FISHERIES DIVISION
Federal Aid Job Progress Report

Montana Statewide Fisheries Management

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Project Title: Statewide Fisheries Management
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ABSTRACT

Bitterroot River trout populations remained stable over the past few years with some exceptions. Rainbow trout in particular have declined in number in the East Fork Bitterroot River and upper Bitterroot River. The parasite associated with whirling disease, *Myxobolus cerebralis* was found in higher densities in the upper river particularly the East Fork Bitterroot. It may be the cause of declining rainbow trout numbers. Populations are stable downstream of Darby at this time. Westslope cutthroat populations have increased since restrictive fishing regulations were imposed in 1990, but have decreased slightly in recent years in the Darby area. However they remain well above the number present before restrictive regulations. Population estimates of brown trout in the Bitterroot River are likely not accurate, but seem to be stable. During 2005 and 2006, efforts to locate fluvial bull trout in the East Fork Bitterroot River resulted in capturing very few fish. .

Fish population monitoring on the Bitterroot National Forest indicates that population trends vary throughout the drainage.. Most of the immediate effects on fisheries of the fires of 2000 are no longer apparent, The debris flows after the fires of 2000 had serious impacts to the fishery in some streams, but most seem to have recovered. One exception is Rye Creek where a small bull trout population may have disappeared and brook trout have shown a mixed response. During 2006, bull trout populations in several monitoring reaches were lower than past estimates. Summertime water temperatures in Bitterroot National Forest streams have been increasing since measurements began in 1993.

The stocking of Lake Como with kokanee has had mixed success. Early survival appeared to be high, however recent sampling has not identified any spawning.

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BACKGROUND

The Bitterroot River flows in a northerly direction from the confluence of the East and West Forks near Conner, Montana. The river flows 84 miles through irrigated crop and pastureland to it's confluence with the Clark Fork River near Missoula, Montana. Five major diversions and numerous smaller canals remove substantial quantities of water from the river during the irrigation season (Spoon 1987). In addition, many of the tributaries, which originate on the BNF are diverted for irrigation during the summer months and contribute little streamflow to the river during that time. Therefore, many tributaries and the mainstem of the Bitterroot River are chronically dewatered during the irrigation season. Streamflow characteristics vary along the Bitterroot River, with the most critically dewatered reach between Hamilton and Stevensville (Spoon 1987). To help alleviate the mainstem dewatering, the MFWP annually supervises the release of 15,000 acre-feet of water from Painted Rocks Reservoir on the West Fork of the Bitterroot River and 3,000 acre-feet of water from Lake Como. Urbanization and associated development of the floodplain is increasing in the Bitterroot Valley (Javorsky 1994).

The Bitterroot River is an important sport fishery for anglers in western Montana. Pressure estimates from the statewide survey indicate that the Bitterroot River supported and estimated 113,700 angler days during 2005, (McFarland R.C. 2006). Due to the high fishing pressure, fishing regulations have become more restrictive in recent years to protect the adult fish. A creel census was conducted in 1992 and 1993 to assess these impacts. Overall, it indicated that fishing harvest was not having a serious impact on the population of trout but that monitoring should continue (Clancy 1993). Angling pressure has nearly doubled since that creel census. A Bitterroot River management plan is overdue since the original 5-year plan was written in 1991 (MFWP 1991).

Streams within the Bitterroot National Forest support widespread populations of native westslope cutthroat and bull trout. Due to the importance of streams within the Bitterroot National Forest (BNF), we have also monitored fish populations there. The Bitterroot National Forest encompasses 1.6 million acres, 71% of which is in Montana. Three mountain ranges, the Bitterroots to the west, the Sapphires to the east, and the Anaconda-Pintlars to the southeast comprise the Bitterroot National Forest. Water flowing within the BNF is excellent in quality and most is considered soft, a result of basin geology. Streams originating from the Bitterroot Mountains are unusually low in hardness and dissolved solids because of the resistant igneous and metamorphic rocks. The streams draining the Sapphire range tend to have higher dissolved solids because of slightly less resistant and more soluble background geology (Garn and Malmgren 1973). Within Montana, the BNF is the headwaters of the Bitterroot River.

Historically, Lake Como has been stocked with various species of fish. In the past decade catchable and brood rainbow trout have been stocked annually. Due to the fluctuating water levels in the reservoir, growth and survival has been poor. Beginning in 1997, kokanee, O*ncorhynchus nerka,* were stocked as fingerlings, in an attempt to add some variety for the anglers and study whether kokanee would grow faster than rainbow trout.

METHODS

Fish population estimates on the Bitterroot River were collected on several reaches over the past 25 years. Study reaches were selected based on historical data, streamflow patterns and fishing regulations. The reaches are 2.2-5.1 miles in length. Electrofishing was conducted from a 14-foot long aluminum drift boat fitted with a boom shocking system. The system was powered by 5000-watt generator and current was modified through a Coffelt Mark XXII electrofishing unit. Smooth direct current was used to capture fish. The Peterson mark-recapture method was used to calculate population estimates as modified through the Montana Fish, Wildlife and Parks Fisheries Analysis + program. Several mark and recapture runs were required to obtain sufficient sample size to estimate fish populations in some reaches. In recent years, most of the fish collections downstream of Hamilton have occurred at night to facilitate handling of more fish. The population estimates were collected during September and October each year. Brown trout may be migrating by October, therefore, their estimates may be inflated.

During 2005 and 2006 sentinel cages were used to assess the presence and degree of whirling disease. Personnel from the Bozeman office of MFWP installed the cages with the help of regional personnel. During this study period we concentrated on the East Fork and upper Bitterroot River.

We monitored fish populations in some streams on the Bitterroot National Forest. Background work that went into selection of the study sites is described in previous reports (Clancy 1993, 1996). During 2006 we concentrated on sites that in the past supported the more robust populations of bull trout.

Fish were captured by electrofishing using smooth direct current. On larger streams a bank electrofishing unit is used powered by a 4500 watt generator and current is controlled through a Coffelt VVP-15 unit. On small streams a backpack shocker, the Coffelt Mark 10, was used. We estimated trout populations on monitoring reaches using a mark-recapture technique. Monitoring sections are usually 1000 feet long. On the marking run, fish are released as close to their capture site as possible and approximately one week is allowed between mark and recapture. Population estimates are calculated using the Montana Department of Fish Wildlife and Parks Fisheries Analysis + program..

RESULTS AND DISCUSSION

East Fork Bitterroot River and Bitterroot River

During 2005 and 2006 trout population estimates were collected from two sections of the lower East Fork of the Bitterroot River. During 2005 population estimates were collected on the Darby and Bunkhouse Bridge sections of the Bitterroot River. During 2006 population estimates were collected on the same East Fork Bitterroot River sections and the Hannon Memorial, Bell Crossing and Bunkhouse Bridge sections of the Bitterroot River (Figure 1). The data collected at the Bunkhouse Bridge section was obtained during the spring by another FWP crew. Due to the time of year it was collected, comparisons to the other sections, where data is collected during the fall, may not be valid.

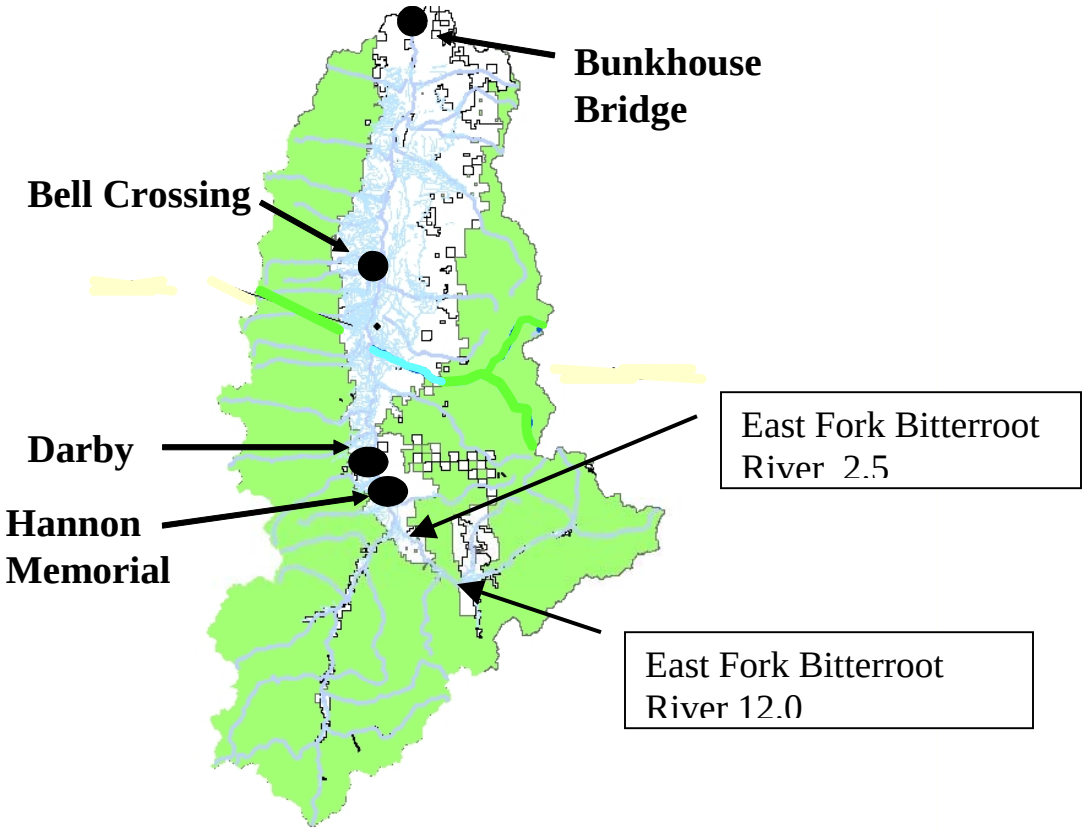

Figure1. Location of East Fork and Bitterroot River electrofishing sections discussed in this report.

Rainbow Trout

Overall, the rainbow trout population estimates indicate a negative trend in the number of rainbow trout in the upper river and a stable population in the downstream sections (Figures 2-12.). The East Fork Bitterroot and Darby sections exhibit declining trends. While the East Fork Bitterroot Conner section (2.5) has been declining in the past few years, the 2006 estimate is slightly higher than the previous year. The East Fork Bitterroot Sula section (12.0) population estimate indicates declining rainbow trout numbers the past few years. This decline may be due to the presence of whirling disease. Whirling disease is discussed later in the report.

Population estimates of rainbow trout in the Darby section of the Bitterroot indicate a declining population. This is possibly related to whirling disease similar to the East Fork Bitterroot River. The 2006 estimate in the Hannon section complicates this conclusion because the population estimate was within the range of past estimates.although at the lower end of the range. Populations in the Bell Crossing and Bunkhouse Bridge sections are similar to past estimates.

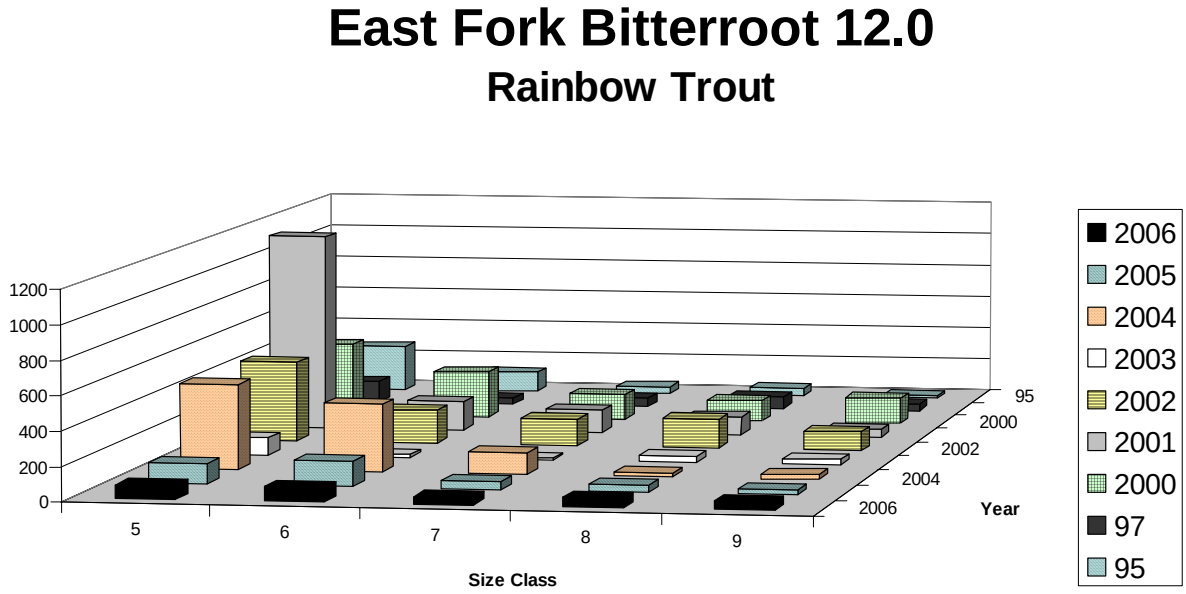

Figure 2. Population estimates of smaller rainbow trout in the East Fork Bitterroot 12.0 section during the years indicated.

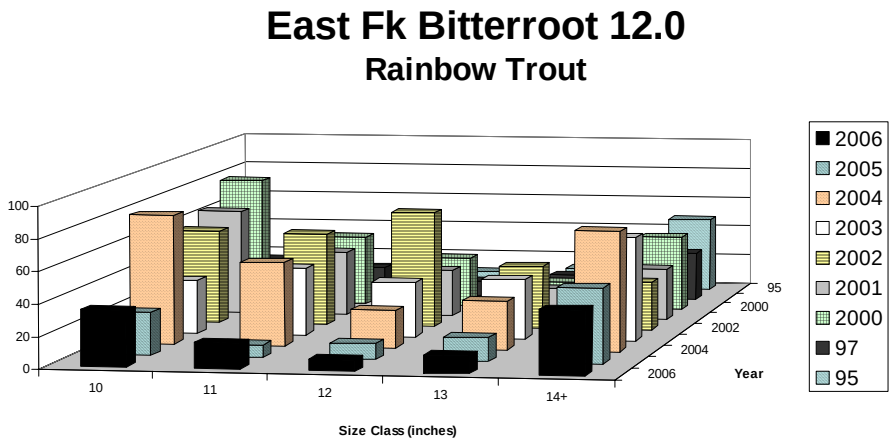

Figure 3. Population estimates of larger rainbow trout in the East Fork Bitterroot 12.0 section during the years indicated.

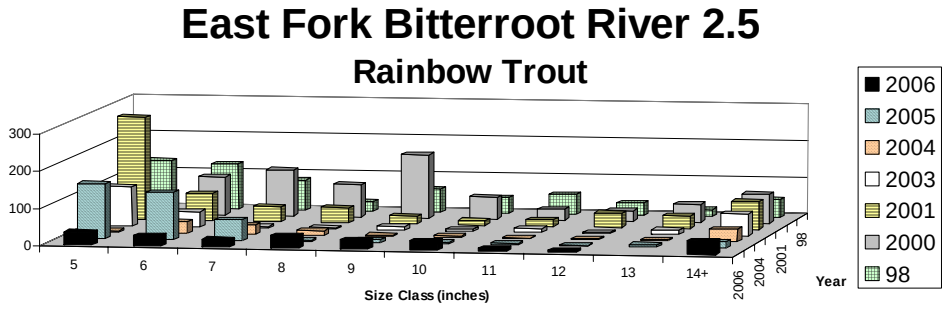

Figure 4. Population estimates of rainbow trout in the East Fork Bitterroot 2.5 section during the years indicated.

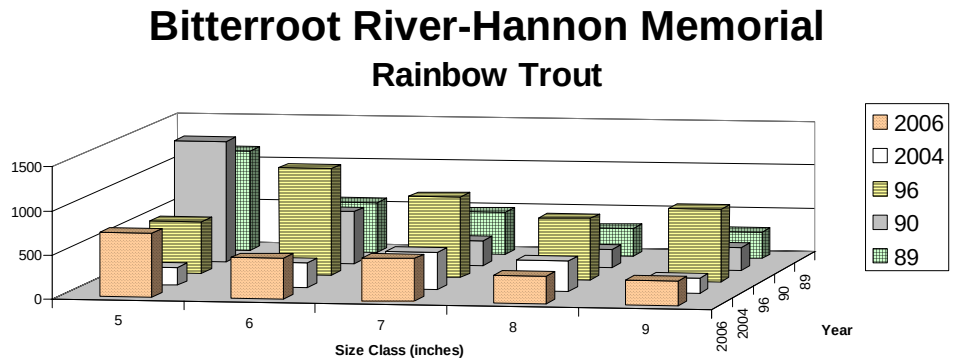

Figure 5. Population estimates of small rainbow trout in the Hannon Memorial section of the Bitterroot River during the years indicated.

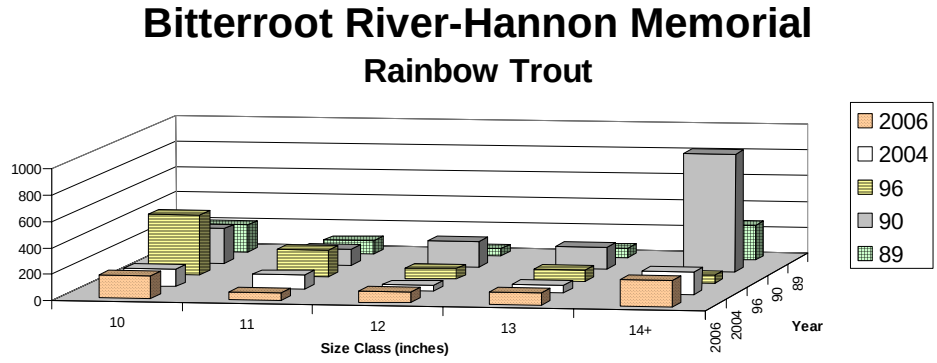

Figure 6. Population estimates of large rainbow trout in the Hannon Memorial section of the Bitterroot River during the years indicated.

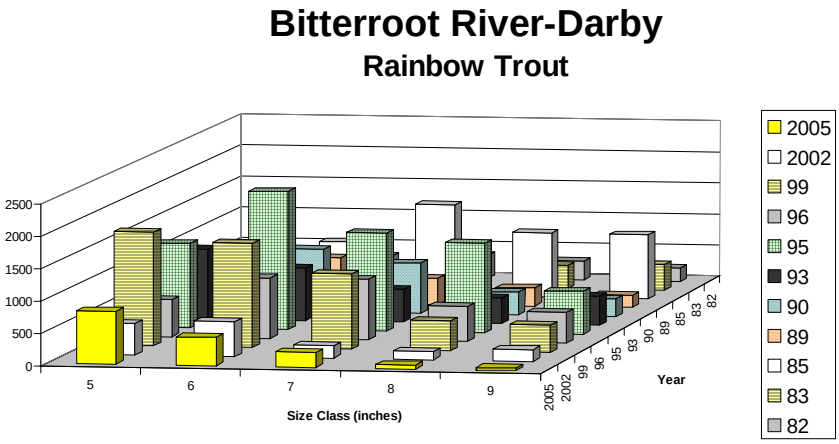

Figure 7. Population estimates of small rainbow trout in the Darby section of the Bitterroot River during the years indicated.

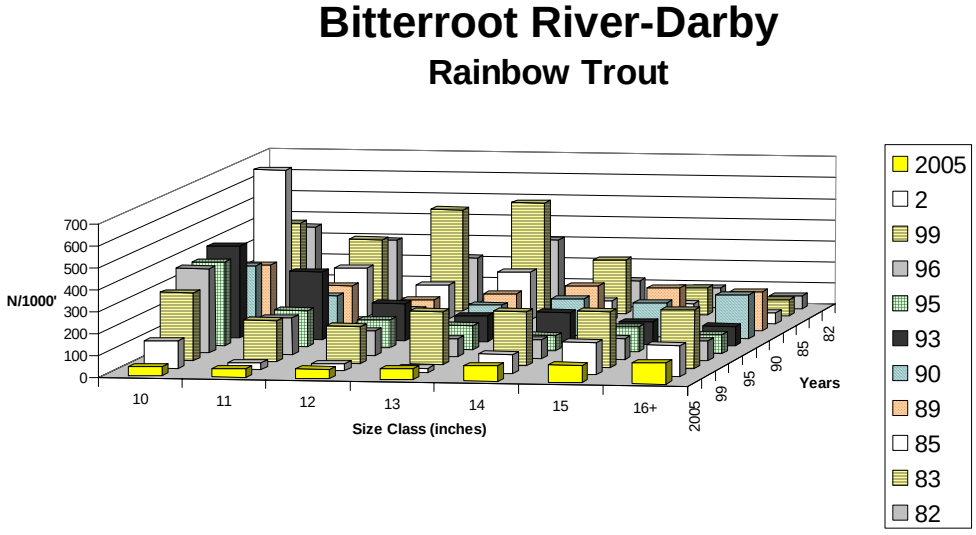

Figure 8. Population estimates of large rainbow trout in the Darby section of the Bitterroot River during the years indicated.

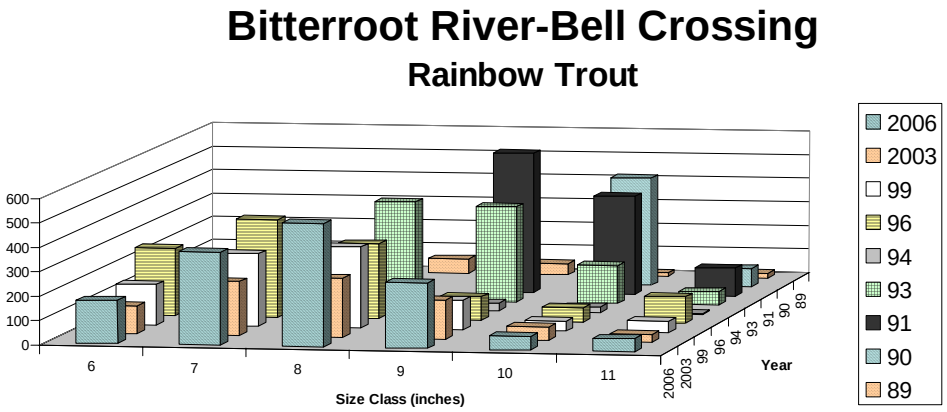

Figure 9. Population estimates of small rainbow trout in the Bell Crossing section of the Bitterroot River during the years indicated.

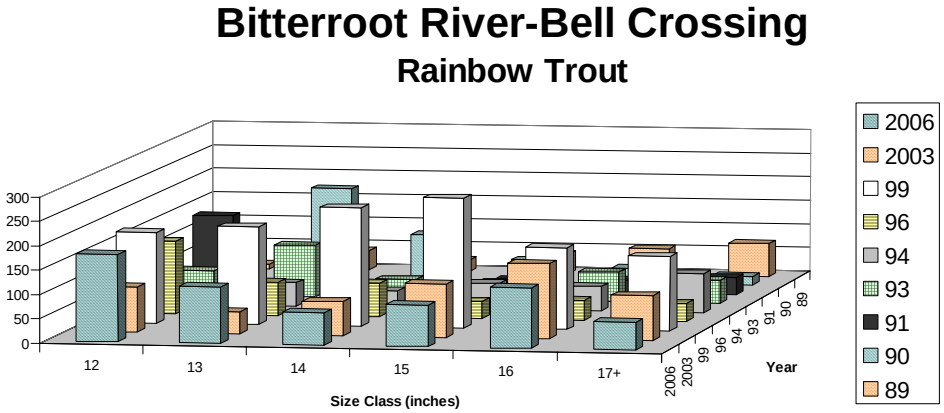

Figure 10. Population estimates of large rainbow trout in the Bell Crossing section of the Bitterroot River during the years indicated.

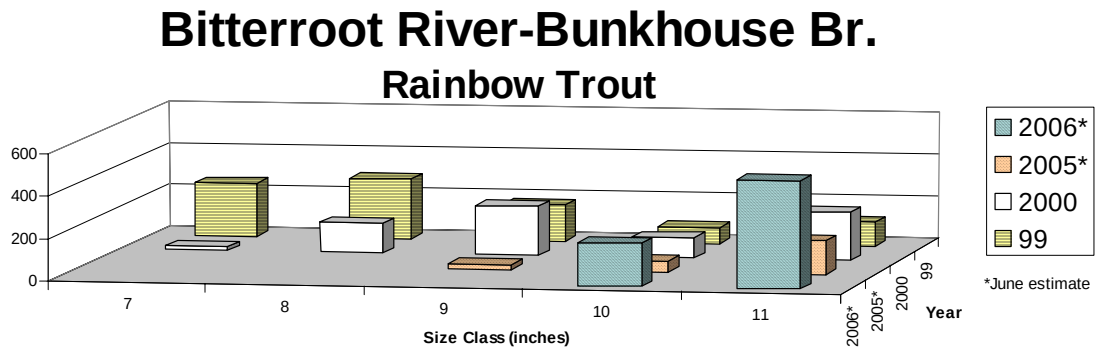

Figure 11. Population estimates of small rainbow trout in the Bunkhouse Bridge section of the Bitterroot River during the years indicated.

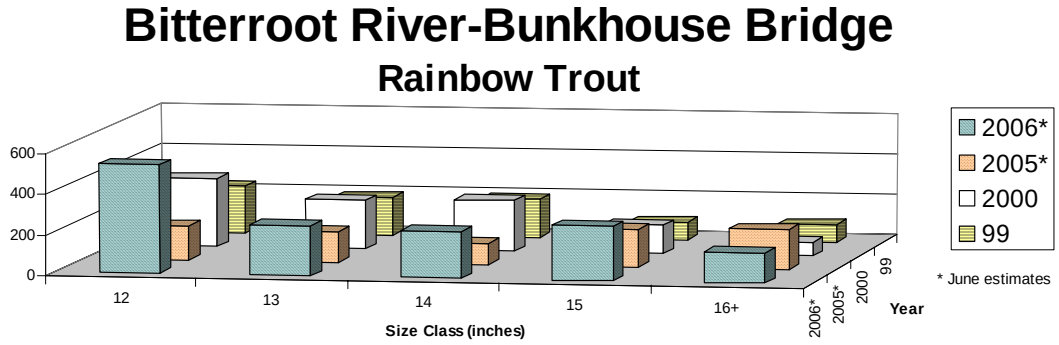

Figure 12. Population estimates of large rainbow trout in the Bunkhouse Bridge section of the Bitterroot River during the years indicated.

Brown Trout

Trout population estimates in the Bitterroot and East Fork Bitterroot River are collected in September and October. It is likely that spawning migrations of brown trout have likely begun and this could bias our population estimates. Therefore, brown trout population estimates are more of an index than numeric estimate. The data indicate that brown trout populations have remained stable in the study sections (Figures 13-22). Although rainbow trout numbers have declined in the East Fork, the brown trout numbers have not changed significantly. This would be consistent with other streams where whirling disease is having an impact.

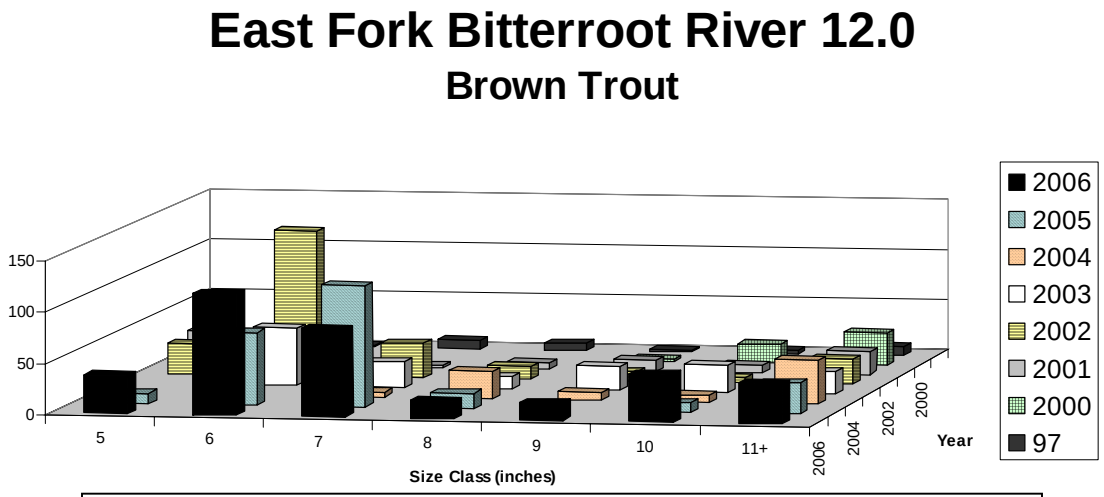

Figure 13. Population estimate of brown trout in the East Fork Bitterroot 12.0 section during the years indicated.

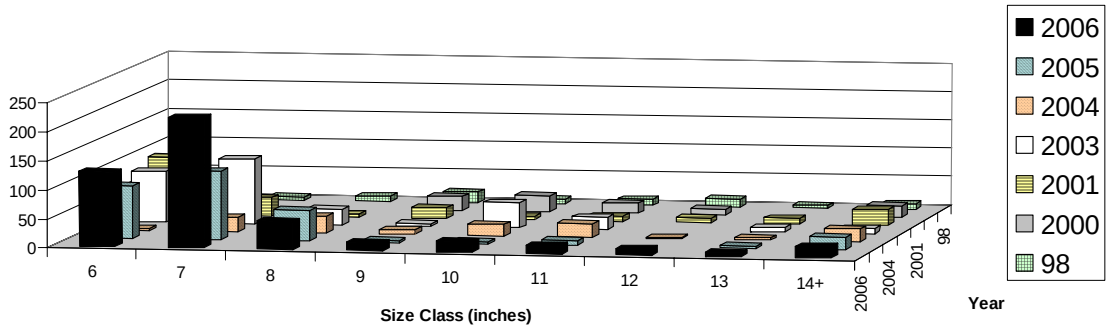

Figure 14. Population estimate of brown trout in the East Fork Bitterroot 2.5 section during the years indicated.

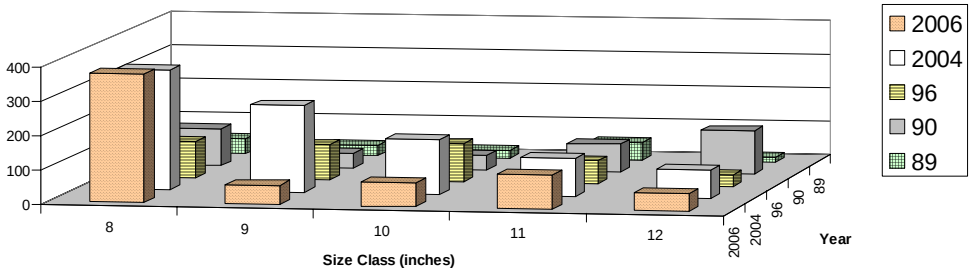

Figure 15. Population estimate of small brown trout in the Hannon Memorial section of the Bitterroot River during the years indicated.

Bitterroot River-Hannon Memorial
Brown Trout

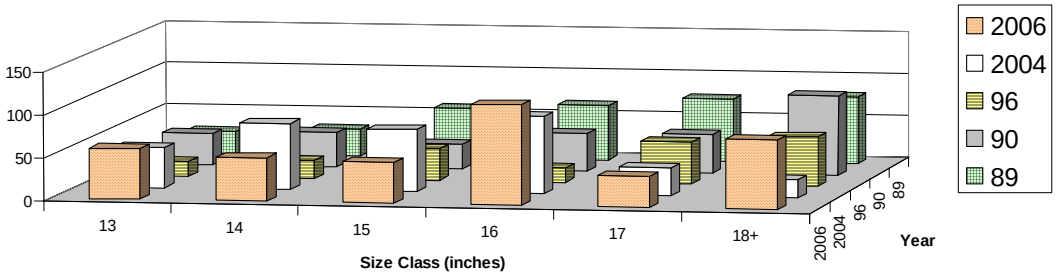

Figure 16. Population estimate of large brown trout in the Hannon Memorial section of the Bitterroot River during the years indicated.

Bitterroot River-Darby
Brown Trout

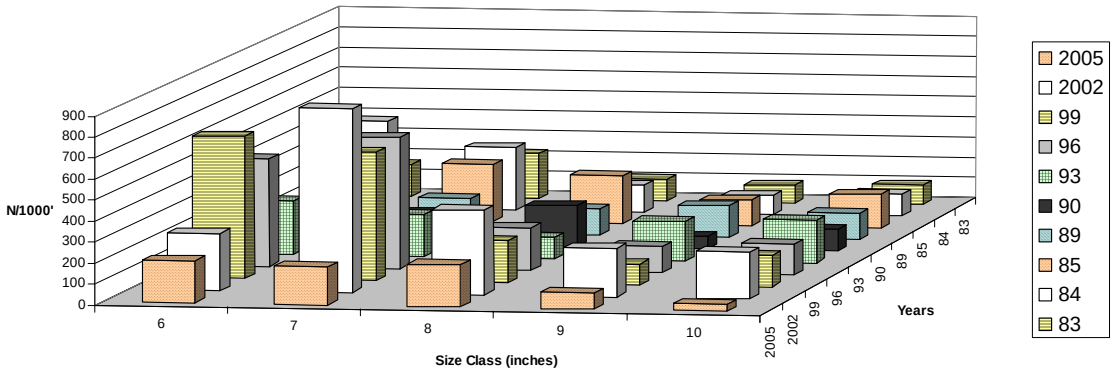

Figure 17. Population estimate of small brown trout in the Darby section of the Bitterroot River during the years indicated.

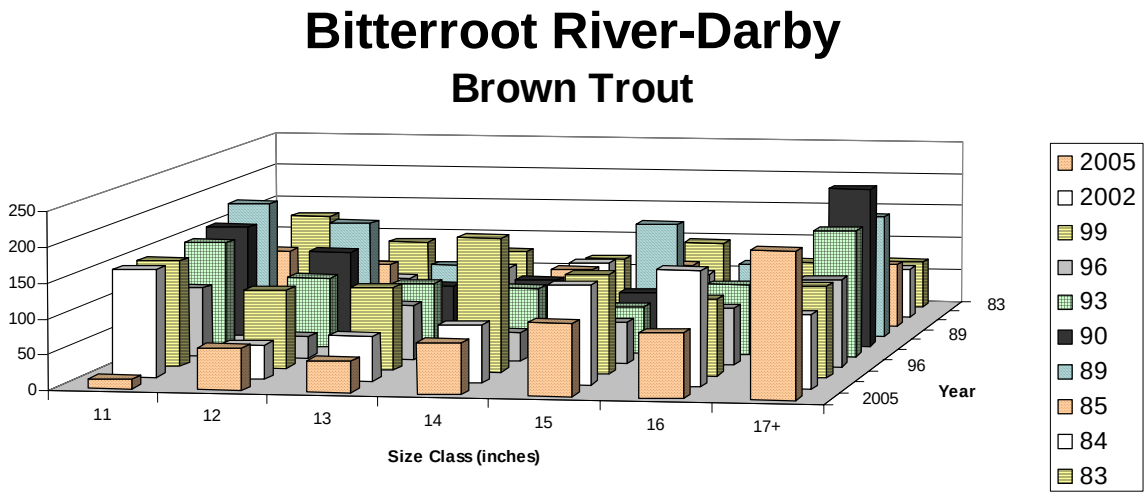

Figure 18. Population estimate of large brown trout in the Darby section of the Bitterroot River during the years indicated.

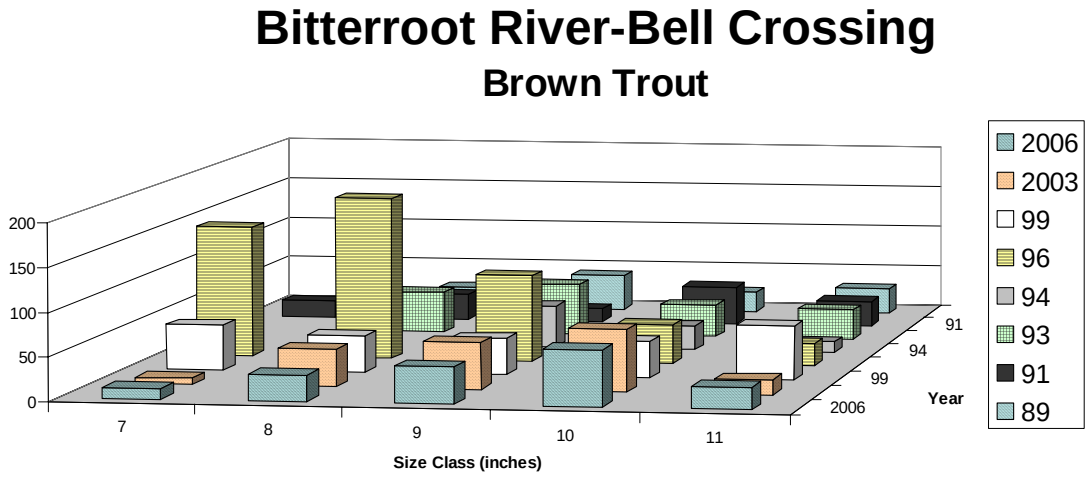

Figure 19. Population estimate of small brown trout in the Bell Crossing section of the Bitterroot River during the years indicated.

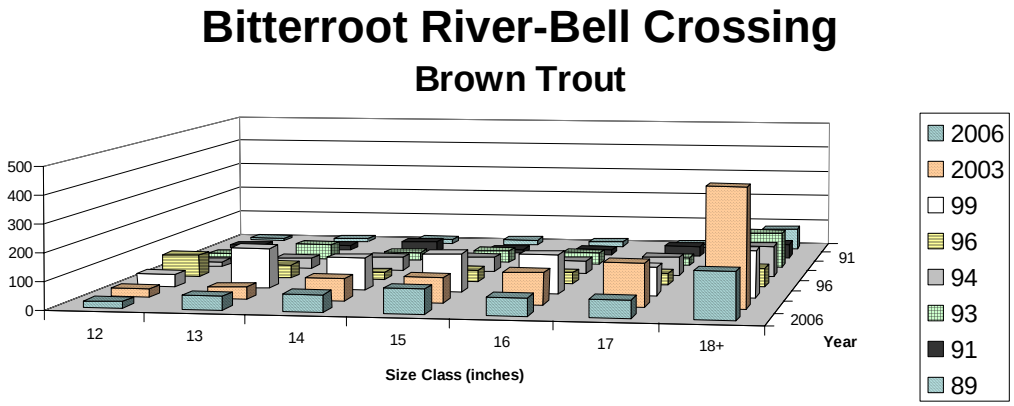

Figure 20. Population estimate of large brown trout in the Bell Crossing section of the Bitterroot River during the years indicated.

Westslope cutthroat

The population estimates of westslope cutthroat indicate a stable population. Westslope cutthroat tend to be the least numerous of the three species of trout common to the river. Therefore, population estimates are not always possible to collect, particularly in the lower river where their numbers are low and hybridization obscures their identity. In 2005 and 2006 we were able to collect population estimates on 3 sections (Figures 21-23). Within the three sections the numbers are probably stable. In 2005 the Darby estimate is lower than recent years but well above the numbers captured before catch and release regulations.

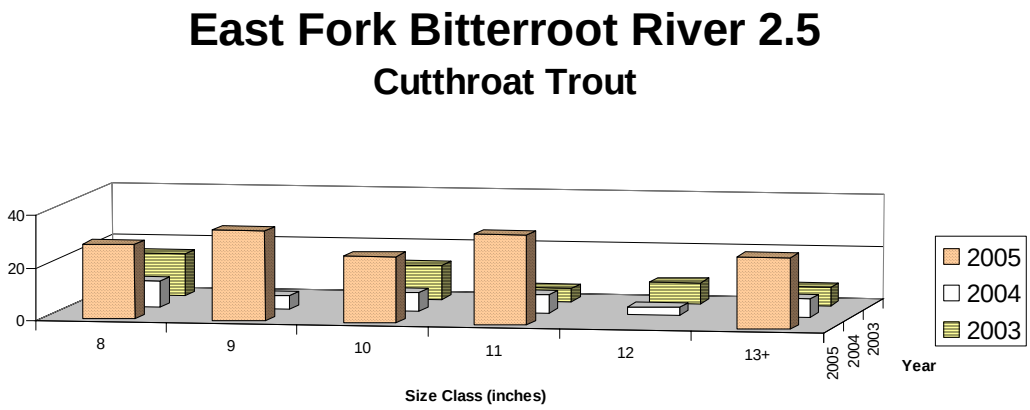

Figure 21. Population estimates of westslope cutthroat in the lower East Fork Bitterroot during the years indicated.

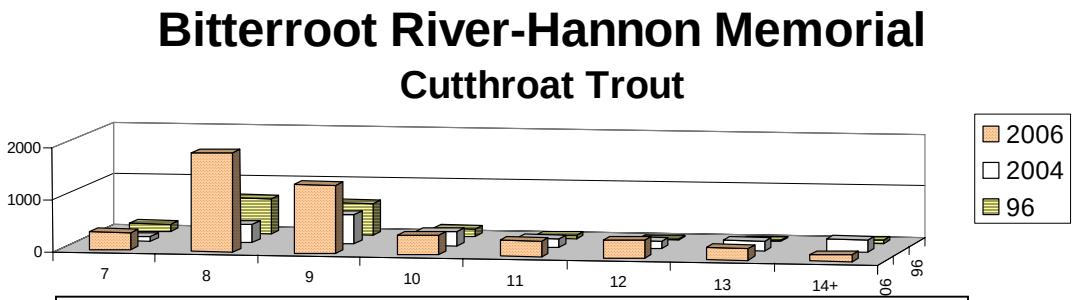

Figure 22. Population estimate of westslope cutthroat in Hannon Memorial section of the Bitterroot River during the years indicated.

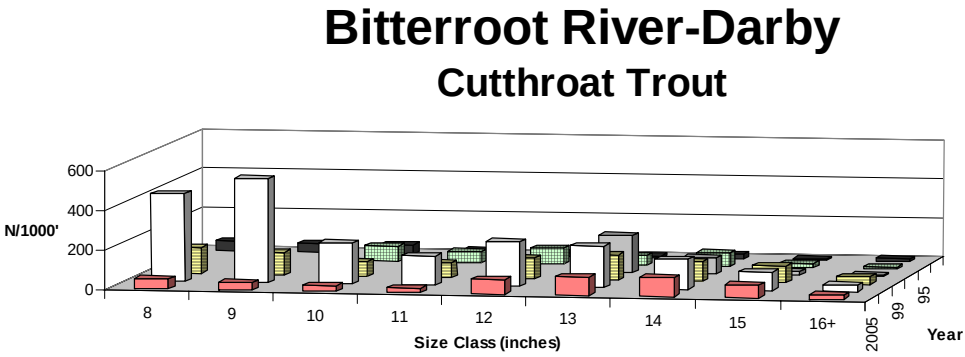

Figure 23. Population estimate of westslope cutthroat in the Darby section of the Bitterroot River during the years indicated.

Whirling Disease

Sampling fish for the presence of *Myxobolus cerebralis* was first undertaken in the Bitterroot River in 1995 (Clancy 2003). Since then, continuous sampling has occurred by Fish Wildlife and Parks personnel from Bozeman and region 2. We have used a combination of grab samples and sentinel cages to assess the presence and distribution of the parasite. Prior to 2000 we found that the parasite was present in the Bitterroot River where a few infected fish were found at scattered locations (Clancy and Javorsky 2001). Recent sampling has indicated that the upper Bitterroot River, and particularly the East Fork Bitterroot River, have high infection rates (Clancy 2003). As previously reported in this document, the population of rainbow trout in the Conner area has declined significantly in recent years and this may be due to the effects of whirling disease. The highest infection rates in the East Fork Bitterroot River have been found between Conner and Sula (Figure 25). These are sites where high numbers of *T. tubifex* have been located. (Clancy 2005). The infection rate of the sentinel fish has been increasing each year to levels that are considered high enough to impact the trout population (Figure 25). In 2006 the infection rates were either slightly lower or higher than in 2005. Infection rates at Hamilton and Stevensville have been low or absent. In 2006 we tested a site at Charlos Heights and the infection rate was 0.24.

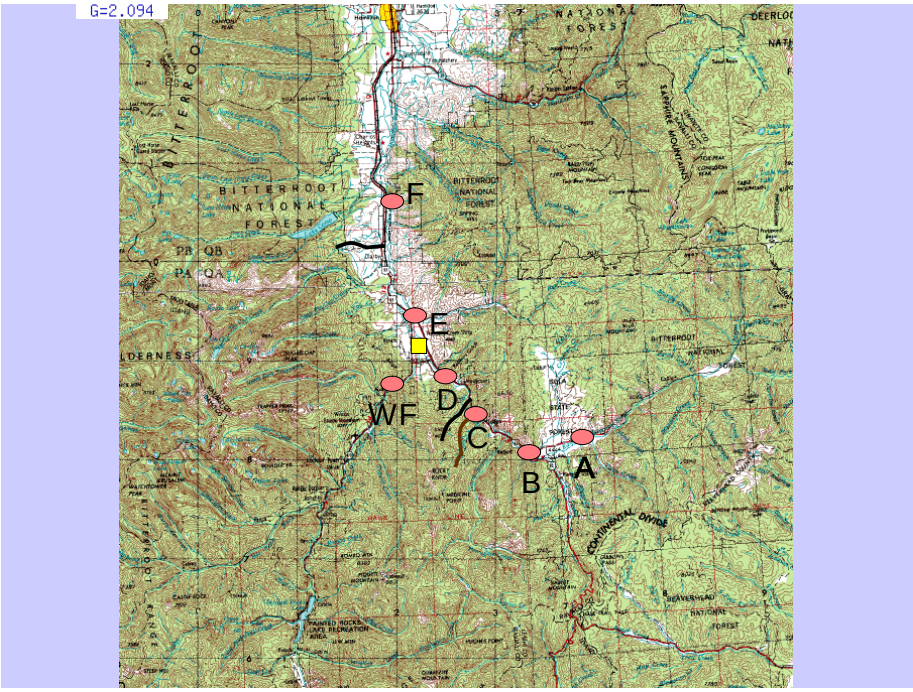

Figure 24. Locations of sentinel cages used for assessing whirling disease.

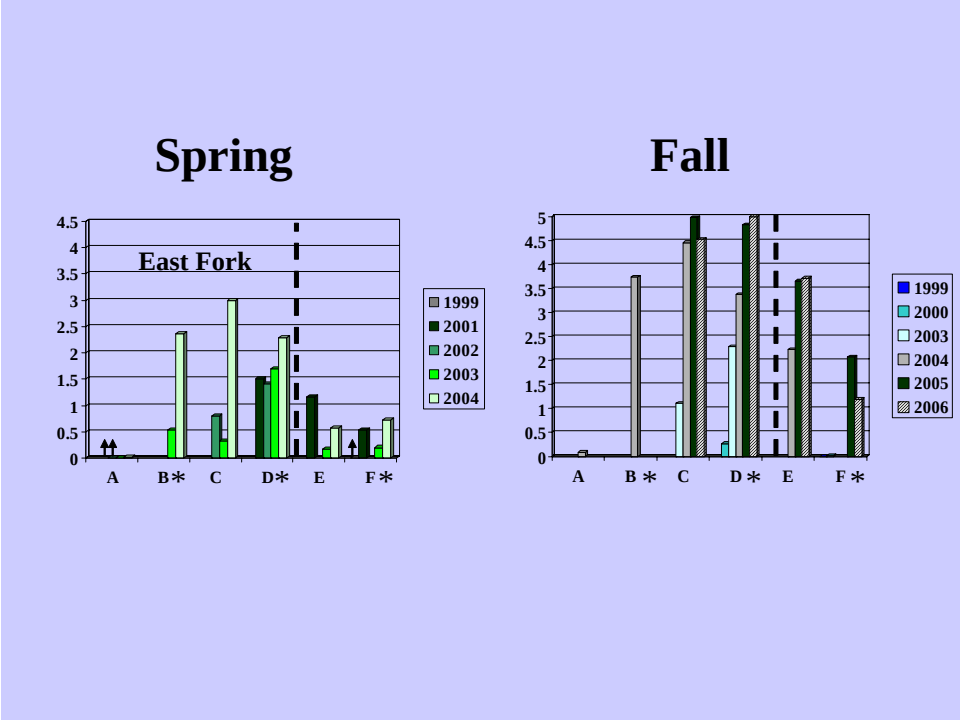

Figure 25. Average infection rates of sentinel fish in cages set at various sites through 2006.

Radio Telemetry

During 2005 and 2006, we attempted to implant radio transmitters in fluvial bull trout in the East Fork Bitterroot River between Conner and Sula. This effort was an attempt to repeat the study from the year 2000, when fires prevented us from flying during much of the bull trout migration period. During both 2005 and 2006 we were unable to capture many bull trout (Table 1). The problem was not with sampling effort as the equipment was working well, and the number of miles electrofished was adequate. We saw many fish but few were bull trout. All of the fluvial bull trout we saw were captured. The catch per unit effort indicates fewer fluvial bull trout in this reach as in 2000. While this data is not definitive, we felt that the fluvial bull trout population in the East and West Forks warrants more intense study.

Table 1. Number of fluvial bull trout captured in electrofishing in the East Fork Bitterroot River between Sula and Conner during Spring of the years indicated.

Year	**Miles**	# Fluvial Bull Trout
2000	**15**	10
2005	**18**	2*
2006	9	1

*Both bull trout were recaptured in subsequent trips. They were the only bull trout observed in 2005.

Radio transmitters were implanted in the two bull trout captured in 2005. While both made upstream movements and one migrated several miles upstream, neither entered a tributary. The lone fish captured in 2006 was released without a transmitter.

Bitterroot National Forest

During 2005 and 2006, we continued to monitor fish populations at established sites within the Bitterroot National Forest. The following discussion is for sites that were sampled by MFWP unless otherwise noted.

Westslope Cutthroat

The trends in cutthroat populations vary by site and it is not possible to characterize them on a widespread basis, partially due to impacts of the fires of 2000. At most sites, the population estimates fall within the range of past estimates. However some sites are of interest.

Rye Creek and North Rye Creek.

Both of these streams have long term data that indicates changes over time. The changes appear to be a result of the fire of 2000. The drainage was severely burned. In Rye Creek water temperatures increased significantly after the fire (USDA 2006). Since the fire of 2000, the number of brook trout has increased in this reach of stream. and the number of larger westslope cutthroat has declined in recent years (Figures 26 and 27). Bull trout have not been captured in this section since the fire.

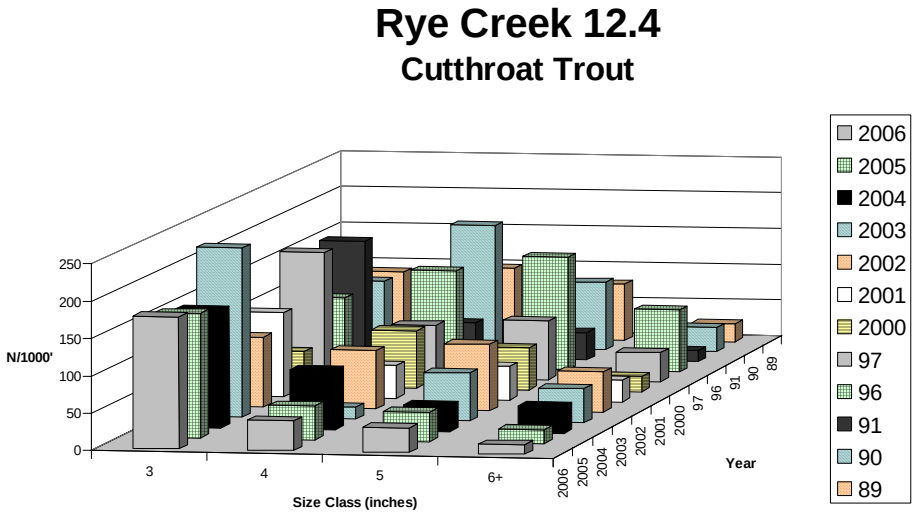

Figure 26. Population estimates of westslope cutthroat in the Rye Creek 12.4 section during the years indicated.

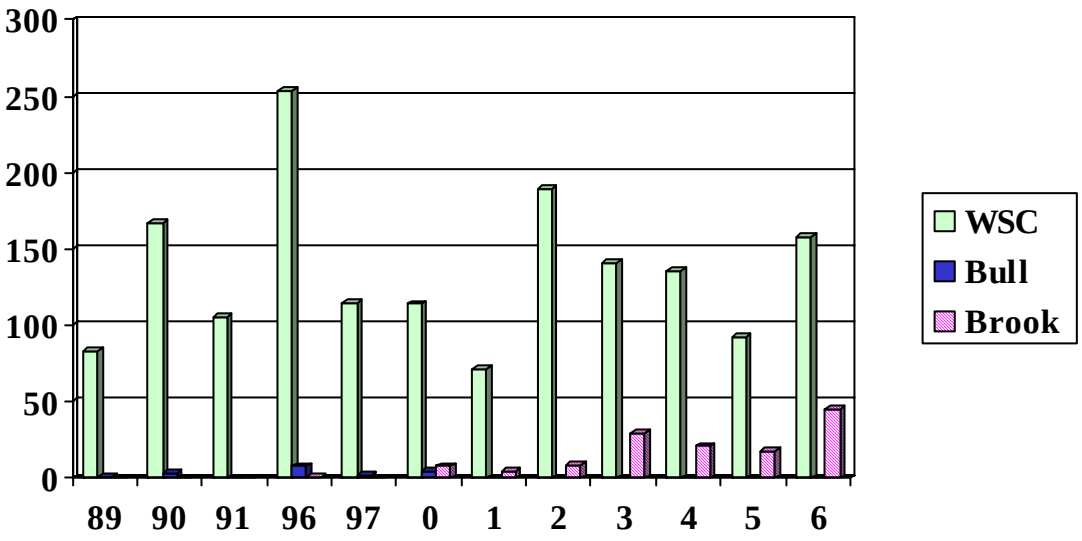

Figure 27. The number of fish of each species captured during electrofishing over the years in the Rye Creek 12.4 section.

In North Rye Creek immediately after the fire, debris flows of varying intensity occurred. This caused high mortality of fish in the study reach. In the past few years there have been no debris flows and the westslope cutthroat population has recovered (Figure 28). However, the brook trout population has never reached pre-fire numbers and in 2006, no brook trout were captured in North Rye Creek (Figure 29).

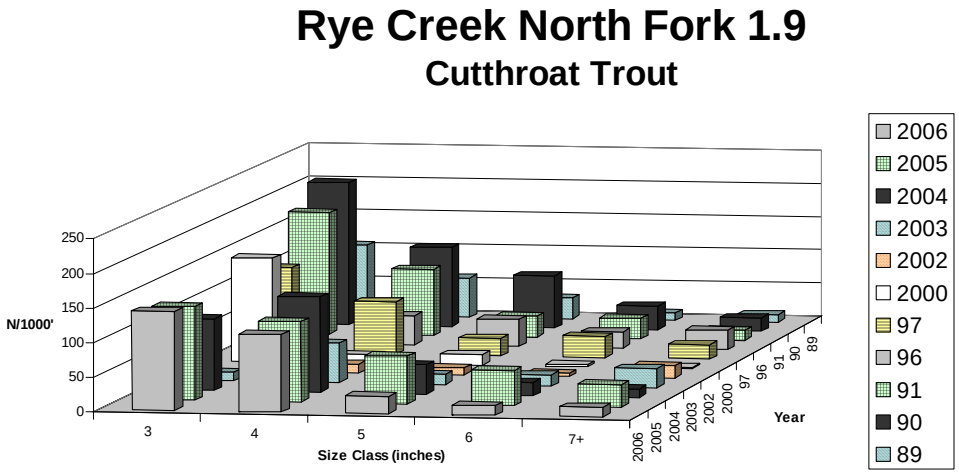

Figure 28. Population estimates of westslope cutthroat in the North Rye Creek 1.9 section during the years indicated.

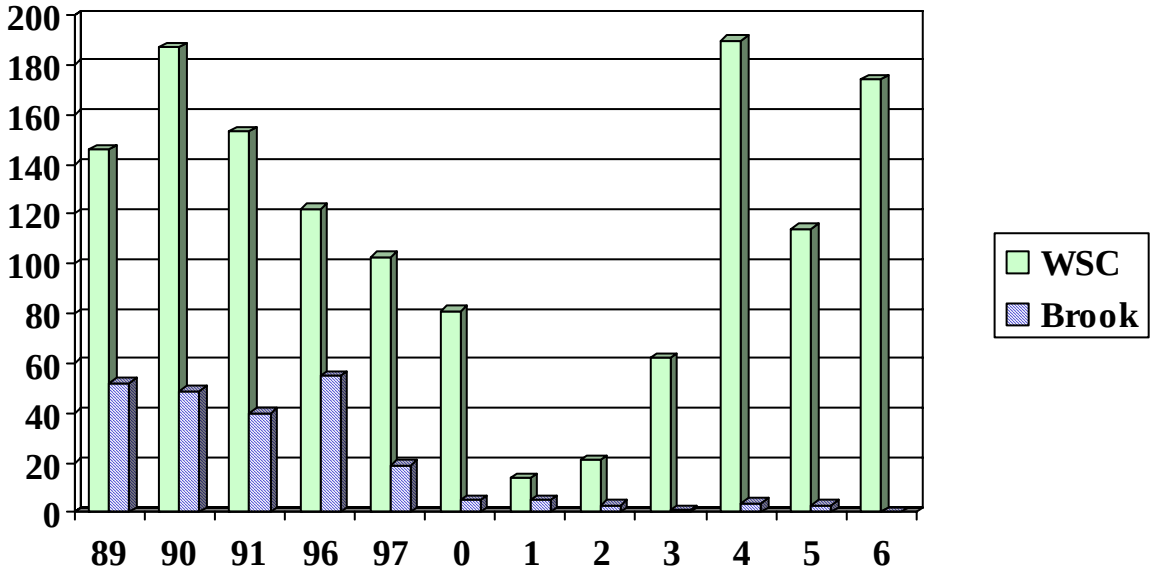

Figure 29. The number of fish of each species captured during electrofishing over the years in the North Rye Creek 1.9 section.

Westslope cutthroat populations in Sleeping Child and Skalkaho Creek have been monitored annually since 1989. On both study reaches the population has been stable overall, however, changes have occurred In Sleeping Child Creek debris flows after the 2000 fires caused significant declines in the fish population. The population has fully recovered and the 2006 estimate was the highest ever in the large sizes (Figure 30). On the Skalkaho Creek 16.8 study section the population structure has shifted from smaller fish to larger fish (Figure 31). This may be due to the catch and release fishing regulations instituted in the early 1990's.

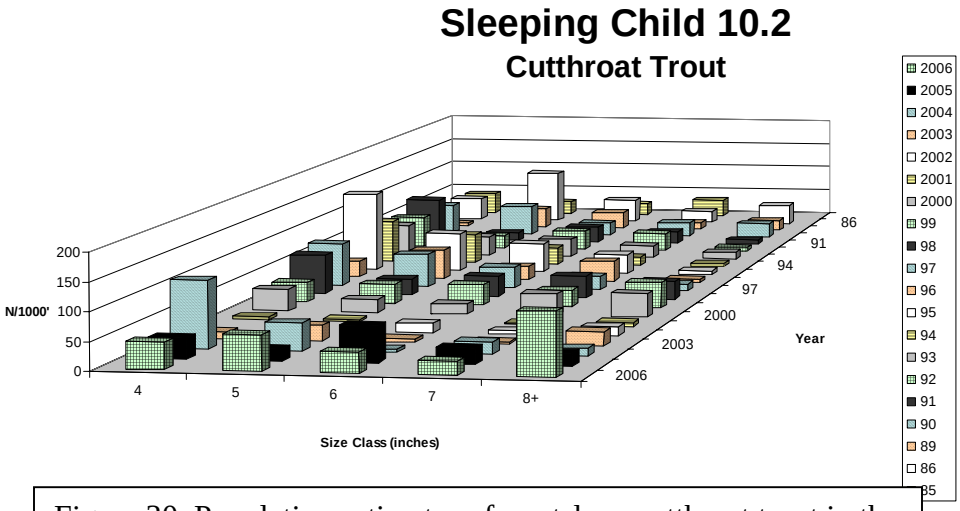

Figure 30. Population estimates of westslope cutthroat trout in the Sleeping Child 10.2 monitoring reach during the years indicated.

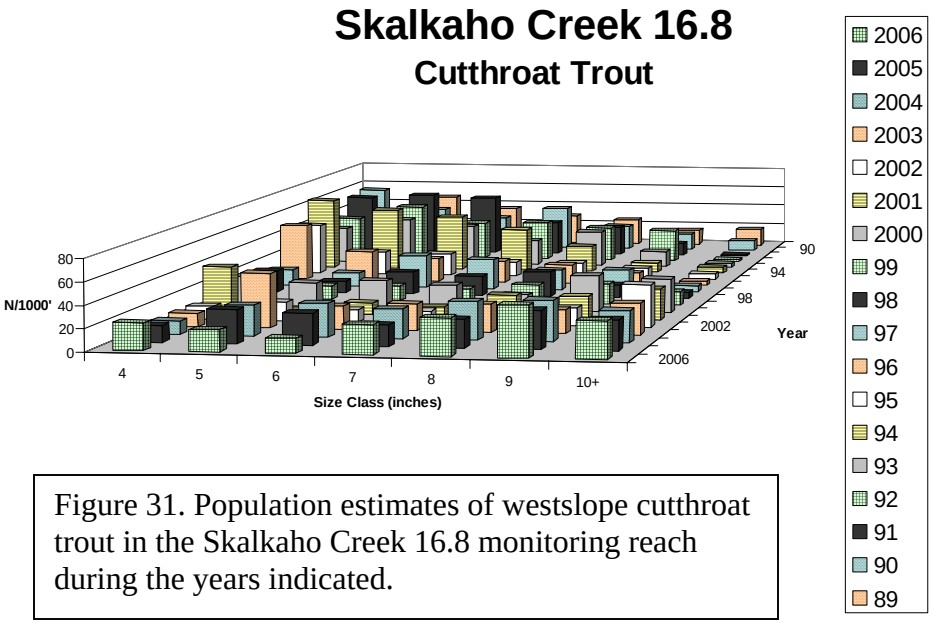

Figure 31. Population estimates of westslope cutthroat trout in the Skalkaho Creek 16.8 monitoring reach during the years indicated.

Camp Creek 2.3 (and 3.2)

This reach was restored from a ditch-like channel parallel to Highway 93 into a more natural meandering channel. The 1999 data represents a one-time population estimate before the restoration work. The 2003 - 2006 data represent the post-restoration data (Fig 32). The population of westslope cutthroat x rainbow trout hybrids is similar in density since the work was completed, but due to the increase in stream length, the population of fish has increased. In 2006, the population estimate indicated that the number of smaller fish had declined and the number of larger fish had increased.

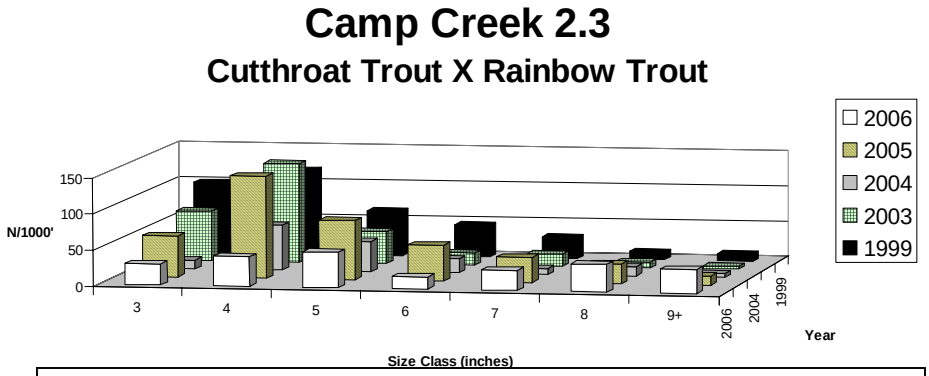

Figure 32. Population estimates of westslope cutthroat x rainbow trout in the Camp Creek 2.3 monitoring reach during the years indicated.

Several other study reaches were sampled in 2005 and 2006 on the Bitterroot National Forest. The most recent estimate may indicate slight increases, decreases or similar population size but no obvious long term trend was evident, or too few years of data have been collected to observe long term trends. The data for these streams is presented in Figures 33-42.

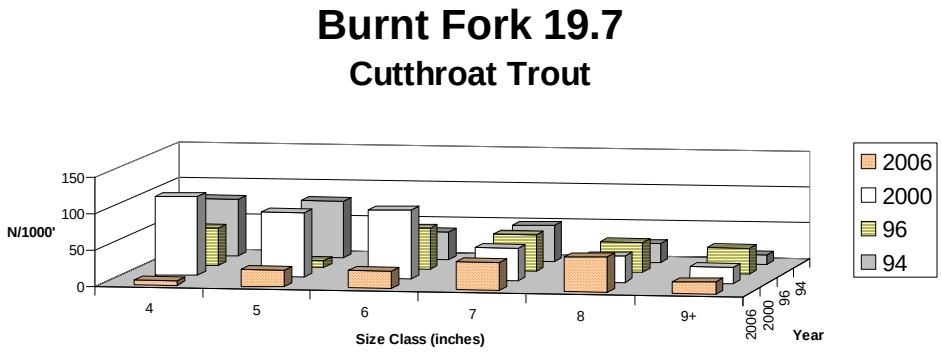

Figure 33. Population estimates of westslope cutthroat trout in the Burnt Fork 19.7 monitoring reach during the years indicated.

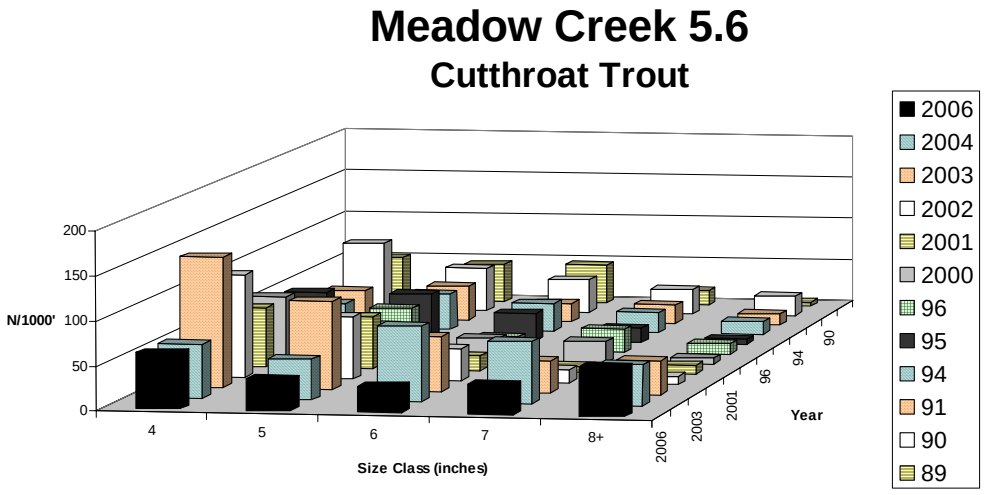

Figure 34. Population estimates of westslope cutthroat trout in the Meadow Creek 5.6 monitoring reach during the years indicated.

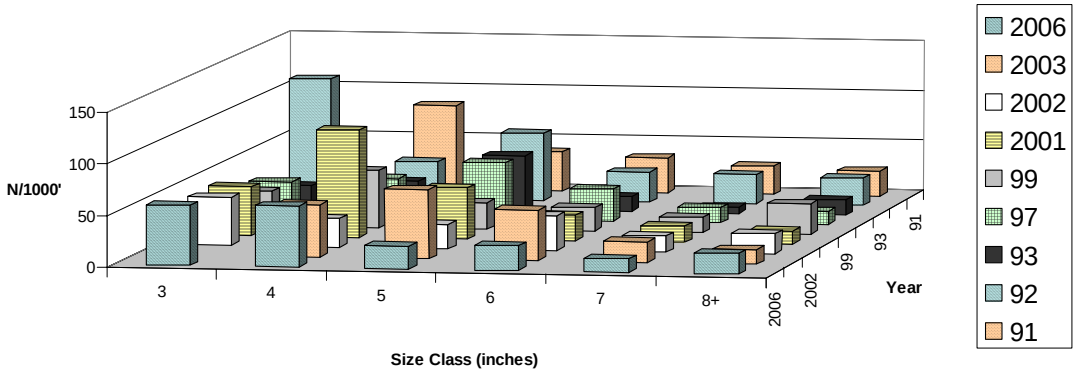

Figure 35. Population estimates of westslope cutthroat trout in the Moose Creek 1.4 monitoring reach during the years indicated.

Moose Creek 3.6
Cutthroat Trout

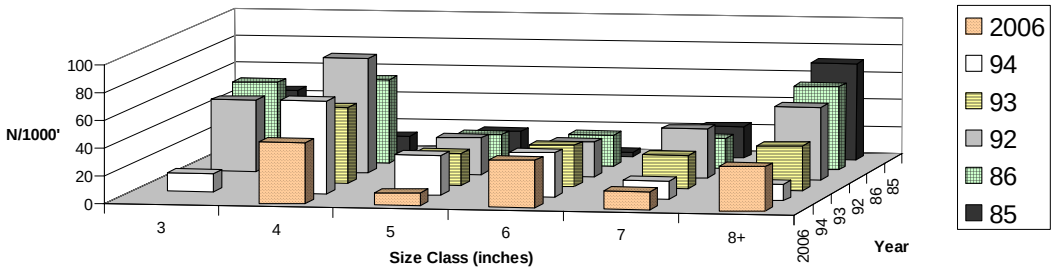

Figure 36. Population estimates of westslope cutthroat trout in the Moose Creek 3.6 monitoring reach during the years indicated.

Bertie Lord Creek 0.2
Cutthroat Trout

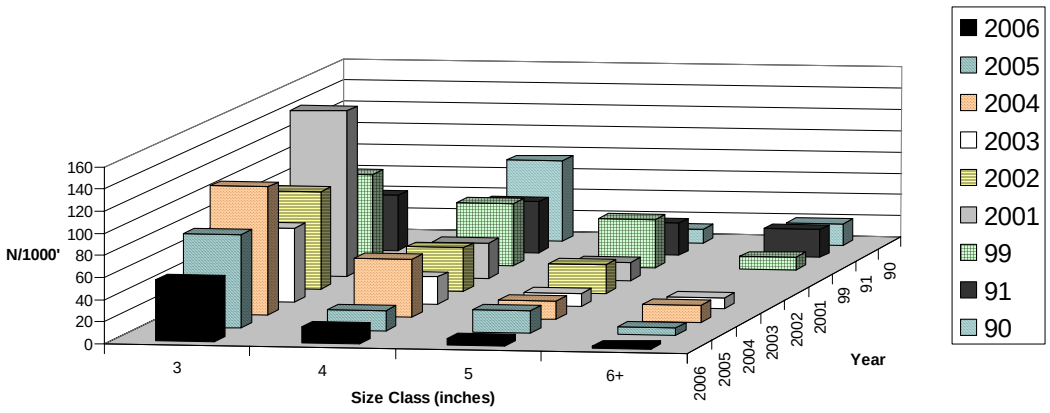

Figure 37. Population estimates of westslope cutthroat trout in the Bertie Lord Creek 0.2 monitoring reach during the years indicated.

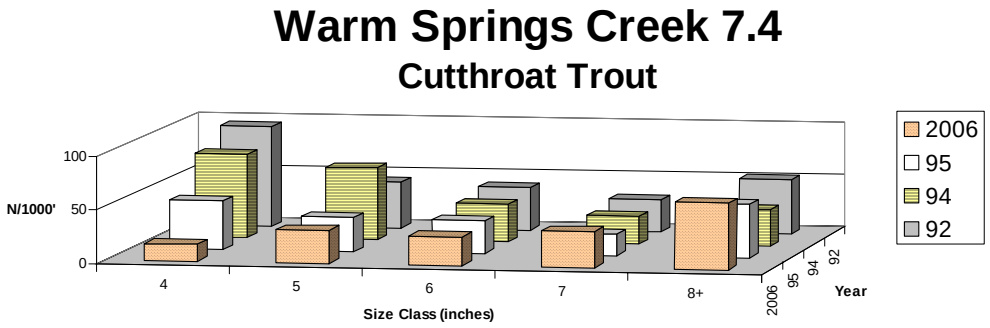

Figure 38. Population estimates of westslope cutthroat trout in the Warm Springs Creek 7.4 monitoring reach during the years indicated.

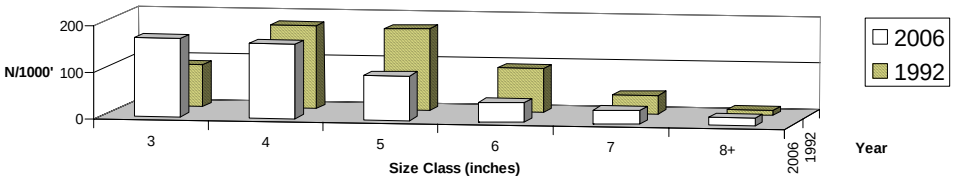

Figure 39. Population estimates of westslope cutthroat trout in the Boulder Creek 2.0 monitoring reach during the years indicated.

Trapper Creek 3.6
Cutthroat Trout

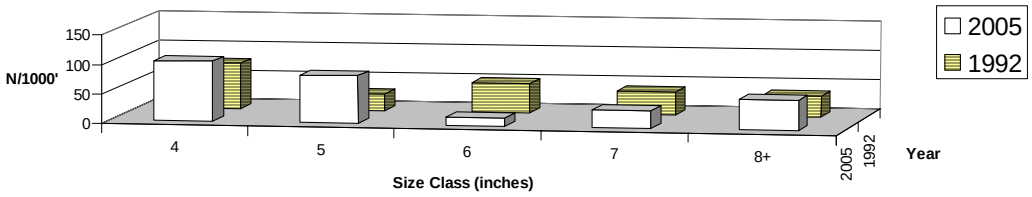

Figure 40. Population estimates of westslope cutthroat trout in the Trapper Creek 3.6 monitoring reach during the years indicated.

Piquett Creek 1.3
Cutthroat Trout

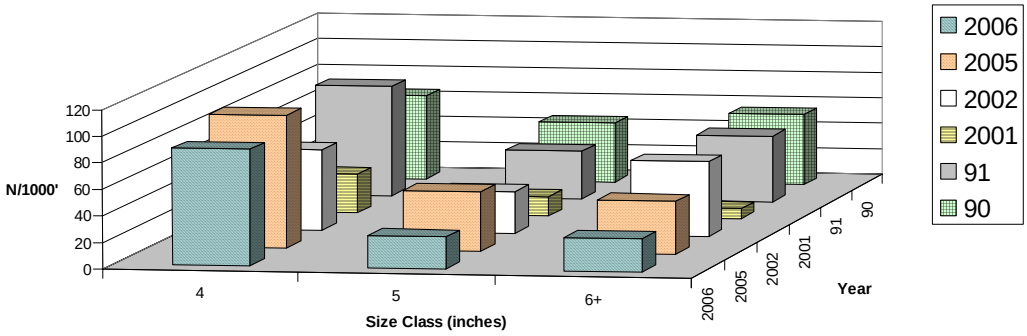

Figure 41. Population estimates of westslope cutthroat trout in the Piquette Creek 1.3 monitoring reach during the years indicated.

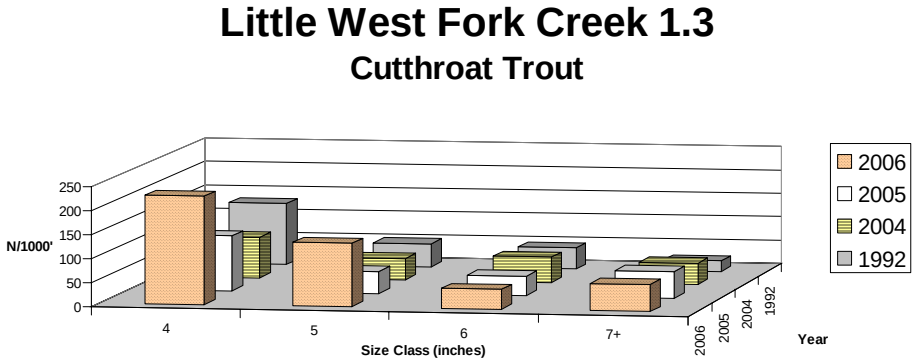

Figure 42. Population estimates of westslope cutthroat trout in the Little West Fork 1.3 monitoring reach during the years indicated.

Bull Trout

Bull trout population estimates are more difficult to collect due to the lesser number of bull trout in the study sections. During 2005 and 2006 bull trout population estimates were obtained in several streams. Some of the study sites had not been sampled in recent years so we had the opportunity to compare recent data with data that was quite a bit older. A common finding in our comparisons of recent data with older data is that the number of bull trout, particularly in smaller sizes during 2006 was lower than past estimates. One site, in particular, upper Warm Springs Creek, had a much lower population than in the early 1990's (Figure 48). The bull trout population estimates are summarized in Figures 43- 49.

The significance of the low numbers of smaller bull trout is unknown. Since it is evident at several sites, it is likely caused by physical factors such as streamflow, water temperature, etc. Most likely, the number of small bull trout will recover. We will monitor these reaches again in 2007 to observe if any trends are occurring. Bull trout are known to prefer very cold water temperatures. Data analyzed by personnel of the Bitterroot National Forest indicates that air and water temperatures have been increasing over the past decade at many sites on the Bitterroot National Forest (Figure 50 and 51).

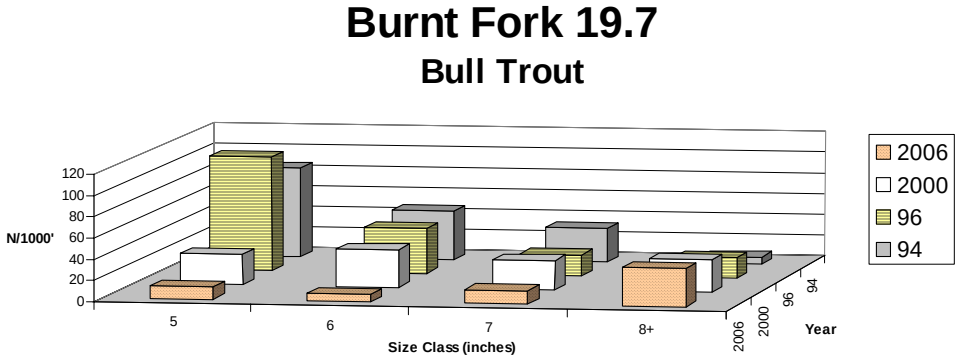

Figure 43. Population estimates of bull trout in the Burnt Fork 19.7 monitoring reach during the years indicated.

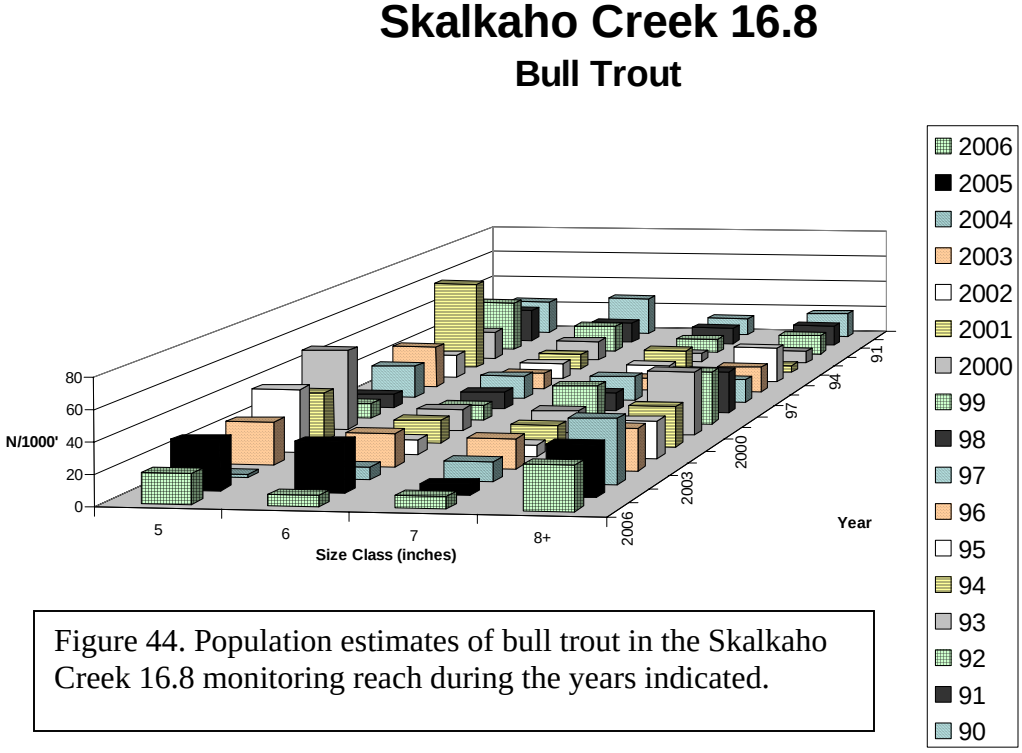

Figure 44. Population estimates of bull trout in the Skalkaho Creek 16.8 monitoring reach during the years indicated.

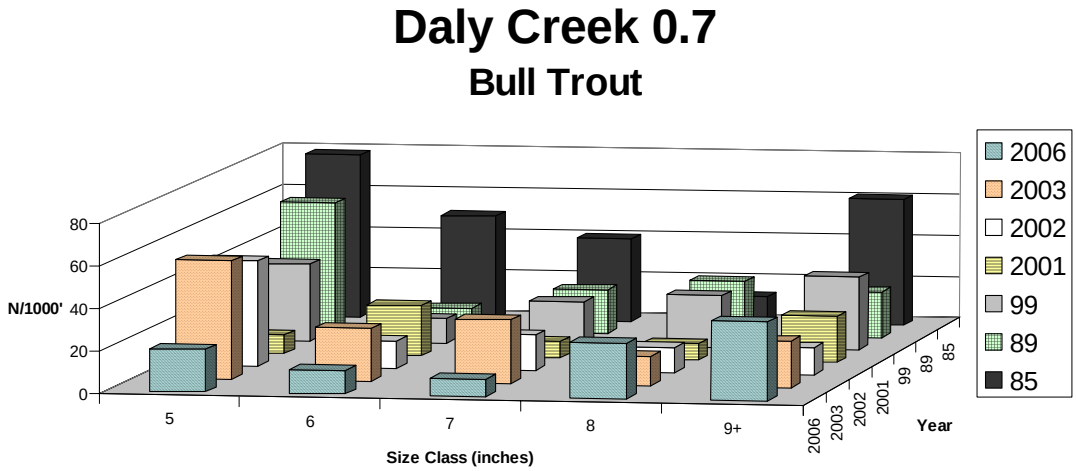

Figure 45. Population estimates of bull trout in the Daly Creek 0.7 monitoring reach during the years indicated.

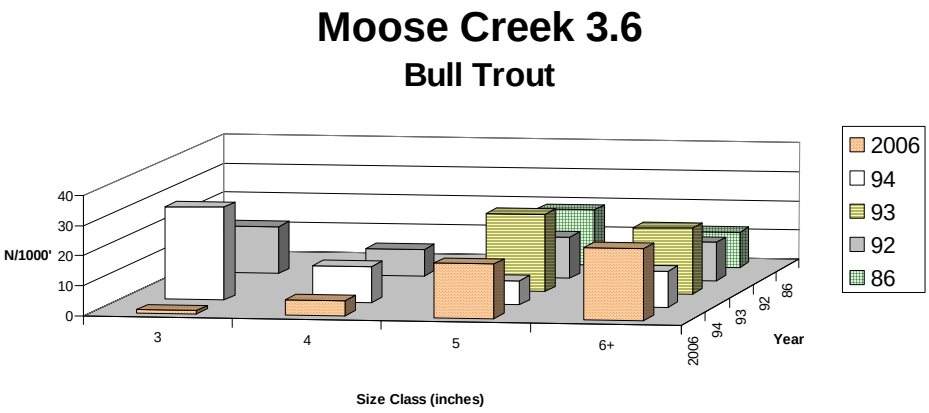

Figure 46. Population estimates of bull trout in the Moose Creek 3.6 monitoring reach during the years indicated.

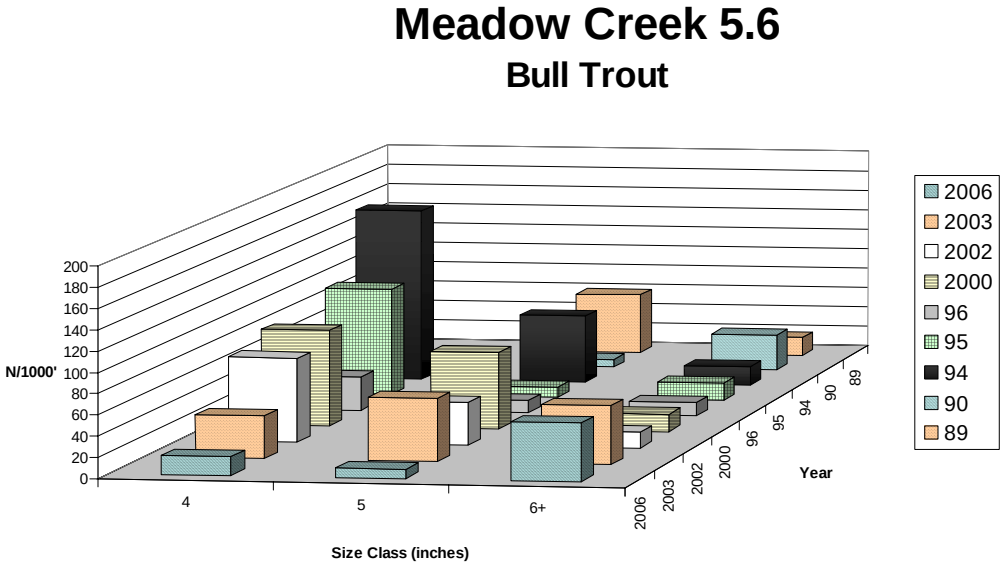

Figure 47. Population estimates of bull trout in the Meadow Creek 5.6 monitoring reach during the years indicated.

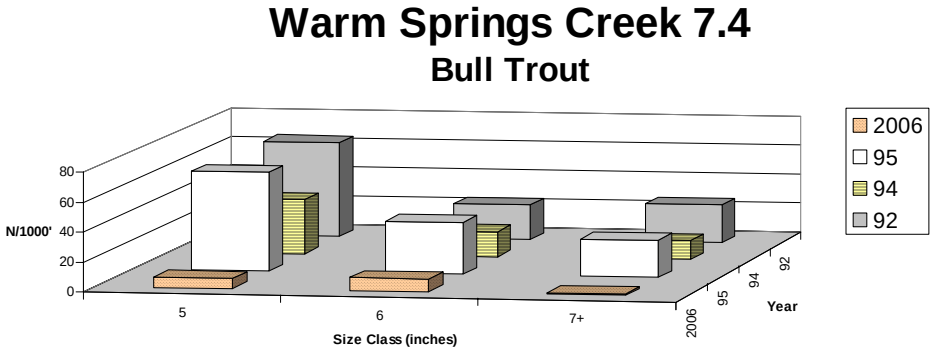

Figure 48. Population estimates of bull trout in the Warm Springs Creek 7.4 monitoring reach during the years indicated.

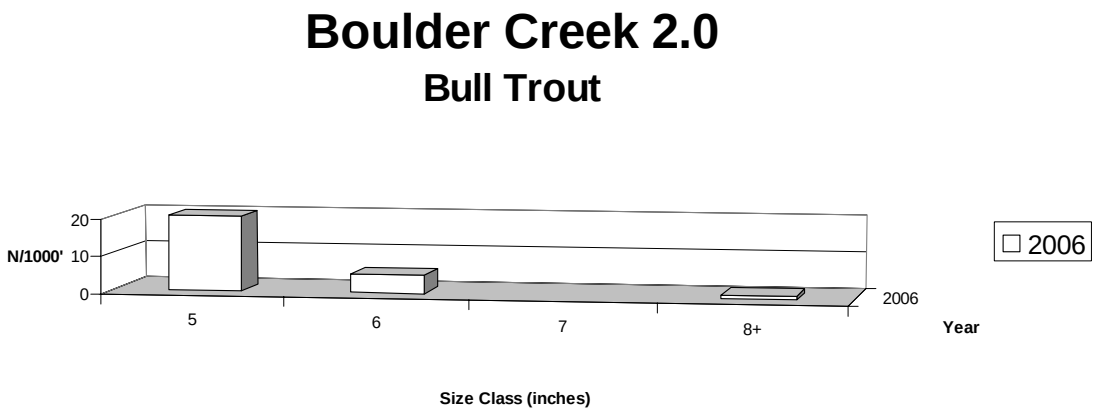

Figure 49. Population estimates of bull trout in the Boulder Creek 2.0 monitoring reach during the years indicated.

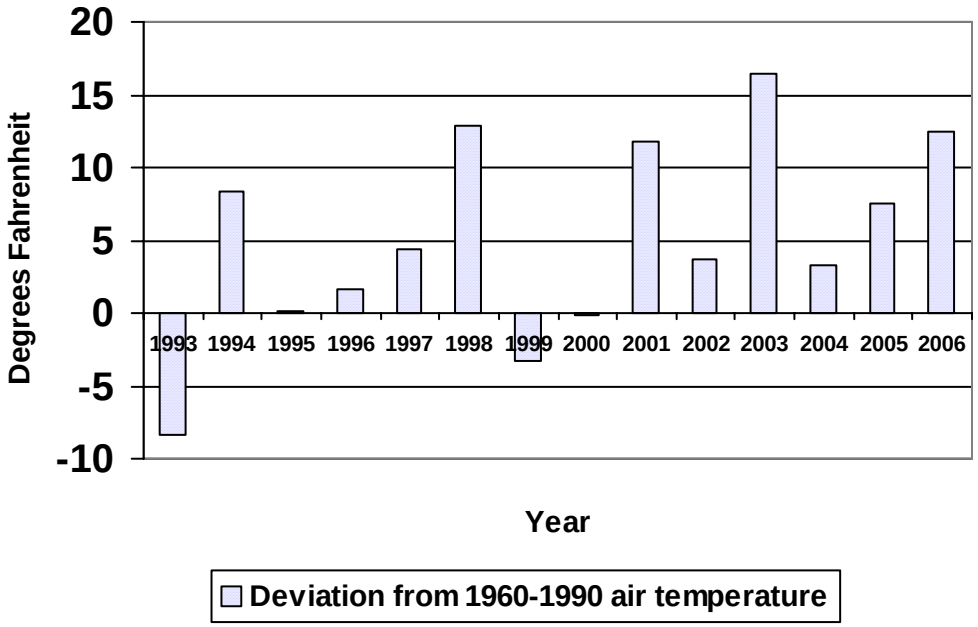

Figure 50. The deviation from past mean air temperatures in the Bitterroot Valley during 1993-2006. Note that most years the deviation is warmer than in the years 1960-1990.

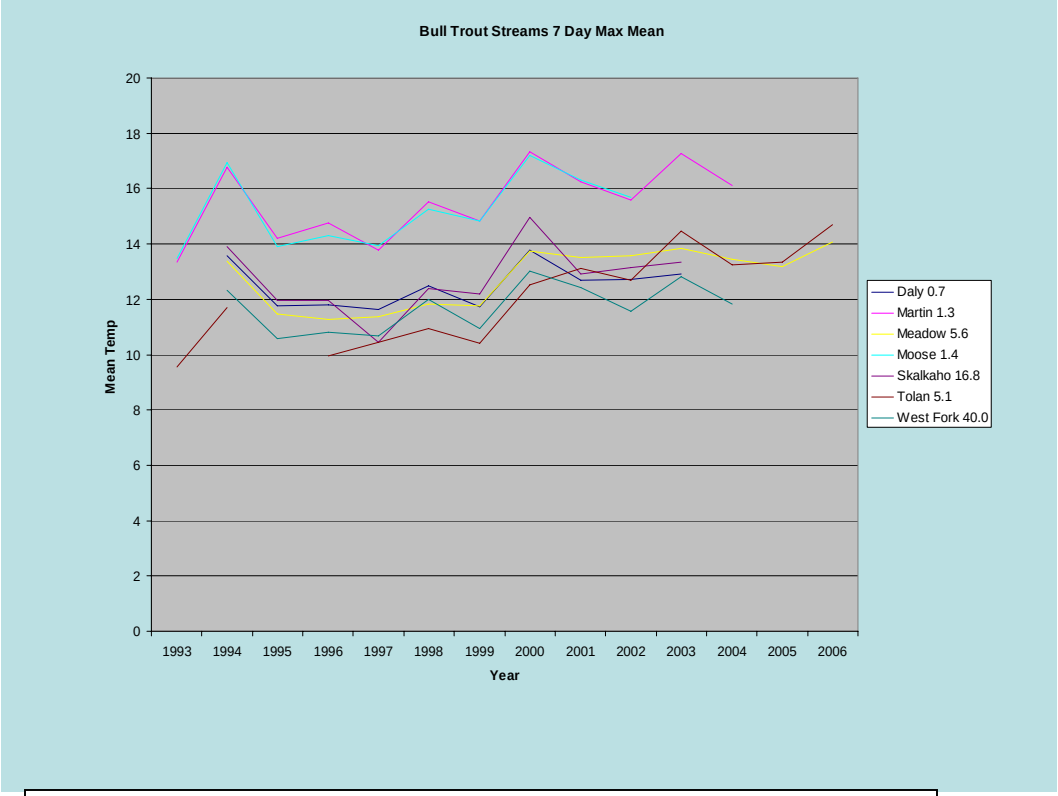

Figure 51. The 7-day maximum mean temperatures at some study sites in streams of the Bitterroot National Forest from 1993-2006. .

Lake Como

Lake Como has been stocked annually with rainbow trout and more recently with kokanee. Each Fall we set gillnets to assess the status of the fishery. Trends in the data are probably not evident due to limited sampling (Table 2).

Table 2 . Capture of fish in 2 gillnets set overnight in Lake Como during the year indicated. Total number of each species is listed with the average length in parenthesis.

Year	Rainbow trout	Kokanee	Largescale sucker
1998	4 (8.6)	61(8.7)	25(10.1)
1999	3(10.3)	15(7.8)	13(12.0)
2001	0	80(7.0)	30(8.5)
2002	8(10.5)	17(7.7)	33(8.4)
2003	3(9.6)	29(8.4)	16(9.8)
2004	5(11.6)	33(9.3)	6(8.0)
2005	2(11.4)	22(10.2)	44(10.8)

The stocking of kokanee did not occur in 2000 and 2002, but did occur in 2003. The average size of kokanee has been increasing.

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Prepared by: Christopher G. Clancy-June 2007

Stream	Code Number	Key Words
Bitterroot River drainage	2-03-8865	Trout populations
		Whirling Disease
		Fishing regulations
		Westslope cutthroat
		Rainbow trout

Brown trout
Bull trout
Brook trout
Radio Telemetry
Lake Como
Bitterroot River
Bitterroot National Forest