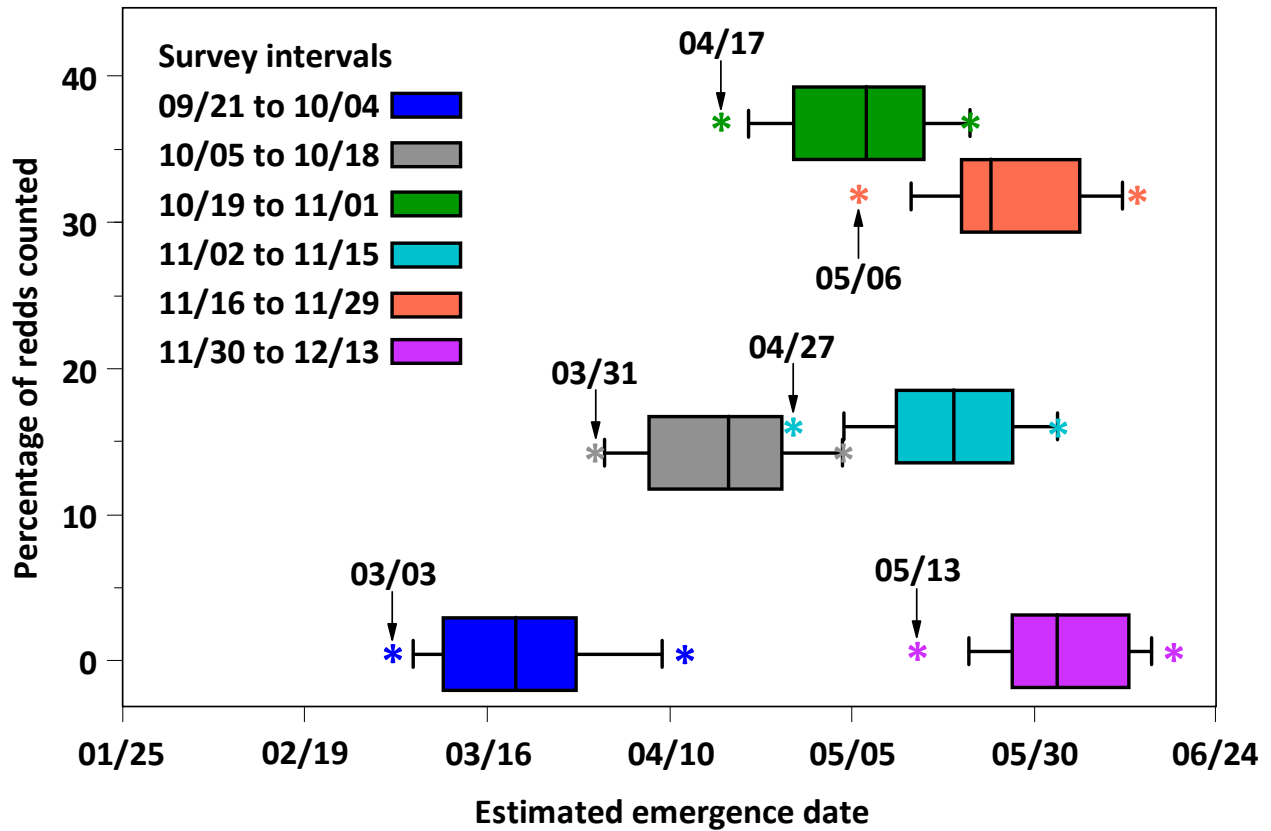


Figure 2.—Estimated emergence date of fry along the Clearwater River lower reach plotted against the overall percentage of the total redd count made during each survey interval. A sample size of 21 years of temperature data was used to calculate each emergence date distribution. The asterisks on the left of each whisker represent the minimum emergence date estimate, the left whisker extends to the 95th percentile, the left of each box extends to the 25th percentile, the horizontal line in each box is the median, the right of each box is the 75th percentile, the right whisker extends to the 95th percentile, and the asterisk to the right of that whisker is the maximum emergence date estimate.

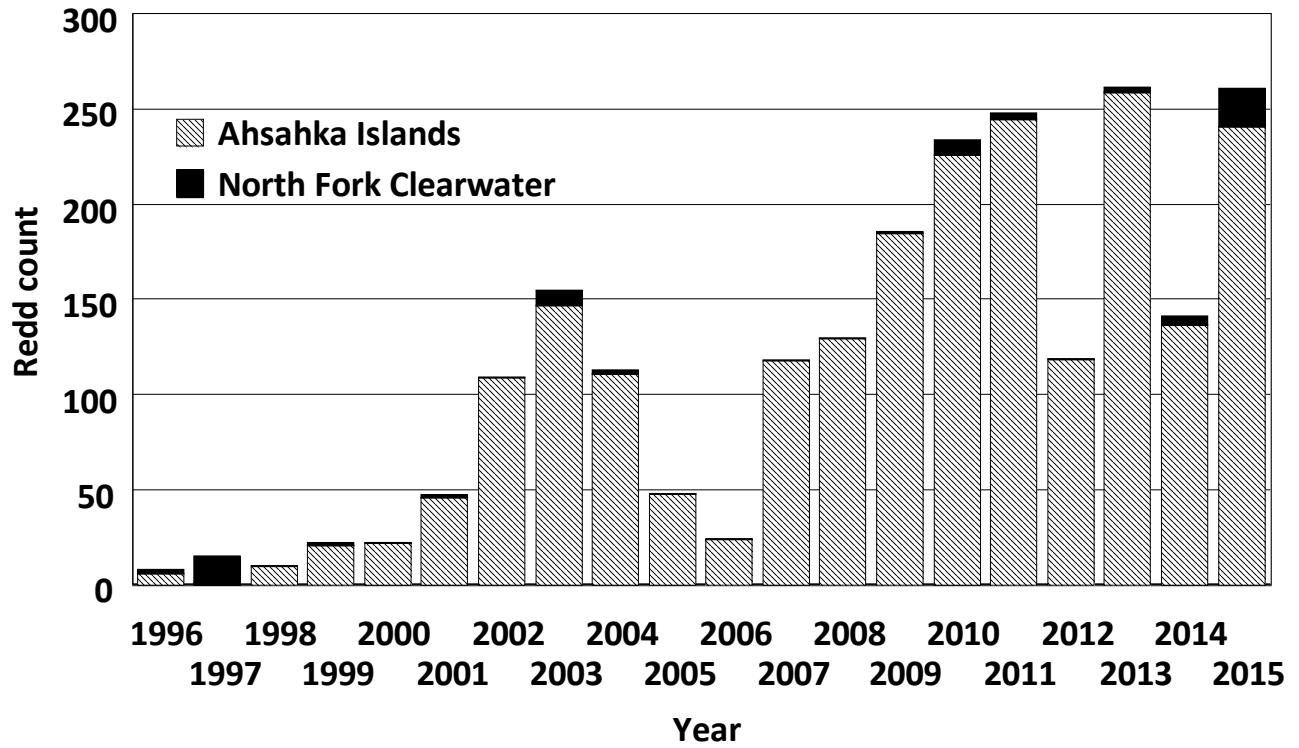


Figure 3.—The number of fall Chinook salmon redds counted in the Ahsahka Island complex and the North Fork Clearwater River, 1996–2015. The data were collected by the Nez Perce Department of Fisheries Resources Management.

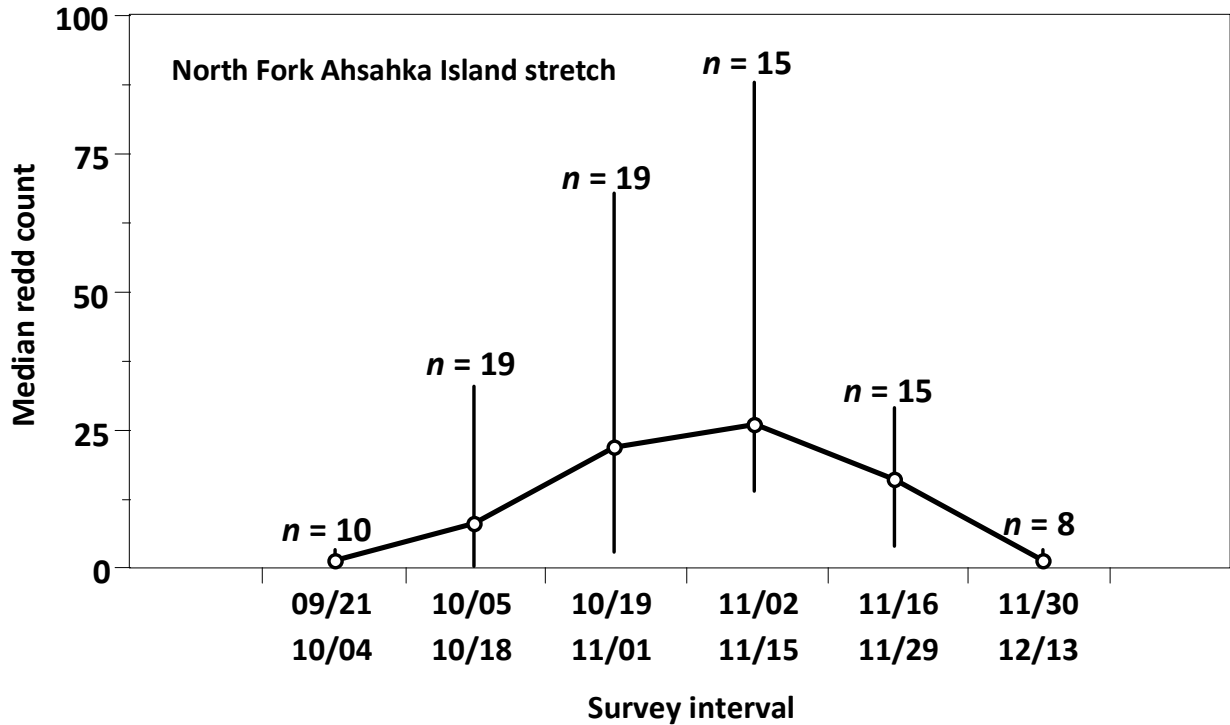


Figure 4.—The median number of newly constructed fall Chinook salmon redds counted in the North Fork Ahsahka Island stretch during six survey intervals, 1996–2015. The whiskers span the 25th and 75th percentiles. The number years a helicopter flight was made during each interval (*n*) is also given. The data were collected by the Nez Perce Department of Fisheries Resources Management.

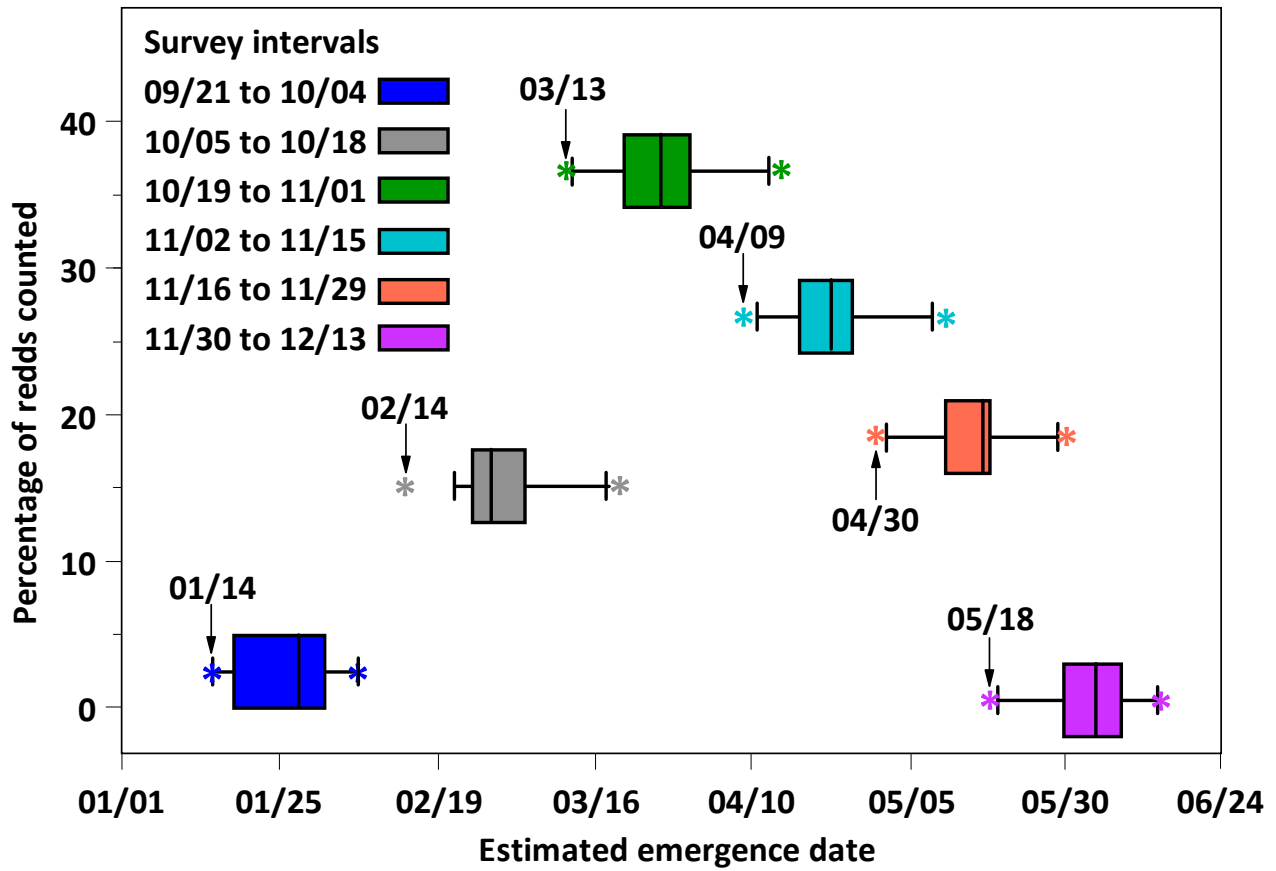


Figure 5.—Estimated emergence date of fry along North Fork Ahsahka Island stretch plotted against the overall percentage of the total redd count made during each survey interval in that stretch. A sample size of 20 years of temperature data was used to calculate each emergence date distribution. The asterisks on the left of each whisker represent the minimum emergence date estimate, the left whisker extends to the 95th percentile, the left of each box extends to the 25th percentile, the horizontal line in each box is the median, the right of each box is the 75th percentile, the right whisker extends to the 95th percentile, and the asterisk to the right of that whisker is the maximum emergence date estimate.