Appendix 68

Bull Trout Data for Hungry Horse and South Fork of the Flathead

Excerpt from: Environmental Assessment and Decision Notice For Bull Trout Sport Fishery Reestablishment In Hungry Horse Reservoir and South Fork Flathead River Drainage. 2003.

Bull Trout Monitoring

In the draft EA we provided bull trout redd count data for the South Fork drainage and gill net monitoring data from Hungry Horse Reservoir since 1958. Since the draft EA we have collected and are including two additional years of redd count data and gill net monitoring (Tables 1 and 2). These data further support our rationale for considering the reopening of a bull trout fishery. In an effort to provide additional review for the final EA decision, the Department also requested statistical researchers Mark Taper and David Staples from Montana State University to review and analyze data within the draft EA and comments from the USFWS (Appendix B).

A number of reservoir tributary streams utilized by spawning bull trout flow directly into HHR and the four selected index streams in Table 1 have been counted annually since 1993 to monitor trends. In the upper South Fork within wilderness, four additional index streams were selected to monitor trends and Big Salmon Creek is also counted as a disjunct population. Upper South Fork redd counts were conducted annually from 1993 to 1997 and then every other year.

From 1993 until present, total bull trout redd counts from the eight index streams in the South Fork demonstrated an increasing trend (Table 1). Linear regression analysis also displays this trend for the period (Figure 1). Not included in the total are counts from Big Salmon Creek because it is a disjunct population only representing the Big Salmon population. Linear regression analysis of all of the individual index streams is available in Appendix C. Wounded Buck Creek is the only index stream of the eight that has a declining trend, however the number of redds began to increase in 2001 after being low for two consecutive years.

Table 1. Summary of South Fork Flathead bull trout redd counts from index stream sections (1993-2001). Reservoir tributaries flow directly into HHR on the Flathead Forest and upper river tributaries flow into the South Fork within the Bob Marshall Wilderness. Big Salmon Creek is the bull trout spawning tributary for Big Salmon Lake that is considered isolated from the South Fork (disjunct).

Reservoir Tributaries

	1993	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Wounded Buck Cr.	22	29	34	41	14	5	3	3	9
Wheeler Cr.	12	10	1	3	1	4	12	23	25
Sullivan Cr.	25	8	-	52	50	54	55	45	51
Qintonkin Cr.	5	3	7	4	0	11	15	15	17
Totals	**64**	**50**	**42**	**100**	**65**	**74**	**85**	**86**	**102**

Upper Tributaries

	1993	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Youngs Cr.	40	24	34	74	43	--	85	--	61
Gordon Cr.	35	44	46	58	30	--	99	--	120

White R.	39	60	45	86	31	--	76	--	76
Little Salmon Cr.	56	47	43	134	100	--	138	--	111
Totals	**170**	**175**	**168**	**353**	**204**	**--**	**398**	**--**	**368**
Combined Total	**234**	**225**	**210**	**453**	**269**	**--**	**483**	**--**	**470**

Big Salmon Cr.

	1993	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Big Salmon Cr.	92	91	93	61	55	--	59	--	75

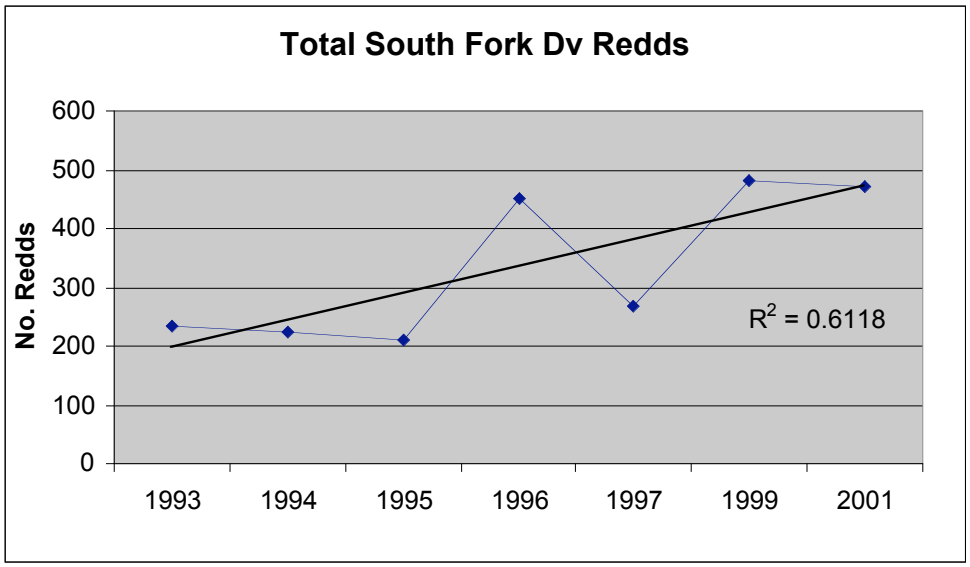

Figure 1. Bull trout redd counts and linear regression from eight index monitoring streams (1993-2001).

Redd numbers in Big Salmon Creek also have a slight negative trend over the period but have recovered steadily since the 1997 low of 55 (Figure 2). A count of 75 redds in 2001 brought numbers within 81 percent of the high count of 93 in 1995 which are within the range of variability.

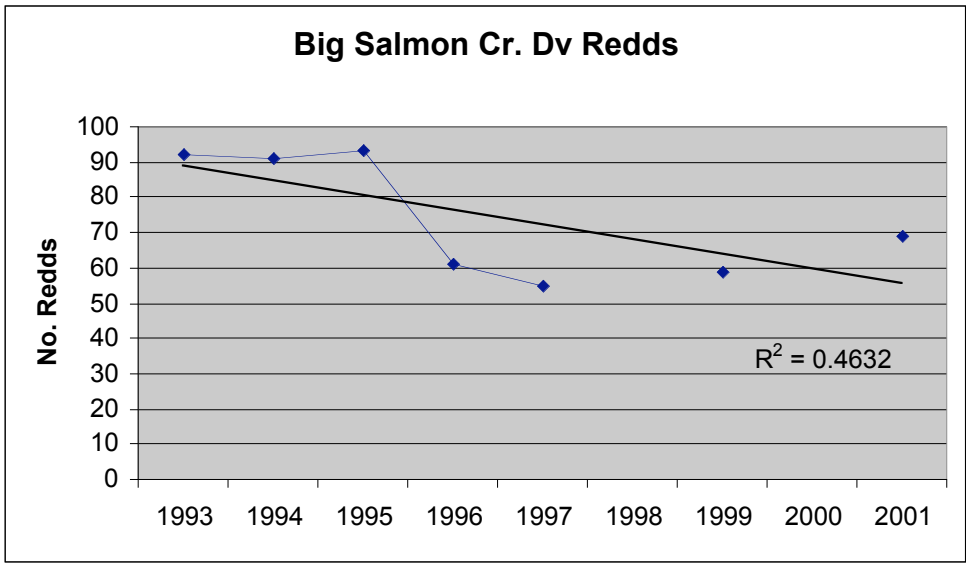

Figure 2. Big Salmon Creek bull trout redd counts and linear regression (1993-2001).

In 1993, all potential bull trout spawning streams (n=36) within the entire South Fork drainage were surveyed for bull trout redds. Redds occurred in 14 of the 36 streams surveyed and a repeat basin-wide survey was conducted in 1999 to quantify any significant changes in distribution. We estimate that index streams account for 85 percent of the total South Fork redds when comparing with basin-wide counts. Overall, 22 percent of the total South Fork drainage redds occur in HHR tributary streams with the remainder in upper South Fork wilderness streams.

There were some concerns raised in the comments on calibration of index stream counts, counter bias, and error due to species overlap. FWP feels that by conducting basin-wide counts on an approximate five-year interval that FWP is adequately assessing spawner distribution and potential changes. Utilization of nearly an identical crew over the entire survey period has minimized the potential for variation due to counter error or bias. No other fall-spawning trout are found in the South Fork, therefore bull trout redds cannot be confused with another species.

Bull trout redd counts for the entire SFFR display an increasing trend over the monitoring period extending from 1993 to 2001 (Table 1 and Figure 1). Increasing trends are exhibited for seven of the eight tributaries counted representing the South Fork population (Appendix C). Wounded Buck Creek is the only individual spawning tributary with a declining trend, however an increase occurred in 2001.

The Big Salmon population is treated as a disjunct population separated from the South Fork by Big Salmon Lake. Big Salmon redd counts (Table 1 and Figure 2) have a declining trend overall, however increases occurred in the last two count years and the 2001 count of 75 redds was 81 percent of the recorded high count of 93 in 1995.

Gill Net Monitoring

Montana Fish, Wildlife & Parks has used gillnetting to monitor fish population abundance, size-and-age structure, and community composition in HHR since 1958. Consistent sampling during this period provided data on long-term population trends and served as a baseline for current population assessments. Prior to 1983, gillnetting was conducted reservoir-wide during spring, summer, and fall seasons. From 1983 until present, three specific monitoring areas (Emery, Murray, and Sullivan) were netted depicting representative thirds of the reservoir. Over time, seasonal netting was reduced to only the fall series (May 1987, Deleray et al. 1999). Table 2 summarizes long-term bull trout mean catch per net in HHR from fall sinking nets. Due to an extensive historic netting program, bull trout net mortality has been significant in certain years when seasonal netting was conducted. Prior to 1993, annual bull trout net mortality averaged 247 per year during multi-seasonal netting. Not until net numbers and the fall series were standardized in 1993 did the bull trout net mortality drop substantially. After 1993, the average bull trout net mortality dropped to 69 annually (Table 3 and Figure 3).

The long-term trend indicates a steady increase in the number of bull trout per sinking net over time (Figure 3). In review and in an attempt to standardize bull trout netting data, Staples and Taper detected two apparent levels of equilibrium (Appendix A). From 1983-1993 bull trout appeared to fluctuate at a lower level, then from 1995-2000 a higher level was established. The upper level is likely due to lower gill net mortality and elimination of angler harvest since total fishery closure in 1995.

Table 2. Fall sinking gill net summary of bull trout catch in Hungry Horse Reservoir (number of bull trout per net) 1958-2001.

Year	Mean Catch Per Net
1958	6.9
1966	2.2
1968	2.3
1970	6.1
1972	4.6
1974	5.2
1976	3.7
1978	2.8
1983	1.9
1984	4.6
1985	3.3
1986	4.9
1988	7.0
1989	5.4
1990	5.5
1991	4.2
1992	6.5
1993	5.4
1994	7.3
1995	6.9
1996	7.2
1997	7.0
1998	7.5
2000	7.3
2001	8.9

Table 3. Estimated bull trout gill net mortality in HHR 1983-2000.

Year	Season Netted	No. Gill Nets	No. Bull Trout Captured
1983	Sp, S, F	294	125
1984	Sp, S, F	345	374
1985	Sp, S, F	302	336
1986	Sp, S, F	342	451
1987	Sp	114	265
1988	Sp, S, F	171	336
1989	Sp, S, F	171	261
1990	Sp, S, F	99	128
1991	Sp, S, F	99	134
1992	S, F	55	59
1993	F	21	53
1994	F	21	75
1995	F	21	67
1996	F	21	67
1997	F	21	73
1998	F	21	74

2000	F	21	77

Key: Sp = Spring; S = Summer; F = Fall

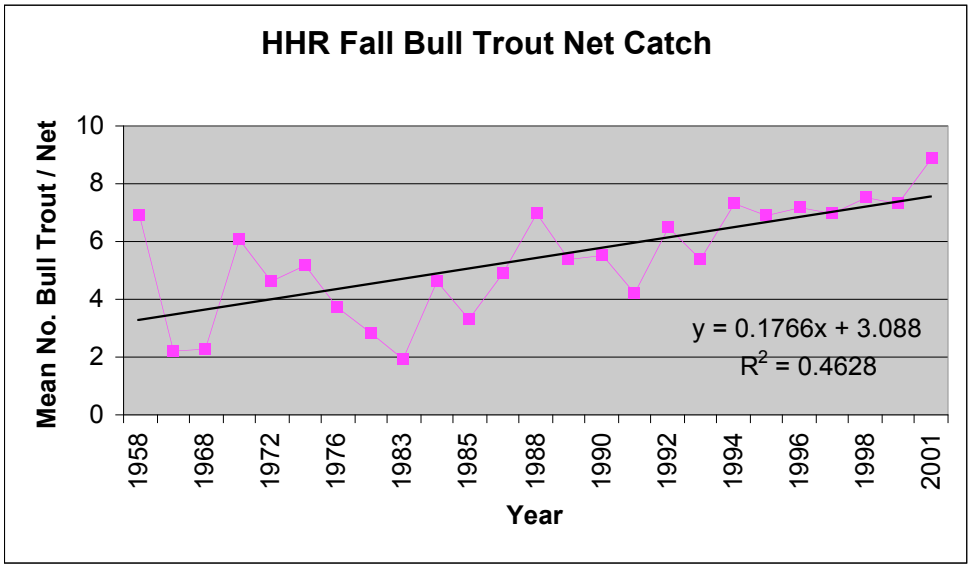

Figure 3. Fall sinking gill net summary of bull trout catch in Hungry Horse Reservoir and linear regression (1958-2001).

Fishing Regulations

Increasingly protective regulations (Table 4) have been used to maintain a healthy bull trout population in SFFR based on monitoring indices. Complete closure of all waters to bull trout fishing except Swan Lake in 1995, eliminated all legal harvest of bull trout in Montana, including the SFFR.

Table 4. South Fork Flathead and Hungry Horse Reservoir bull trout regulations summary.

Year	Bull Trout Regulation
Pre-1959	15 fish, not >10 lb. & 1 fish, 18” minimum
1959	10 fish, not >10 lb. & 1 fish, 18” minimum
1982	Streams – 1 bull trout, 18” minimum; Lakes – 18” minimum
1985	Streams & Lakes – 1 bull trout per day
1990	Streams & lakes – 1 bull trout per day, immediate kill or release
1992	Close all waters to taking of bull trout except HHR and Swan Lake
1995	Close all waters except Swan Lake

Angling Pressure and Harvest

Hungry Horse Reservoir

Angler pressure and harvest levels for HHR and SFFR have been randomly evaluated in past years. Statewide mail creel surveys are now conducted every two years in an effort to depict trends. Trends for HHR do not show a steady increase in angler pressure (Table 5). In the 1980s pressure varied between 5,397 and 9,472 angler-day per fishing season. In the early 1990s pressure reached a high of 8,043 and a low of

2,423 angler-days. After closure of the bull trout fishery in 1995, pressure ranged between 3,824 and 8,433. In 2001, the estimated pressure reached 6,484 angler-days.

Other measures of angler use included a creel survey between May and October of 1986. During this survey May (1987) predicted a bull trout harvest of 2,168 fish utilizing the 1985 mail creel survey pressure. This estimate lacks accuracy due to confidence limits of ±3,800 man-days (Bob McFarland, pers. comm.) and catch and harvest were not differentiated. Catch rates for bull trout during the 1986 creel survey were estimated at 0.15 per angler day (3.5 hours per angler day).

Summary comments by May (1987) indicate that HHR attracted mostly local anglers (91 percent from Flathead County) who spent only nine percent of their effort targeting bull trout utilizing lures or lures and bait combination.

Table 5. Hungry Horse Reservoir mail creel survey angler pressure estimates.

Year	Pressure
1982	8,399
1983	9,472
1984	5,397
1985	6,071
1989	7,511
1991	8,043
1993	2,423
1995	3,824
1997	8,433
1999	7,568

South Fork Flathead River

In 1983, a creel survey of the South Fork Flathead River enumerated 1,082 anglers that spent an estimated 1,839 angler-days on the river. During that period, 151 bull trout were harvested at a catch rate of 0.05 per hour or 0.18 per angler day. Fifty-three percent utilized flies or lures, sixteen percent bait and thirty-one percent used a combination of flies, lures, and bait.

In 1988 and 1989 a wilderness survey interviewed anglers to determine that bull trout were caught at a rate of 0.015 per hour.

Mail Creel

Statewide mail creel surveys conducted for the SFFR indicate an ever-increasing use trend. During the 1980s pressure ranged between 991 and 4,555 angler days per year averaging 2,757 days. In the 1990s use ranged between 2,974 and 11,488 angler-days, averaging 8,162.

Comparison to Swan Lake

A comprehensive year-long creel survey was conducted on Swan Lake during 1995 (Rumsey 1996) which contains a healthy and stable bull trout population. The mean annual bull trout catch rate was 0.3 fish per day with a harvest rate of 0.04 per day. Anglers released an average of 86 percent of the bull trout caught and only 53 percent of harvested fish were adults. Many anglers voluntarily released legal fish.

We estimate daily catch rates for bull trout will approximately 0.15 in HHR and 0.18 in the SFFR based on creel survey data. Similarly, we assume approximately 50 percent of harvested fish are sub-adult bull trout and that anglers would voluntarily release many legal fish, further reducing impacts to the population.