

2019 Annual Report for Bull Trout Recovery Actions Conducted in Glacier National Park, Montana

Prepared for:

**U.S. Fish and Wildlife Service
Ecological Services
780 Creston Hatchery Road
Kalispell, Montana 59901**

Pursuant to:

U.S. Fish and Wildlife Service Recovery Permit Number TE191853-0

Prepared by:

**Chris Downs
Fisheries Program Manager**

And

**Jon McCubbins
Fisheries Biologist**

NPS, Glacier National Park

December 11, 2019

Introduction

Glacier National Park (GNP) represents one of the last remaining strongholds for bull trout across their native range (Fredenberg et al. 2007). GNP's status as a national park, along with management direction as a wilderness area serve to protect both critical habitats and ecosystem processes bull trout need for survival. GNP supports both resident and migratory forms of bull trout, further highlighting its importance as a bull trout conservation area. GNP is used by migratory stocks of bull trout from Flathead Lake for spawning and rearing (e.g. Ole Creek), supports disjunct migratory bull trout populations in GNP lake systems (e.g. Upper Kintla Lake), and also resident populations in some areas (e.g. Canyon Creek) (Muhlfeld and Marotz 2005, Mogen and Kaeding 2005, Meeuwig 2008). Bull trout are present on both sides of the Continental Divide in GNP, and as such GNP and the adjacent Blackfeet Indian Reservation support the only group of bull trout native to the east side of the Continental Divide in the U.S.

Bull trout face serious threats across their range and interactions with non-native species are one of the most critical (Fredenberg 2002, Martinez et al. 2009). Adverse interactions with non-native lake trout on the west side of GNP currently represent the single greatest threat to bull trout populations in these areas of the park. Recent studies have documented the replacement of bull trout by lake trout as the dominant predator in the majority of the large lakes on the west side of GNP in just the past 30-40 years (Fredenberg 2002, Downs and Fredenberg 2016). Other existing or potential threats to bull trout in GNP include angler bycatch, fish passage and entrainment issues associated with St. Mary Diversion, hybridization with non-native brook trout, and climate change.

Although there are many challenges facing managers in conserving bull trout in GNP, actions detailed in this report are intended to assist in the recovery and conservation of the species through on the ground actions that directly benefit bull trout, as well as monitoring and evaluation projects that form the foundation for understanding and developing successful conservation strategies. More detailed interpretation of results can be found in the parks' annual Fisheries Program reports. These annual reports are typically released in March of each year.

Recovery Activities Conducted in 2019

Activity 1: Quartz Lake lake trout removal

Activities associated with this project occurred between May and October 2019. We purchased and flew in a new larger gill net boat (apprx. 22' w/ 115 Hp outboard) complete with a hydraulic net puller in 2016 to improve crew safety and the efficiency/effectiveness of the project. Spring (May-June) removal efforts involved intensive lake wide gill netting focusing on juvenile lake trout (< 400 mm) capture and removal. Spring net sets are typically set during daylight hours between 40 and 60 m of depth to reduce bycatch of native fish. Fall efforts focus on removing spawning adults by setting nets on shallow spawning (<15m) reefs at night. To minimize bycatch mortality, we endeavored to use short duration (2-4 hr.) gill net sets.

A total of 35 bull trout were captured during lake trout removal efforts in 2019. Catch of bull trout has varied over the past six years ranging from a high of 58 in 2014 to a low of thirteen in 2017 (mean=34). Nineteen bull trout were captured in the spring and 16 were captured in the fall. Both are similar numbers to the 2018 catch for each sampling period. We pulled 29.4km of net in the spring of 2019 and the only bull trout mortalities were two adults. In the fall of 2019, we set 12.6km of net and there were no bull trout mortalities. We captured and removed 71 lake trout, 63 of which were mature, during the fall of 2019. We captured a total of 214 lake trout during the spring with 207 being in our juvenile size class (<400mm). Of these, 10 were radio-tagged and released. The rest were removed from the system. None of these tagged lake trout were recaptured in the nets.

We had few bull trout mortalities in the nets in 2019 and it is difficult to draw any meaningful conclusions on how soak time impacted mortality. Previous efforts suggest shorter duration sets reduce mortality and we typically strive for 3-5

hour sets in the spring and two hour sets in the fall. Both bull trout mortalities occurred in the spring on sets ranging from 3-4 hours. Shorter sets are necessary in the fall when bycatch of westslope cutthroat and bull trout is more likely due to the shallow nature of these sets (<15m). Sets are longer in the spring because it takes more time to set and pull the longer net sets and bycatch risk is relatively low due to the deep nature of these sets (>40m). The overall bull trout mortality rate in 2019 was 5.7%, far lower than in previous years. Mortality rates from 2016-2018 ranged from 21%-28%.

From 2012 to present, the gill net mortality ratio of lake trout to bull trout remains strongly in favor of bull trout (45:1 in 2012, 84:1 in 2013, 149:1 in 2014, 285:1 in 2015, 149:1 in 2016, 190:1 in 2017, 31:1 in 2018, and 143:1 in 2019). The use of finer twine diameter (changing from 0.2 mm to 0.15 mm) on the juvenile lake trout nets increased our removal efficiency on juvenile lake trout but it is also more efficient at capturing juvenile mountain whitefish. We will continue to seek ways to reduce bycatch of native species.

Twenty-five additional bull trout were captured via angling during lake trout radio-tagging efforts in the spring of 2019. Most of these were larger than 400mm. Standardized angler catch rates for lake trout have continued to climb despite our juvenile netting efforts (Figure 1). The lake trout angling catch rates mirror our gill netting results indicating there are more larger lake trout present than in previous years. The most likely explanation is a strong year-class of younger lake trout that are just recruiting to our angling and netting gear that were produced in the early years of our netting efforts. In the first few years of the project we were likely much less efficient at lake trout removal than we are today because we were learning how and where to catch the juveniles. We expect to see a dramatic decline in adult catch rate over the next several years, as these year classes reach maturity and we remove them at a high rate of exploitation. Over the long-term, bull trout angler catch rates appear to be declining slightly which is consistent with our fall gill netting data. However, redd count data suggest a fairly stable population over time (Figure 2). We will continue to monitor the bull trout population to evaluate the effectiveness of the program.

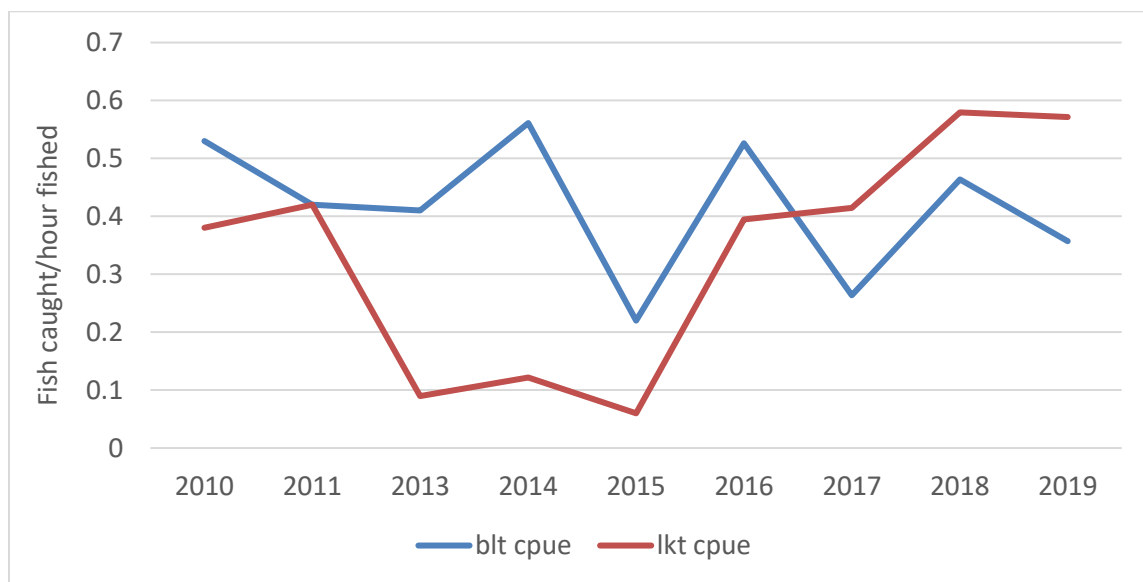


Figure 1. Catch-per-unit-effort (fish/angler hour) for project personnel over time.

The total number of lake trout removed since the project began in 2009 climbed to 8,014 by the end of 2019. Most of these fish were juveniles caught in the spring in finer mesh nets.

Annual fall catch of lake trout has been steady or increasing over the past five years (Figure 3). However, a standardized CPUE approach to evaluating the data doesn't suggest a trend in either direction (Figure 4). Regardless, there does appear to be a strong year class of lake trout just recruiting to our netting and angling gear. Bull trout CPUE in the fall nets continues to remain low (Figure 5).

The most productive fall netting nights come during the first half of the season. For example, 64 of 71 lake trout captured in 2019 were caught between October 7 and October 16 despite continued netting through the end of October. Similarly,

31 of the 39 lake trout caught in fall efforts in 2018 were captured between October 3 and October 16. However, individual mature lake trout were captured throughout the remainder of October in all years indicating removal attempts should continue over the course of the entire month.

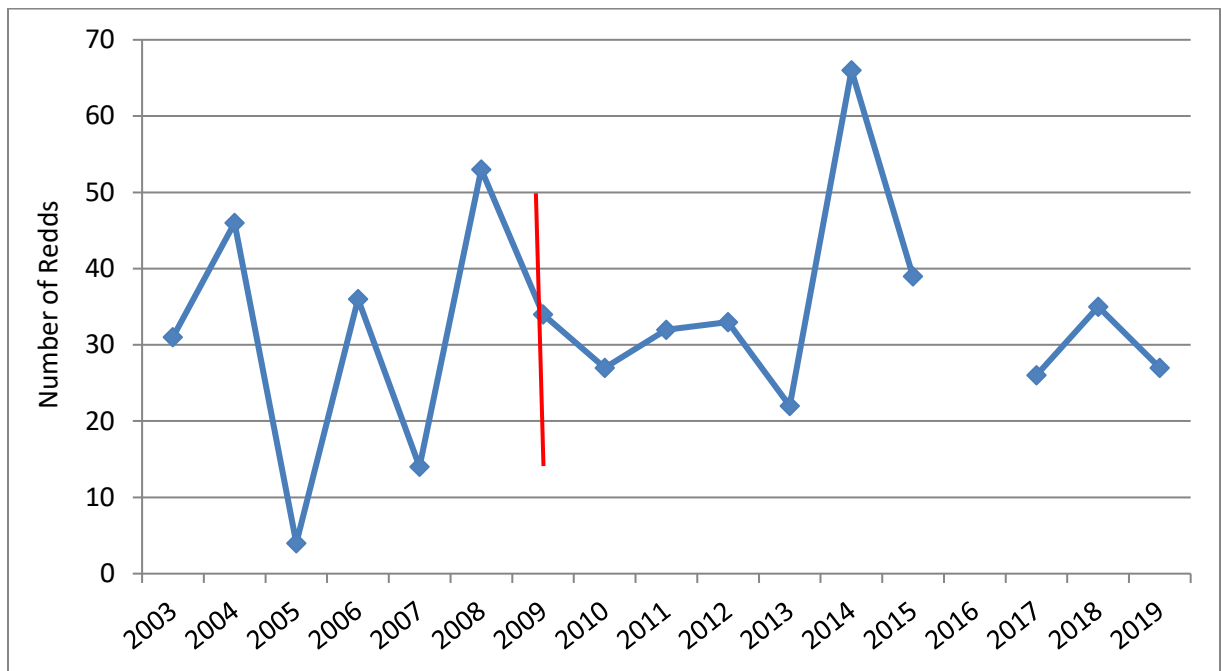


Figure 2. Long term bull trout redd counts in Quartz Lake. The red bar represents the year the project started.

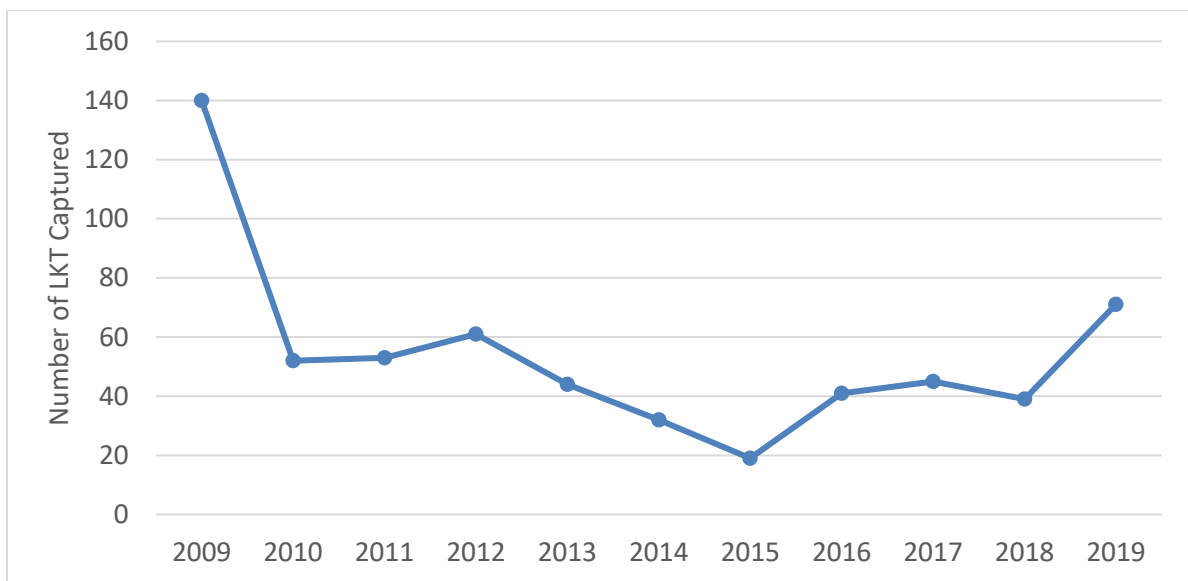


Figure 3. Total catch during fall gill netting efforts targeting spawning lake trout in Quartz Lake.

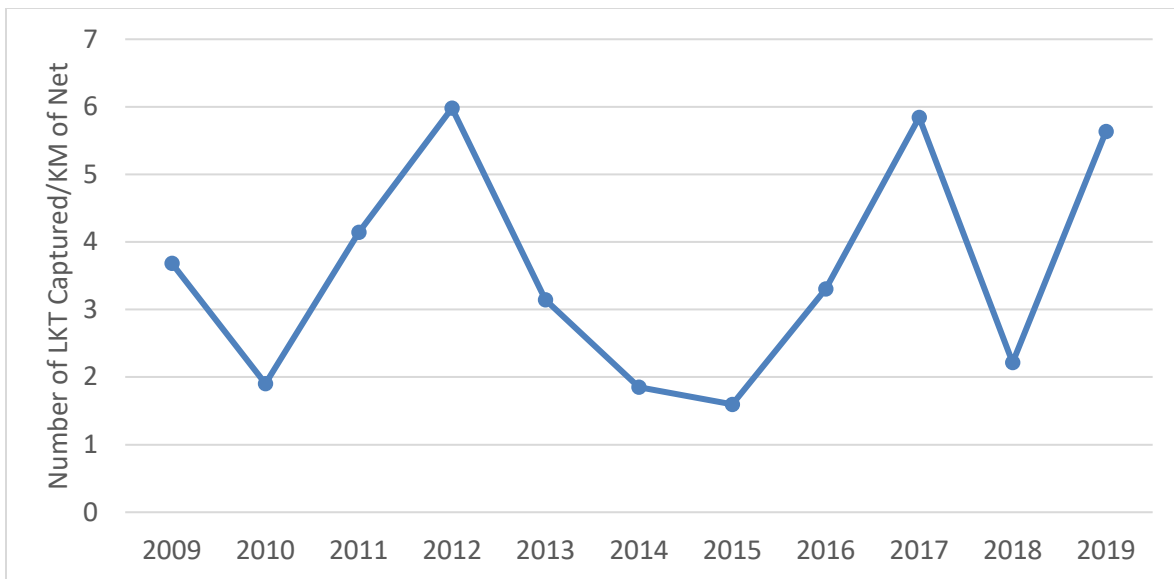


Figure 4. Catch-per-unit-effort (fish caught/km of net set) during fall adult lake trout removal in Quartz Lake.

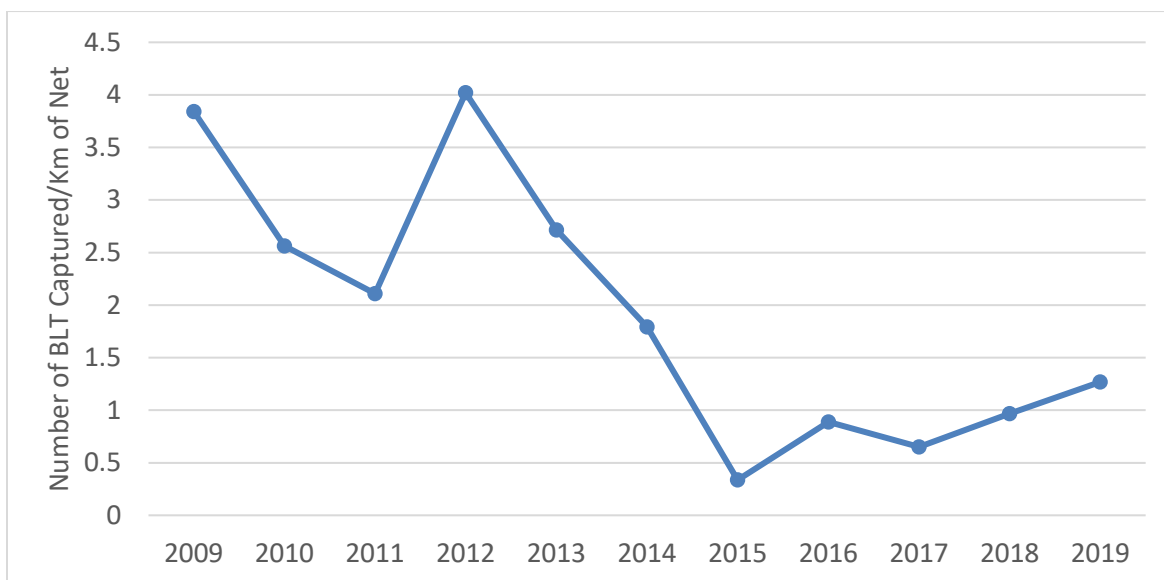


Figure 5. Catch-per-unit-effort (BLT caught/km of net set) during fall adult lake trout removal in Quartz Lake.

Juvenile catch-per-unit-effort continued a downward trend since we began using green tint and finer diameter mesh nets in 2013 (Figure 6). This is occurring even as we are improving our skills and refining our approaches with the commercial netting gear. The average age of sexually mature male and female lake trout in Quartz Lake is 7 and 9 years, respectively. Based on this and the program start year of 2009 (when we began disrupting spawning through adult removal in October), we would expect to start to see the effects of the adult lake trout removal on juvenile recruitment beginning sometime around 2019. Supporting this timeline, our total catch for juveniles has declined dramatically over the past five years to a low point in 2019 (Figure 7). This should translate to fewer adult lake trout reaching maturity in subsequent years. This in turn would be expected to impact spawning and juvenile production. The intent is for the cycle to feed on itself and put increasing downward pressure on the lake trout population.

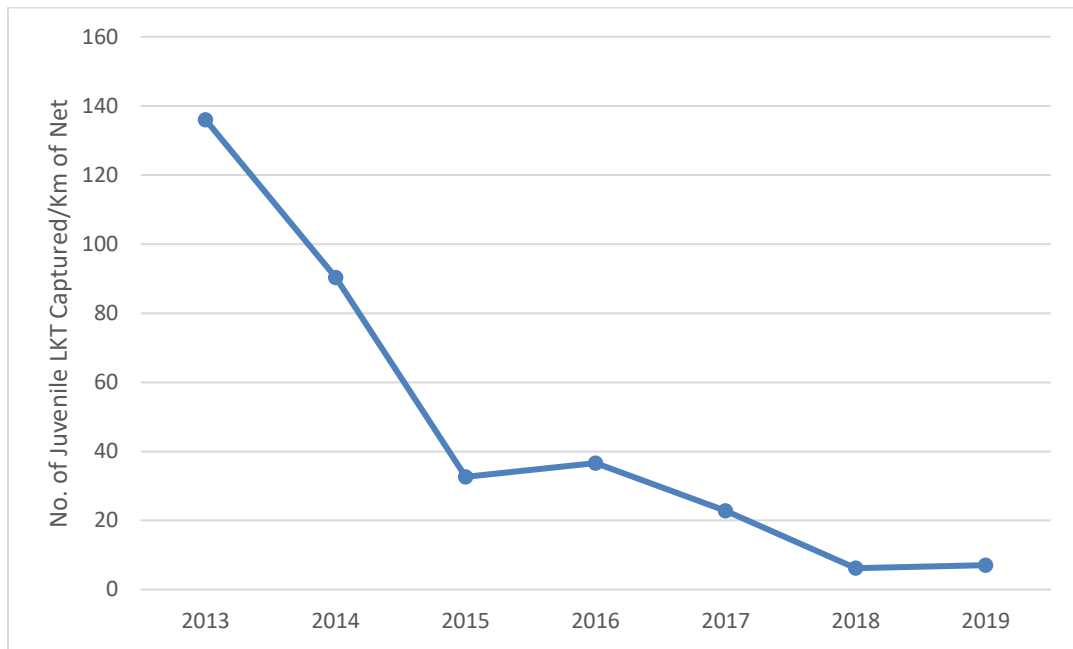


Figure 6. Catch-per-unit effort (lake trout/km of net set) of spring juvenile lake trout removal in Quartz Lake from 2013 to present.

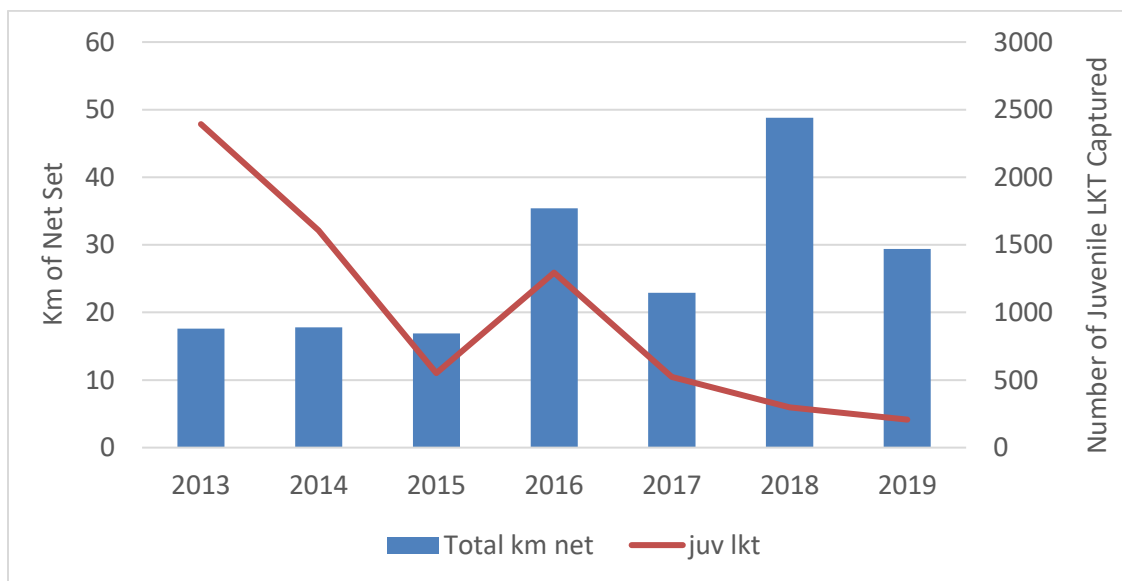


Figure 7. Total catch and length of gill net set during spring juvenile lake trout removal efforts at Quartz Lake.

Activity 2: Native salmonid population monitoring project

This project is intended to develop a baseline and monitor trends in native fish abundance and distribution within the park for long-term monitoring purposes. Monitoring techniques include netting, trapping, electrofishing, snorkeling, angling, and redd counts.

Jefferson Creek Electrofishing: On July 31, 2019 we sampled Jefferson Creek using a backpack electrofishing unit. Jefferson Creek is a tributary to Bowman Creek upstream of Bowman Lake. It was sampled to determine if Jefferson Creek is a spawning and rearing stream for Bowman Lake bull trout. Previous redd surveys of the mainstem Bowman Creek often fail to detect any bull trout redds and previous sampling data (USGS, unpublished data) has documented juvenile bull trout in Jefferson Creek, therefore it is possible Jefferson Creek may be an important bull trout spawning stream for Bowman Lake bull trout. We shocked for 856 seconds and captured two juvenile bull trout and two westslope cutthroat trout. The bull trout were both 108mm and were likely age-1. The cutthroat trout were 81 and 101mm in length and both also likely age-1 fish. Jefferson Creek is likely a spawning stream for both species. Additional surveys are warranted to identify critical areas of the stream for bull trout spawning and rearing.

Bull Trout Redd Counts: Trained and/or experienced counters typically working in pairs count bull trout redds on index reaches each year. Only those redds that survey crews were certain were actually bull trout redds based on an established definition (i.e. an area of clean gravel at least 1'x2' with a distinct pit and tail) are included in the totals. Monitoring adult abundance through annual redd counts is a cost effective and efficient way to track trends in bull trout abundance across a large number of streams over time. Due to early heavy snow and subsequent high water, only six streams were surveyed for spawning activity in 2019 (Tables 2 and 3). Redd counts on Ole and Park should be considered an undercount/minimum count since high water made redds difficult to detect. It was not possible to survey any streams in the St. Mary River drainage due to heavy snow eliminating reasonable access. We counted 27 redds in Quartz Creek which is slightly lower than the long-term average of 33 redds. Access to the spawning area for bull trout on Akokala Creek continues to be completely blocked by beaver dams and the primary spawning and rearing area is now a series of silt-bottomed beaver ponds. This could result in loss of this population in the near-term if the dams and associated habitat changes remain in place.

Lake Monitoring: Every five years we use park-standard experimental mesh multifilament gill nets to sample the parks larger lowland lakes. In 2019 we sampled Bowman Lake, Kintla Lake, and Lake McDonald. On Bowman Lake we caught seven bull trout ranging in length from 125-373 mm (TL=total length). Of these, four were mortalities. In Kintla Lake we caught only one bull trout (588mm; TL) and it was a mortality. In Lake McDonald, we captured eight bull trout of which five were released alive. Captured bull trout in Lake McDonald ranged in size from 265-700mm; TL. When compared over the past 20 years, lake trout numbers appear fairly stable in all three lakes (Figures 8-10). Bull trout abundance in Kintla Lake and Lake McDonald also appear fairly stable (albeit at very low numbers) over the past 20 years as well. This is consistent with observed declines in other bull trout populations tied closely to Flathead Lake itself. Both Lake McDonald and Kintla Lake are genetically similar to Flathead Lake populations suggesting regular exchange of individuals. Neither lake has known bull trout spawning areas. It is possible that both Kintla Lake and Lake McDonald are "sink" populations for the larger Flathead Lake system. That is, they are supported by reproduction elsewhere in the inter-connected Flathead basin. Bowman Lake is genetically differentiated from these other populations and the bull trout population there likely functions as an independent unit. Declines in bull trout abundance have continued in Bowman Lake over the past 20 years.

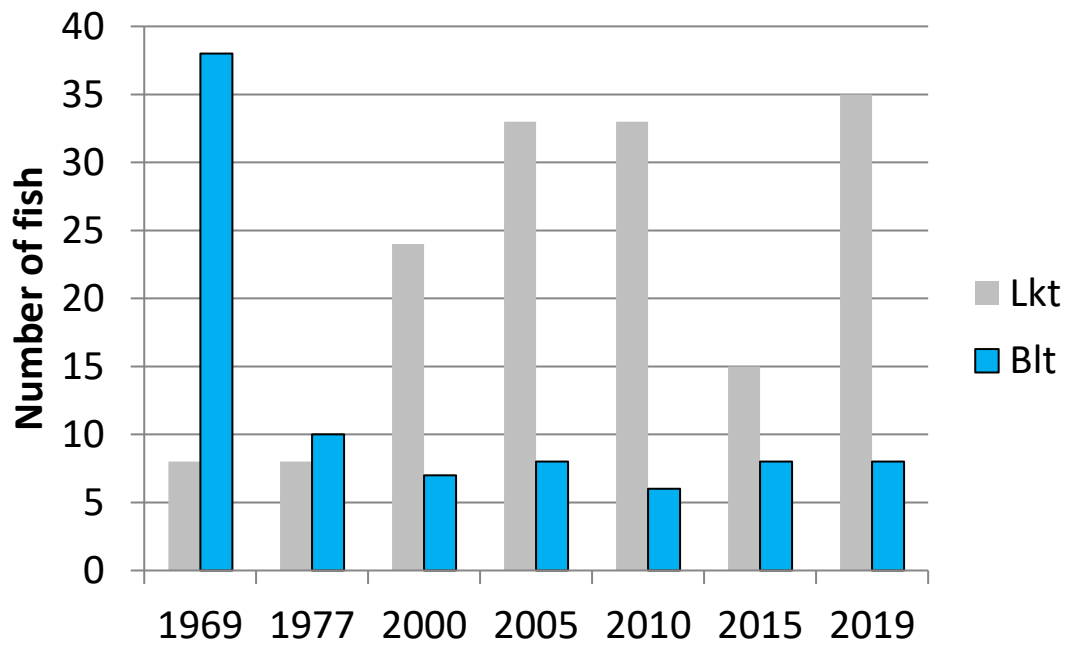


Figure 8. Standardized gill net catch of lake and bull trout in Lake McDonald over time.

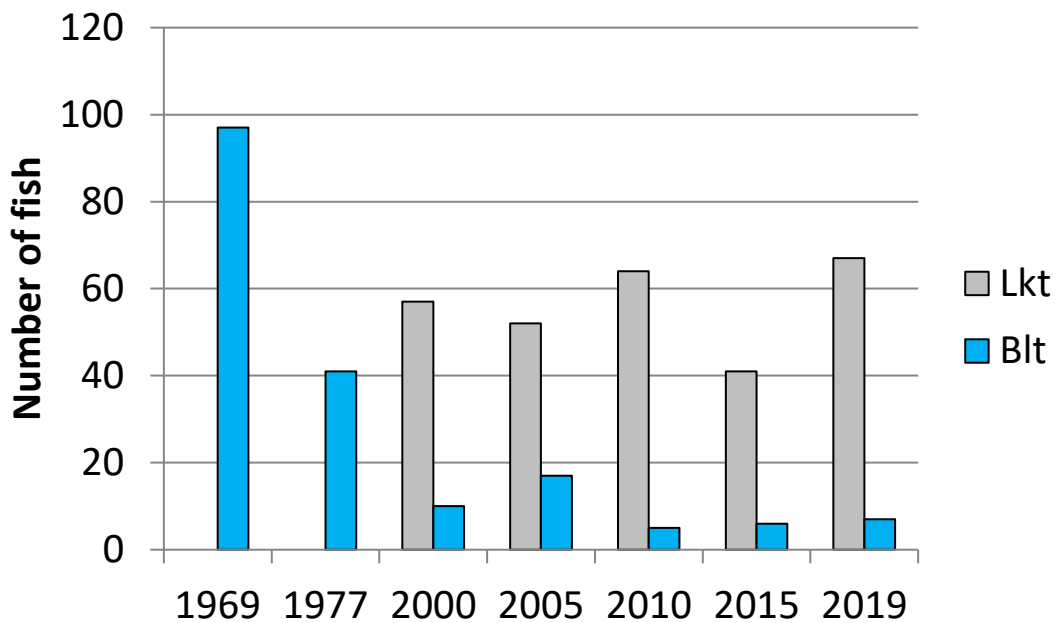


Figure 9. Standardized gill net catch of lake and bull trout in Bowman Lake over time.

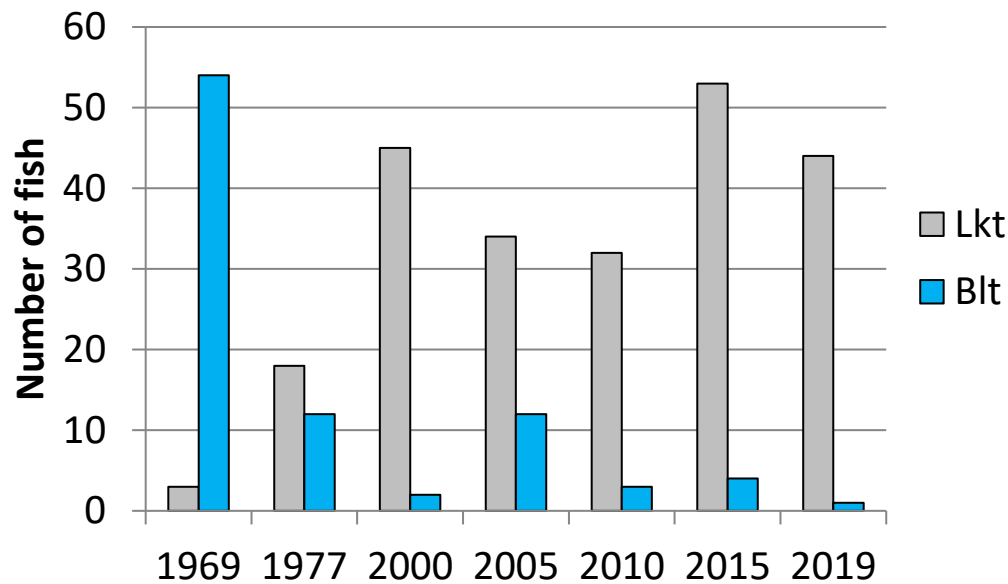


Figure 10. Standardized gill net catch of lake and bull trout in Kintla Lake over time.

Activity 3. Experimental lake trout suppression in Logging Lake.

The 2019 lake trout suppression in Logging Lake began in June. The spring removal efforts involve intensive lake-wide gillnetting focusing on juvenile lake trout (< 400 mm) capture and removal. Fall removal efforts focus on adult lake trout and occur largely in October. Five-hundred-twenty-four lake trout were removed from Logging Lake in June, 2019. Forty-two bull trout were also captured in spring sampling and 27 of these were mortalities. Based on size and some PIT tag recaptures, most were likely age-1 bull trout produced at Creston Hatchery. A total of 2,761 age-1 bull trout averaging from 8-9" in length were stocked into Logging Lake in 2018 and 2019. Only 444 of these are PIT-tagged.

One-hundred-sixty-eight lake trout were removed during October, 2019. Five bull trout were also captured during fall lake trout removal efforts of which only two were mortalities. In total, there were 43 juvenile bull trout mortalities and four adult bull trout mortalities associated with this project in 2019.

Activity 4. Bull trout translocation into Grace Lake and Grace Lake monitoring

Because of extremely low catch rates of juvenile bull trout in Logging Creek in 2015 (n=1), the lack of observed bull trout redds in Logging Creek from 2014-2016, and a desire to reduce potential impacts of electrofishing on juvenile cutthroat trout, we did not attempt to collect juvenile bull trout for upstream transport from Logging Creek in 2016-2019. Instead, we collected eggs from wild bull trout from Quartz Lake, hatched and reared them at Creston National Fish Hatchery, and released them into Grace and Logging lakes.

In 2017 we stocked 750 age-0 bull trout reared from Quartz Lake eggs into Logging Creek upstream of Grace Lake. In 2018, we stocked 1,543 age-1 bull trout reared from Quartz Lake eggs into Logging Lake near the Logging Creek inlet. We also stocked 250 of these same age-1 bull trout into Grace Lake near the inlet, 838 age-0 bull trout into Grace Lake near the outlet and 838 age-0 bull trout into the small lake a short distance upstream of Grace Lake. In 2019, we stocked 199-9" (age-1) bull trout into Grace Lake, 401-3" (age-0) bull trout into Grace Lake, and 401-3" bull trout into the pond upstream of Grace Lake. All of the age-1 fish stocked into Grace Lake in 2019 were PIT tagged. We also stocked 609-9" (age-1) bull trout into Logging Lake in 2019. Two-hundred of these fish were PIT tagged. All stocking into Grace and Logging lakes has occurred in mid-to-late June.

Twenty-nine juvenile bull trout from previous stocking/wild fish translocation efforts were recaptured in Grace Lake using trap nets and angling in 2019. Age-2 recaptures averaged approximately 300mm. The two bull trout captured by angling were 545 and 583mm (TL) and were the result of earlier wild fish translocations from Logging Creek (translocated as age-0 or age-1 fish). There were no mortalities associated with these efforts.

Table 1. Summary of bull trout recovery activities conducted in bull trout waters in 2019 in Glacier National Park under Recovery Permit Number TE191853-0.

Drainage	Water	Action	Purpose	Length/ Area	Date of Action	Personnel	Completed	No. BT Handled	No. mortalities (Adult/Juv)	Repeat in 2020?
N. Fk. Flathead	Logging Lake	Gill netting	Lake Trout Suppression	lakewide	May-June, Oct	D'Angelo, Marotz	Y	47	1/29	Y
N. Fk. Flathead	Quartz Lake	Gill netting	Lake trout Suppression	lakewide	May-June, Oct	McCubbins, Downs	Y	35	2/0	Y
N. Fk. Flathead	Quartz Lake	Angling	Lake trout Suppression	lakewide	May-June	USFWS, McCubbins, Downs	Y	25	0/0	Y
N. Fk. Flathead	Grace Lake	Stocking, trapping, electrofishing, angling	Population Supplementation and monitoring	lakewide	June-Sept	Downs, D'Angelo, Muhlfeld, USFWS, MFWP	Y	1,030	0	Y
N. FK. Flathead	Logging Lake	Stocking	Population Supplementation	Upper end of lake	June	Downs, USFWS, MFWP	Y	609	0	Y
N. Fk. Flathead	Logging Creek	Electrofishing	Survival monitoring	Above and below Grace Lake	September	D'Angelo, Marotz	Y	6	0	Y
N. FK. Flathead	Bowman Lake	Gill netting	Abundance monitoring	Lakewide	July	McCubbins, NPS seasonal staff	Y	7	0/4	N
N. FK. Flathead	Kintla Lake	Gill netting	Abundance monitoring	Lakewide	July	McCubbins, NPS seasonal staff	Y	1	1/0	N
N. FK. Flathead	Lake McDonald	Gill netting	Abundance monitoring	Lakewide	July	McCubbins, NPS seasonal staff	Y	8	2/1	N
N. Fk. Flathead	Jefferson Creek	Electrofishing	Distribution and abundance monitoring	866 seconds	July	NPS Seasonal staff	Y	2	0	Y
Parkwide	Parkwide	Redd surveys	Abundance monitoring	N/A	October	Downs, McCubbins, Muhlfeld	Y	0	0	Y

Table 1. Continued.

Drainage	Water	Action	Purpose	Length/ Area	Date of Action	Personnel	Completed	No. BT Handled	No. mortalities (Adult/Juv)	Repeat in 2020?
St. Mary	Boulder Creek	Electrofishing	Cutthroat monitoring	Streamwide	September	D'Angelo, Marotz	Y	146	0	N
St. Mary	Divide Creek	Electrofishing	Cutthroat monitoring	Streamwide	July	D'Angelo, Marotz	Y	15	0	N
St. Mary	Kennedy Creek	Electrofishing	Cutthroat monitoring	Streamwide	August	D'Angelo, Marotz	Y	4	0	N
St. Mary	Lee Creek	Electrofishing	Cutthroat monitoring	Streamwide	August	D'Angelo, Marotz	Y	33	0	N

Table 2. Bull trout redd counts conducted in the North Fork of the Flathead River Drainage, Glacier National Park, 1994 to present.

	Akokala Cr (o)	Bowman Cr (c,l)	Harrison Cr (d)	Logging Cr (n)	Lower Quartz	Middle Quartz (h)	Quartz Cr (a,b,e,m)	Rainbow Cr	Upper Kintla (m)
1994	--	--	--	--	--	--	--	--	52
1995	--	--	--	--	--	--	--	--	--
1996	--	--	--	--	--	--	--	--	--
1997	--	--	--	--	--	--	--	--	--
1998	--	--	--	--	--	--	--	--	--
1999	--	--	--	--	--	--	--	--	--
2000	--	--	--	--	--	--	--	--	--
2001	--	--	--	--	--	--	--	--	--
2002	--	0	--	--	--	--	--	--	--
2003	--	0	--	--	--	0	31	--	--
2004	--	0	4	3	1	0	46	--	--
2005	--	0	0	20	3	0	4	--	--
2006	--	2	8	0	2	0	36	--	--
2007	--	1	15	--	2	0	14	--	--
2008	11	0	14	5	3	0	51	28	0
2009	6	0	1	0	2	3	34	12	--
2010	1	1	6	3	2	0	27	4	25
2011	4	3	N/R	3	5	--	32	9	--
2012	5	--	1	1	3	--	33	--	--
2013	0	1	--	N/R	5	--	22	4	--
2014	12	4	10	0	4	1	66	5	--
2015	14	0	--	0	1	0	39	7	--
2016	--	--	--	--	--	--	--	--	--
2017	2	--	0	0	0	--	26	0	--
2018	4	--	--	--	6	0	35	--	--
2019	1	--	0	0	--	--	27	--	--

a=high flows may have obliterated some redds in 2005

b=spawning activity may have been impacted by weir placement near the mouth in 2007

c=minimum count during 2005 survey due to poor conditions

d=redd count accuracy may have been compromised by kokanee spawning activity in 2007 and 2008.

e=2008 data is a cumulative count based on multiple survey events

g=high flows may have obliterated some redds in 2004, 2005, 2019

h = old cutthroat redds still visible and may have affected count reliability

i = 3 additional redds were identified upstream of index reach in 2009

j=count was conducted by helicopter in 2008

l=poor counting conditions due to higher water levels and high turbidity (glacial) from Jefferson Creek in 2010

N/R=unreliable count due to kokanee spawning

m=2 redds observed in both 2008 and 2013, and 1 redd in 2014 and 2015 in Quartz above confluence of rainbow creek and included in index section total. This area (apprx 200m) not counted in other years.

n=2013 count likely inflated due to large (14-18") kokanee spawning at the time of the count. 14 redds not included that were presumed to be kokanee redds due to the observation of kokanee in the immediate vicinity of these redds.

Table 3. Bull trout redd counts conducted on tributary streams to the Middle Fork of the Flathead River and the St. Mary River, Glacier National Park, 1980 to present.

Middle Fork Flathead Tributaries				St. Mary Tributaries			
	Ole Cr (g)	Park Cr (j,g)	Nyack Cr	Boulder Cr	Kennedy Cr (i)	Unnamed Kennedy Cr Trib.	Lee Cr
1980	19	--	14	--	--	--	--
1981	19	13	14	--	--	--	--
1982	51	0	23	--	--	--	--
1983	35	--	--	--	--	--	--
1984	26	--	--	--	--	--	--
1985	30	--	--	--	--	--	--
1986	36	87	27	--	--	--	--
1987	45	--	--	--	--	--	--
1988	59	--	--	--	--	--	--
1989	21	--	--	--	--	--	--
1990	20	--	--	--	--	--	--
1991	23	19	22	--	--	--	--
1992	16	1	12	--	--	--	--
1993	19	--	--	--	--	--	--
1994	6	--	--	--	--	--	--
1995	16	--	--	--	--	--	--
1996	10	--	--	--	--	--	--
1997	14	2	9	12	23	--	--
1998	22	--	--	42	37	--	--
1999	26	--	--	20	--	--	--
2000	33	10	13	30	23	--	--
2001	29	--	--	28	12	--	--
2002	21	--	--	28	11	--	--
2003	21	0	14	28	18	--	--
2004	14	--	--	27	13	--	--
2005	16	--	--	--	25	--	--
2006	31	--	--	50	20	--	--
2007	29	--	--	38	13	--	--
2008	42	23	16	58	22	--	--
2009	34	3	8	38	5	2	--
2010	32	3	6	33	12	0	--
2011	40	20	16	61	15	1	15
2012	53	15	14	53	9	--	31
2013	44	9	--	61	8	--	12
2014	32	4	11	66	20	--	16
2015	35	--	13	66	14	1	5
2016	31	--	--	--	--	--	22
2017	18	13	--	26	1	--	5
2018	20	11	14	39	0	--	7
2019	3	2	--	--	--	--	--

o = 2017-2019-New beaver dam complex located apprx. 40 m from the lake blocking access to all spawning habitat.

Literature Cited

- Downs, C.C., and C. R. Fredenberg. 2016. Glacier National Park Fisheries Monitoring and Management Report, 2016. National Park Service, West Glacier, Montana.
- Fredenberg, W. A. 2002. Further evidence that lake trout displace bull trout in mountain lakes. *Intermountain Journal of Sciences* 8:1-11.
- Fredenberg, W., M. H. Meeuwig, and C. S. Guy. 2007. Action plan to conserve bull trout in Glacier National Park. Final Action Plan Report. U.S. Fish and Wildlife Service, Creston, Montana and the U.S. Geological Survey, Montana Cooperative Fishery Research Unit, Montana State University, Bozeman.
- Martinez, P. J., P. E. Bigelow, M. A. Deleray, W. A. Fredenberg, B. S. Hansen, N. J. Horner, S. K. Lehr, R. W. Schneidervin, S. A. Tolentino, and A. E. Viola. 2009. Western lake trout woes. *Fisheries* 34:424-442.
- Meeuwig, M.H. 2008. Ecology of lacustrine-adfluvial bull trout populations in an inter connected system of natural lakes. Ph.D. Dissertation. Montana State University, Bozeman.
- Mogen, J.T. and L.R. Kaeding. 2005. Identification and Characterization of Migratory and Nonmigratory Bull Trout Populations in the St. Mary River Drainage, Montana. *Transactions of the American Fisheries Society* 134:841-852.
- Muhlfeld, C.C. and B. Marotz. 2005. Seasonal Movement and Habitat Use by Subadult Bull Trout in the Upper Flathead River System, Montana. *North American Journal of Fisheries Management* 25:797-810.