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Angler Survey of Experimental Recreational Bull Trout Fishery for Hungry Horse Reservoir and South Fork Flathead River, Montana for the 2010-2011 season

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The author would like to thank the R-1 support staff for their efforts in processing bull trout catch card applications and for informing anglers of the proper catch card procedures. Additionally, R-1 fisheries personnel Chris Caye and Scott Hawxhurst were instrumental in the completion of this survey. I would also like to thank Bob McFarland, for his efforts associated with the angler survey and study design.

SUMMARY

In 2004, Montana Fish, Wildlife and Parks (MFWP) applied to the U.S. Fish and Wildlife Service (USFWS) for authorization to allow a limited sport fishing season for bull trout (*Salvelinus confluentus*) under Section 10(a)(1)(A) of the Endangered Species Act for fisheries deemed to have reached recovery goals. The USFWS permitted fishing for bull trout on Hungry Horse Reservoir (HHR), South Fork Flathead River (SFF) and Lake Koocanusa (LK) per the regulations proposed by MFWP, which allowed angler harvest of up to 300 fish from HHR and catch and release but no possession from SFF. The permit also requires a bull trout permit and catch card system, angler survey and development of educational information pertaining to these new fisheries.

The 2010 angling season represents the seventh year of permitted fishing for bull trout in HHR and SFF. Beginning in 2009, anglers were required to choose between acquiring catch cards for either HHR/SFF or LK. This allowed for better separation of data between the two drainages, and likely more accurate survey information. In past surveys, it appeared as though anglers were acquiring both catch cards out of convenience rather than necessity, which increased survey needs and may have biased past data. During the 2010 season, a total of 1,008 anglers secured permits to fish for bull trout in HHR and SFF. This only a slight decrease from 1,040 in the 2009 season. Angler survey results estimated 1,225 angler days pressure on HHR and 877 days on SFF, representing a decrease in angling effort compared with the previous season. Bull trout catch estimates were 792 for HHR with an estimated harvest of 75 fish, well below the USFWS authorized take of 300 bull trout. In the SFF, an estimated 400 bull trout were caught and released. This represented a slight increase in bull trout catch in SFF despite a decrease in angling pressure.

INTRODUCTION

We conducted an angler mail survey for the recreational bull trout fisheries on HHR, SFF and LK for the 2010 season. These fisheries are regulated by Montana Fish, Wildlife & Parks (MFWP) under special permit by the U.S. Fish and Wildlife Service (USFWS) due to listing of bull trout as a "threatened species" under the Endangered Species Act in 1998.

BACKGROUND

Bull trout were listed as "threatened" under the Endangered Species Act in 1998. At the time of listing, sport fishing for bull trout was continued only in Swan Lake because of stable populations.

Under special permit, in 2004 the USFWS authorized sport fishing for bull trout on HHR, SFF and LK (Rumsey et al. 2005). This activity was intended to benefit the species by measuring the effects of restoring recreational fishing and by increasing public support for management of bull trout populations in the identified water bodies, which were deemed to have reached recovery goals. Public support is essential for restoration of bull trout habitat and for other management activities that will increase the distribution and abundance of bull trout populations throughout the state.

METHODS

Conditions of the USFWS special permit (TE-077533) for new bull trout fisheries contained specific items agreed upon by both USFWS and MFWP. Part of the conditions called for the development and use of a harvest catch card. Also required was a formal survey of anglers participating in these experimental bull trout fisheries. Educational materials were also developed to explain catch card use, bull trout identification, seasons, limits, and regulations pertinent to each fishery and bull trout conservation measures.

Bull Trout Permit Application

The first step of developing a catch card harvest authorization involved creating an application for anglers who wanted to fish for bull trout. This form was made available through the Region 1 MFWP office and over MFWP's web site. The application required the angler's name, address, automated licensing system (ALS) number and permit area (waters) that they chose to fish. In 2007 anglers were given the choice of two catch cards. Separate catch cards were issued for (1) HHR/SFF and (2) LK. However, anglers still had the option of obtaining both catch cards. Beginning in 2009, anglers were only allowed to obtain one catch card, and had to choose between the two drainages. This rule remained unchanged in 2010. All applications had to be submitted to the Region 1 FWP office in Kalispell. There was no charge for the bull trout catch card.

Bull Trout Catch Card

After processing a completed application, a permit and numbered catch card for either water body were issued to each individual. The catch cards provided general instructions for anglers fishing for bull trout on HHR, SFF and LK. The cards required entry of the catch zone, fish length, month and day of catch for each fish harvested in HHR and LK and for each fish caught and released in SFF.

Upon landing a bull trout, an angler must either immediately release or legally harvest the fish. Immediately upon harvesting a bull trout from a permitted water, anglers must record the required information in ballpoint pen and notch out a triangle on the line for each fish.

Bull Trout Angler Mail Survey

As in previous seasons, we felt we could obtain more thorough and accurate estimates by conducting a survey of catch card holders (Hensler et al. 2005; Rumsey et al. 2005; Hensler and Benson 2006; Rosenthal and Hensler 2008; Rosenthal 2009; Rosenthal 2010) rather than rely solely on catch card returns. The survey was sent to all individuals who obtained a catch card, contrasting what was done in 2007 when the survey was sent only to anglers who did not return their catch cards by a certain date. The survey asked anglers to enter the information recorded on their catch card including whether the angler fished for bull trout or not and the number of days fished per validated water. The survey also requested specific catch card information pertaining to harvested or released fish by date, zone and size of fish. Beginning in 2009, anglers were asked to keep their catch card until they received the survey. This allowed anglers to simply transfer their catch card data to the survey, leading to less duplicate and erroneous data.

RESULTS

Bull Trout Catch Cards

Catch card instructions asked anglers to return them with their survey, after using the card to answer survey questions. However, by August of 2011 we had received 50 catch cards of the 1,008 cards issued (5.0% return) and added these data to the angler survey data.

Bull Trout Angler Mail Survey

We mailed the angler survey to 1,005 of the 1,008 anglers that obtained catch cards. Card holders from Canada (2) and Great Britain (1) were not sent surveys to simplify mailing procedures. The surveys were sent out on December 15, 2010, as the catch and release season on SFF had already closed and angling on HHR was likely done for the season. By July 26, 2011 we had received 525 surveys which when combined with the 50 catch cards returned to the R-1 office resulted in a 57% return rate. In previous years we sent out a reminder mailing to anglers that had not responded by a certain date. This year reminders were not mailed as a result of departmental changes associated with this survey. However, in previous years the reminder

mailing resulted in only slight increases in return rates and the data used for this year should be considered representative of all years of the survey.

Angler Preferred Waters

The total number of catch cards issued for the 2010 season decreased for the third consecutive year with 2,080 cards being issued between the two drainages (HHR/SFF and LK). Starting in 2007, anglers were given the choice of two separate catch cards, but were still allowed to obtain catch cards for both drainages (Table 1). However, in 2009 a new regulation required anglers to choose between the two drainages, and obtaining both catch cards was not allowed. The 2010 total of 1,008 catch cards issued for HHR/SFF was similar to the total issued in 2009 (1,040).

Table 1. Bull trout waters selected by anglers from bull trout permit applications 2004 - 2010

Waters Selected	Number Selected **2004**	% of Total **2004**	Number Selected **2005**	% of Total **2005**	Number Selected **2006**	% of Total **2006**	Number Selected **2007**	% of Total **2007**	Number Selected **2008**	% of Total **2008**	Number Selected **2009**	% of Total **2009**	Number Selected **2010**	% of Total **2010**
All (HHR, SFF, LK)*	1,200	42	1,034	41	846	39	917	39	801	33	-[c]	-	-	-
LK Only	1,040	37	911	36	768	35	817	35	901	38	1,181	53	1,072	52
HHR Only	125	4	103	4	76	3	-[a]	-	-[a]	-	-[c]	-	-	-
SFF Only	95	3	115	4	154	7	-[a]	-	-[a]	-	-[c]	-	-	-
HHR and SFF	215	8	194	8	170	7	602	26	702	29	1,040	47	1,008	48
LK and SFF	36	1	19	1	11	1	-[a]	-	-[a]	-	-[c]	-	-	-
HHR and LK	147	5	146	6	184	8	-[a]	-	-[a]	-	-[c]	-	-	-
Total Cards Issued	2,858	100	2,522	100	2,209	100	2,336	100	2,404	100	2,221	100	2,080	100
Total Validations that included HHR	1,687	59	1,477	59	1.276	58	1,519[b]	65[b]	1,503[b]	63[b]	-[c]	-	-	-
Total Validations that included SFF	1,546	54	1,362	54	1,181	53								

* HHR = Hungry Horse Reservoir, SFF = South Fork Flathead River, LK = Lake Koocanusa

[a] – Because of separate cards, anglers had only three possible combinations in 2007 and 2008

[b] – Anglers were given one card for HHR and SFF in 2007 and 2008.

[c] – Beginning in 2009 anglers were able to obtain only one catch card. Anglers must choose between LK and HHR/SFF.

The total number of catch cards issued between LK and HHR/SFF decreased to the lowest number observed since the opening of the fishery (2,080). However, the proportion of validations by drainage has remained relatively consistent over all years surveyed. Prior to 2009, the majority of anglers chose to obtain catch cards for all three waters (LK, HHR, and SFF). Because this option was discontinued in 2009, we were able to better disseminate angler use by drainage. When separated by drainage, 48% of anglers selected the combination of HHR and SFF, with LK receiving a slightly higher percentage (52%) (Table 1).

Angler Demographics

Consistent with previous years, the majority (81%) of permitted bull trout anglers for HHR and SFF were Montana residents. Non-resident anglers for HHR/SFF were primarily from the states of California (17%), Georgia (9%), New York (6%), Colorado (5%), Washington (5%), and Pennsylvania (5%) with remaining anglers from 38 other states, 1 Canadian province and one angler from Great Britain.

Fishing Pressure Estimates

Survey results revealed that bull trout anglers fished 699 days on HHR and 500 days on SFF during the period surveyed (Table 2). To estimate total bull trout pressure, we used the number of anglers and angler days reported by survey respondents who fished for bull trout (Hensler et al. 2005; Rumsey et al. 2005; Hensler and Benson 2006; Rosenthal and Hensler 2008; Rosenthal 2009; Rosenthal 2010). For non-responding anglers we assumed the same proportion fished for bull trout with the same effort (Table 2). Estimated pressure for HHR increased slightly from the previous year, as did the estimated pressure for SFF. This slight increase in pressure in SFF documents the highest level observed since the beginning of this regulated fishery and represents an increasing trend in use. The increase in pressure for SFF is also compressed into a shorter time period due to a regulation change shortening the catch and release season by two weeks. This regulation change was in response to elevated water temperatures in late July as a result of drought.

Table 2. Bull trout season pressure estimates extrapolated from angler survey results for HHR and SFF 2004 - 2010.

	Angler Days of Fishing Pressure			
	Hungry Horse Reservoir		**South Fork Flathead**	
Year	From Survey	Estimated	From Survey	Estimated
2004	935	1,650	411	725
2005	679	1,314	426	793
2006	694	940	603	897
2007	916	1,218	489	650
2008	983	1,211	861	1,060
2009	858	1,322	748	1,152
2010	699	1,225	500	877

Bull Trout Catch and Harvest Estimates

Bull trout anglers again reported catch and harvest by zone for HHR and SFF in 2010 (Figures 1 and 2). Similar to previous seasons, the majority of bull trout caught in HHR were caught in the middle and southern zones (Zone B and C) (Figure 1). In previous seasons, we have seen a higher catch proportion to occur early in the season in both the middle and southern zones due to staging and progressive spawning movements up river.

For the South Fork Flathead River, only catch and release fishing is allowed for bull trout (Figure 2). Catch by zone continues to be similar through all years in that during May and June, catch was mostly in zone "A", the lowest and most accessible portion of the river. During July and August, catch progressed somewhat up river into more remote areas of wilderness where access is limited. Surprisingly, anglers reported catching 10 bull trout during the month of August even though the catch and release season ended July 31. The anglers' names were passed on to law enforcement for fishing outside the season, though it is likely that several of the fish may have been caught inadvertently while fishing for cutthroat.

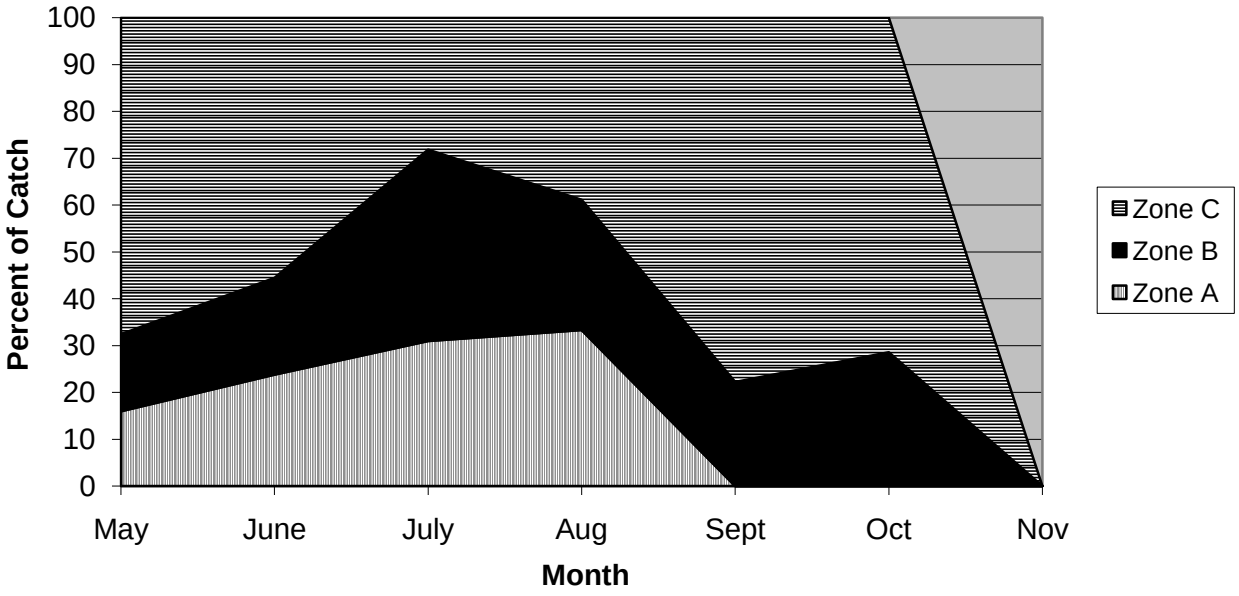

Figure 1. Hungry Horse Reservoir (HHR) bull trout reported catch by zone, from angler survey, 2010. Zone A equals the northern portion of HHR, Zone B is central, and Zone C is the southern portion. Zones are mapped in the Bull Trout Pamphlet, (Rumsey et al. 2005).

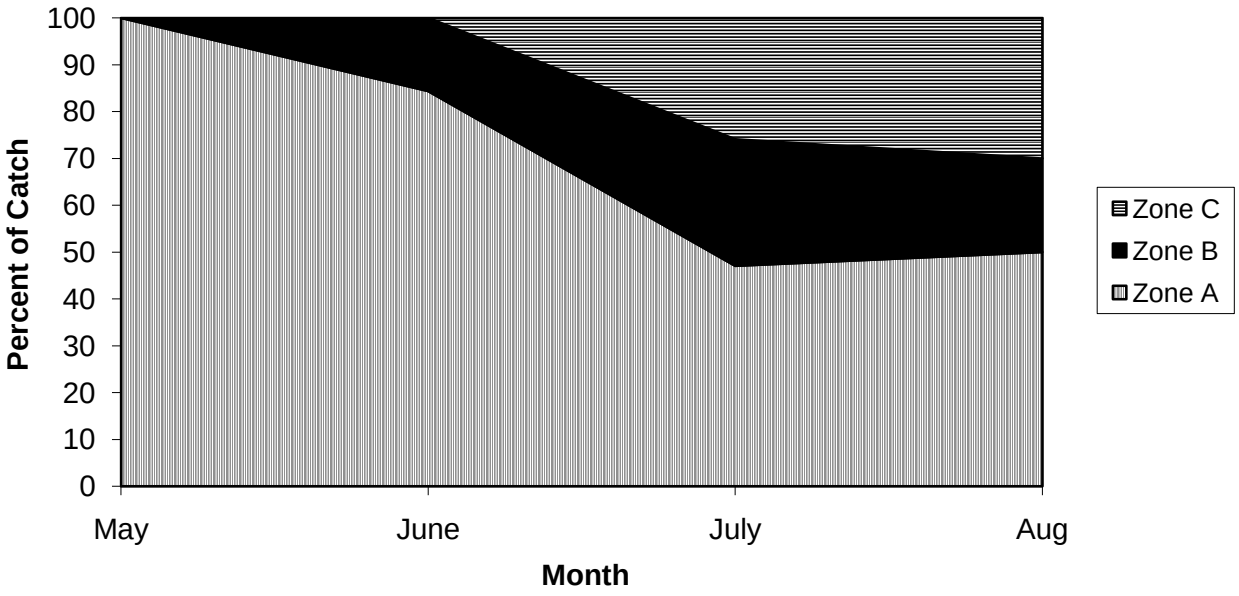

Figure 2. South Fork Flathead (SFF) bull trout reported caught and released by zone, from angler survey, 2010. Zone A equals the northern portion of SFF, Zone B is central, and Zone C is the southern portion. Zones are mapped in the Bull Trout Pamphlet, (Rumsey et al. 2005).

Total catch and harvest estimates for each water were derived for non-respondent anglers. Catch from estimated pressure was added to catch reported from the angler survey assuming equal catch rates (Hensler et al. 2005; Rumsey et al. 2005; Hensler and Benson 2006; Rosenthal and Hensler 2008; Rosenthal 2009; Rosenthal 2010) (Table 3). For HHR in 2010, an estimated 792 bull trout were caught and 75 harvested, with 90% released. The total catch and harvest estimates from 2006-2008 are likely more accurate than 2005 because we were able to better separate validations those years. However, they still should be viewed with some caution because they include validations for all three systems, and non-responding anglers may not have fished at HHR. In contrast, estimates from 2009 on, more accurately represent true catch and harvest rates because anglers were forced to choose between the two drainages (HHR/SFF and LK). In the SFF, 220 bull trout were caught and released by surveyed individuals. An estimated total of 400 bull trout were caught and released over the 2010 season (Figure 3).

Table 3. Estimated bull trout catch and harvest for Hungry Horse Reservoir through the 2010 season. The lower bound for these estimates represents the known catch and harvest from surveyed individuals.

Year	Bull Trout Caught	Upper Bound (95% CI)	Lower Bound (Known)	Bull Trout Harvested	Upper Bound (95% CI)	Lower Bound (Known)
2004 – 2005	355	--	201	48	--	27
2005 – 2006	2154	2167	778	58	59	44
2006 – 2007	623	627	460	56	57	43
2007 – 2008	533	535	402	57	57	44
2008 – 2009	621	624	502	74	75	60
2009 - 2010	832	839	540	97	98	63
2010 - 2011	792	801	452	75	77	43

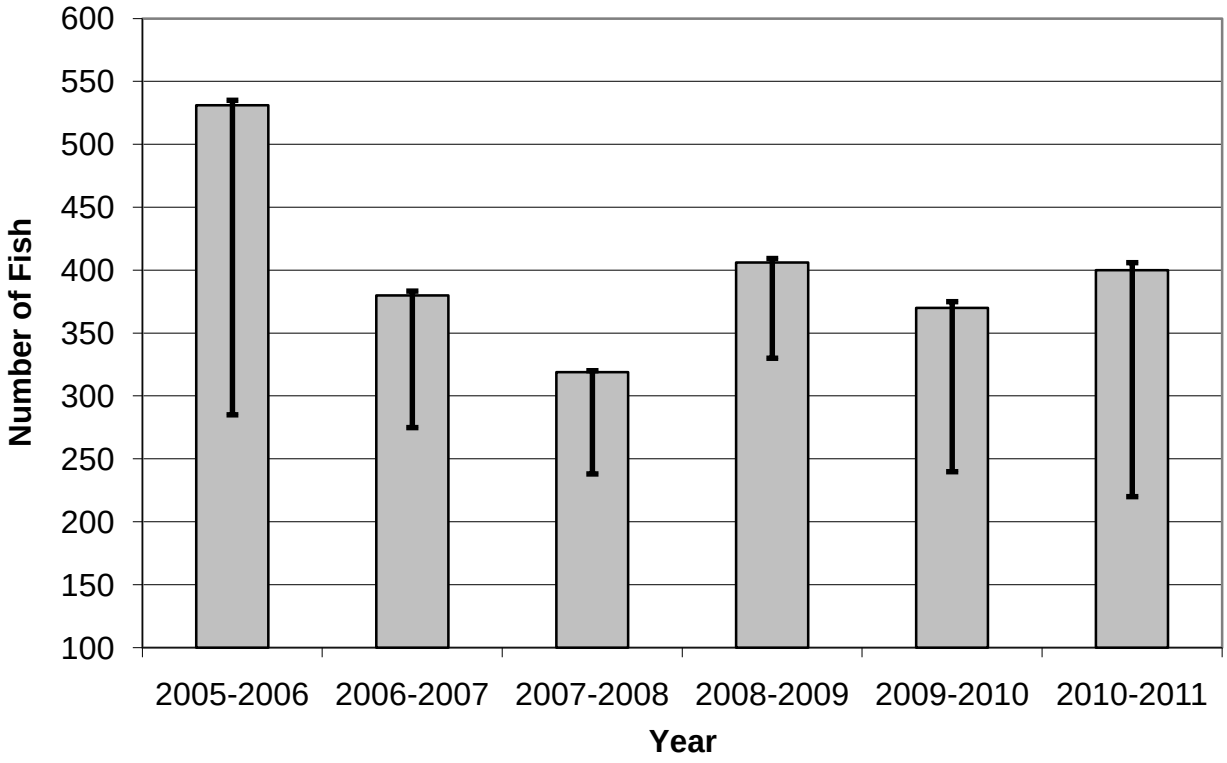

Figure 3. Estimated numbers of bull trout caught and released in the South Fork Flathead River through the 2010 season. Error bars represent the 95% confidence intervals (upper bound) and the known bull trout catch from surveyed individuals (lower bound).

Included in the catch and harvest data, anglers also recorded lengths of bull trout caught by water. Length frequency distributions for HHR (Figure 4) depict the size of bull trout harvested

or released by anglers. The distribution of bull trout harvested and released for HHR was similar to the previous season. Anglers continue to select for the larger fish (≥18") for harvest. Consistent with the previous seasons, the distribution of bull trout caught and released from SFF has shifted back to smaller sizes from those observed in 2005 (Table 4).

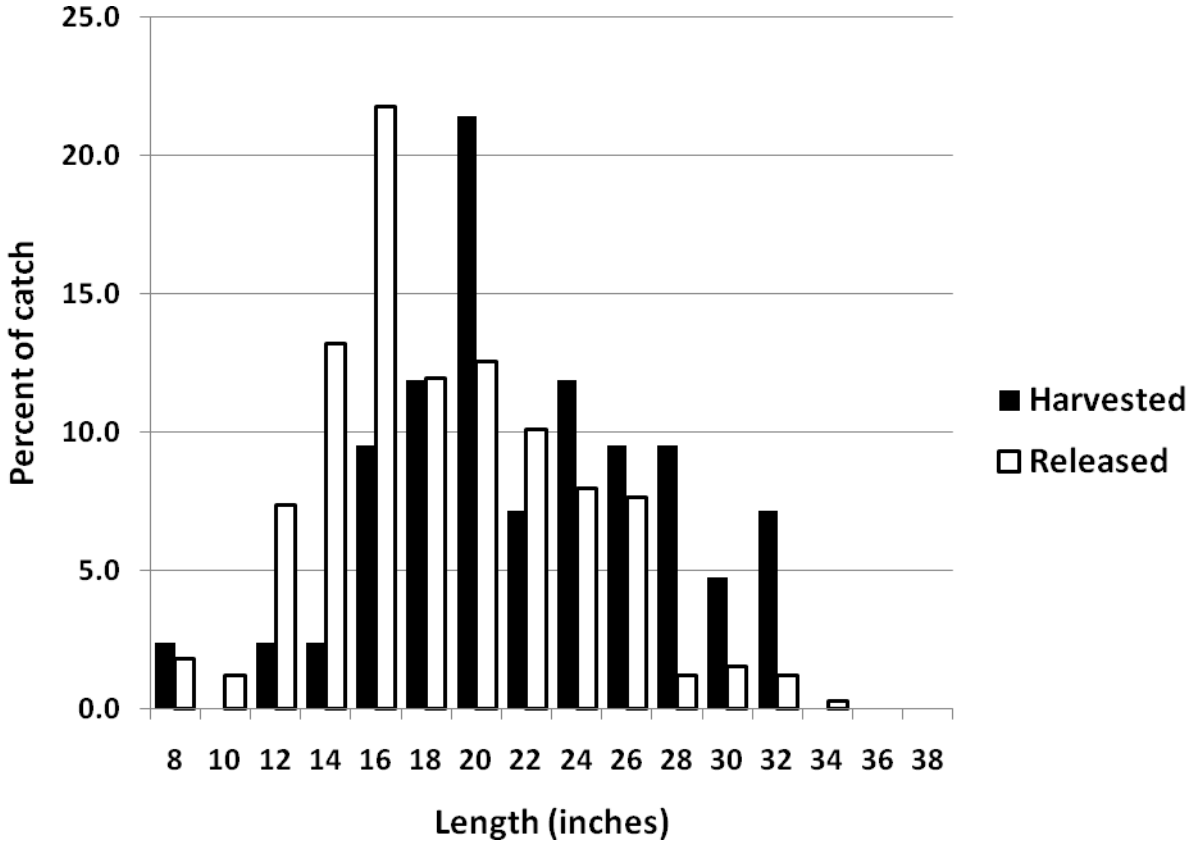

Figure 4. Length frequency histogram of bull trout harvested and released by percent for Hungry Horse Reservoir, 2010.

Table 4. Lengths of caught and released bull trout from the South Fork Flathead River 2004-2010. Lengths are measured in inches.

Year	Minimum	Maximum	Mode	Mean	Standard Deviation
2004	10	38	20	23.75	5.91
2005	6	38	28	22.50	6.48
2006	8	40	18	21.43	6.18
2007	11	38	24	23.39	4.86
2008	9	36	28	22.49	6.71
2009	8	42	18	20.72	6.02
2010	6	36	22	20.75	5.63

Catch Card Violations

A total of 322 catch cards were returned to MFWP by August of 2011. Of those, we found technical violations on 13 cards (4.0%). This is slightly less than that of 2009 (7.2%) and consistent with what was observed in 2007 (3.5%) and 2008 (3.9%). This is a considerable decrease from the 2006 survey (19.2%). The majority of violations continue to be combinations of failure to notch the card for fish kept (n=10), and not signing the catch card (n=3). Violations for not signing the catch card have decreased substantially since the Region 1 front desk staff have asked anglers to sign them upon reception. Unsigned cards were typically those that were mailed to individuals. There were several anglers who reported catching (and releasing) bull trout after the closing date in the SFF. Some of these anglers may have simply been fishing for cutthroat and inadvertently caught bull trout and marked them on their catch card. However, it is possible that some anglers may have been intentionally fishing outside the season. All violations were submitted to Region 1 Enforcement Division for follow-up, and letters were submitted to those that did not notch their cards and those that did not sign the catch card.

DISCUSSION

Provisions of the USFWS special permit authorized an angler take of up to 300 bull trout from HHR and catch and release only in the SFF for the 2010 season. Although the overall number of anglers participating in the experimental bull trout fishery has decreased since the inception of the catch card program, estimated catch and harvest for HHR and SFF remained consistent with past seasons. Catch cards and angler surveys estimated HHR bull trout harvest at 75 fish. The 2010 harvest estimate is well below the permitted number of 300 fish and considerably lower than the estimated harvest in 2009 (97 fish). This low level of harvest has remained consistent through the seven years of the fishery, suggesting that anglers are being conservative with regard to the species' status. HHR gill net monitoring, as well as SFF bull trout redd counts and juvenile population estimates will continue to be conducted to evaluate population trends. This year (2011) represents a year in which basin-wide redd counts will be conducted, thus increasing our confidence in estimating adult bull trout density. Basin-wide redd surveys were postponed the past few years because of a fire burning in the Bob Marshall Wilderness (2009) and unusually high fall stream flows as a result of significant rain events (2010).

Estimated fishing pressure and estimated catch of bull trout for the catch and release season in SFF was consistent with the range of values recorded over the seven years of the fishery. Estimated pressure for the South Fork was considerably lower in 2010 when compared with the two previous seasons, however the 877 days was within the range of the history of the fishery. Although the angling pressure estimate had decreased since the previous two years, estimated catch for the SFF was similar to all previous seasons. This finding is of particular interest because a new regulation in 2009 shortened the season two weeks due to elevated water temperatures in July and August observed over the past several years. The concern is that bull trout would be more vulnerable to angling as they congregate near creek mouths for thermal refuge, and that elevated water temperatures would increase angling related mortality. Angler use will continue to be monitored in future surveys.

In past seasons, combining the results of the catch card and survey data provided the most accurate data in terms of return percentage. Beginning in 2009, anglers were instructed to keep their catch card until they received the survey, and to use the card to help complete the survey questions. Anglers were then instructed to return their catch card with the survey. Consistent with 2009, returns of only catch cards were much lower than in previous seasons (4.8%). However, the return rate of surveys with attached catch cards was relatively high (57%) considering that a reminder mailing was not conducted. Angler pressure and estimated catch and harvest data also revealed consistent trends with past surveys in light of the absence of a reminder mailing. It is likely that the reminder mailing is not necessary for this survey and will potentially be omitted from future survey as a way to streamline the methodology and decreases overall survey expenses.

The overall number of bull trout catch cards issued for HHR/SFF and LK has decreased since the inception of the experimental fishery. However, estimated angling pressure and catch and harvest of bull trout have remained consistent with past data. These results suggest that in past seasons, many anglers obtained catch cards without intending to actually target bull trout in the permitted waters, and that a smaller group of permitted anglers were catching most of the fish. Because data since 2009 represents a situation in which anglers were made to choose between LK and HHR/SFF, it appears as though fewer anglers are obtaining catch cards out of convenience rather than actually planning to target bull trout. If this trend continues, accuracy of estimated angling pressure and catch will also improve in future surveys.

Reporting estimated catch and harvest on a catch card system requires angler cooperation for reliability. The ability to charge for a bull trout permit and mandatory turn-in of catch cards would increase efficiency and accuracy of the estimate. Mandatory turn-in would also eliminate the need for expensive and time-consuming angler surveys requiring final data extrapolation. We hope to be able to improve on the catch card system in the future.

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