Status of the
Amended Salmon-Challis National Forest Plans
Management Indicator Species
Bull Trout

November 2004

Introduction

With the exception of the Big Lost River watershed, bull trout are common within watersheds of the Salmon–Challis National Forest. Bull trout have, since being listed as a "Threatened" species, been intensively monitored through a cooperative monitoring program with FS, IDFG, FWS, NOAA- Fisheries and other agencies. Protocols for electro-fishing, snorkeling and redd counts are well established and much data has been accumulated. Bull trout occur in streams within virtually all coniferous forest communities, which are subject to resource management activities, including timber and grazing. They are known to be sensitive to stream habitat and watershed alterations.

Habitat Distribution

Total acres and potential vegetation types within the aquatic habitat\community at type and distribution of this habitat/community type are displayed in Table 1 and Figure 1.

Monitoring Protocols

Redd Counts

Cursory broad-scale spawning surveys performed on designated aquatic MIS streams will identify "Index Areas" with the most suitable spawning habitat (generally stream reaches with < 2% gradient) and concentrations of bull trout spawning activity between the last week of August and the last week of September. Index Areas will be identified and marked with permanent transects at least 100 meters long, using GPS demarcation points, recorded on 1:24,000 scale maps, and installing visual reference points on the ground, for consistency in performing future redd counts. Thermographs with recording frequencies of two hours or less, will be located in the center of each Index Area, or at the upper and lower terminal points of spawning activity, depending on length.

Marking and counting of completed redds will be made on a weekly basis between the last week of August and the last week of September, in order to document the total completed spawning events and their weekly frequencies of occurrence, over the course of each spawning season, on each MIS stream monitored for redd counts that year. Index Area monitoring will be performed annually for the first five to seven years, until a complete year-class or "cohort's" baseline population trend is established, from the initial stage of spawning and recruitment, to maturity.

Supplemental observations will also be recorded for the number and sizes of spawning fish observed, along with other information (eg. Resident or fluvial spawners) that may be needed to define relationships of bull trout spawning activity for each stream. As part of the forest's annual monitoring report, aquatic MIS monitoring results for selected streams will include Index Area temperature profiles in association with a completed redd frequency histogram, to identify that year's onset, peak and termination of bull trout spawning activity.

Snorkeling

Aquatic MIS monitoring utilizing snorkeling to acquire bull trout population density and trend information will use procedures described in "Underwater Methods for Study of Salmonids in the Intermountain West",

by Russell F. Thurow. (USFS General Technical Report INT-GTR-307; July 1994) These methods outline the following general protocols.

Background rationale for the selection of index areas and designation of transect reaches will be described in a permanent monitoring file narrative, outlining snorkeling objectives and design for each aquatic MIS monitoring stream, including the following design factors:

- Timing: Specify snorkel timing in relation to bull trout life stages, time of year and day, and life stage/habitat use criteria. (Juvenile rearing, resident populations, monitoring for fluvial adults, etc.)

- Depth: Specify depth characteristics of respective transect locations and their relationships to transect site selection.

- Temperature: Specify temperature criteria relative to snorkel timing, to ensure monitoring consistency as well potentials for bull trout presence, activity, and uses of the transect area. Temperatures between 9° and 15° C are most favorable for monitoring bull trout presence and activity.

- Water Visibility: Visibility of at least 3 to 4 meters is most suitable, with sight distances less than the maximum water depth within the transect area being unsuitable for snorkeling.

Procedures for snorkeling each transect will be established and consistent for each transect, noting the direction, number of snorkelers, number of passes, etc. Methods of enumeration, size class groupings, (e.g. >80mm minimum size) transect area calculations and number of "counters" will be established and consistent between years. Methods for estimating population density and trend will be specified and consistent between all sites, and a common data record format will be established for all S-C Forest snorkeling transects (examples of which can be found in Thoreau's guide) to ensure consistency within and between sites, from year-to-year.

Electrofishing

The primary objective of monitoring by electrofishing is to determine bull trout occurrence as well as population density and trends, within respective aquatic MIS streams, their index areas, and permanent transect locations. Common interagency protocols for this monitoring technique are used for electrofishing surveys throughout the upper Salmon River sub-basin, following methods and data formats of the Idaho Fish and Game Department, Region 7 Fisheries Program. Results of all agency electrofishing surveys are compiled within an interagency fisheries Access database, created and maintained by the Idaho Fish and Game Department. Common interagency protocols that will be applied in all electrofishing MIS monitoring on the Salmon-Challis National Forest include the following items:

- The selection of representative stream habitat index areas within each MIS stream (e.g. low, mid and high) within 5^{th} or 6^{th} field Hydrologic Unit Code (HUC) watersheds.

- Permanent electrofishing transects of at least 100 meters in length will be demarcated using natural habitat breaks or block nets, and their locations benchmarked by GPS points, recorded on 1:24,000 scale maps and visually identified with markers on the ground, for consistency in future monitoring.

- At least five, wetted width measurements taken throughout each transect at the time of monitoring, in order to determine average stream width, total area sampled and fish density.

- Multiple sampling passes of the entire transect performed until less than 50% of the total fish captured (in the prior pass) are captured. This will require a minimum of two passes, with possibly three or four, depending on site conditions.

- Only fish larger than 70mm are measured and recorded, within the Idaho Fish and Game Department's prescribed database size classes; fish smaller than 70 mm are only counted and recorded.

Electrofishing will be performed during periods of suitable stream temperatures for bull trout presence and activity, to ensure consistency in monitoring and potentials for bull trout presence at the time of sampling. Temperatures between 9° and 15° C are most favorable for monitoring bull trout presence and activity. Standard methods for low impact handling of fish will be followed, as prescribed within collecting permits from the Idaho Fish and Game Department, U.S. Fish and Wildlife Service, and NOAA Fisheries. These include the utilization of at least three person crews, buckets for safely holding captured fish, possibly supplemental aeration and/or anaesthetization, and rapid handling to reduce stress and mortality. Standard field forms will be utilized in all transects to consistently record data elements, measurements, and supplemental observations required by the IDFG methodology and various agency's collecting permit stipulations. Each lead fisheries biologist performing MIS monitoring will have collecting permits and follow their stipulations as required.

Data Evaluation

Forest-wide bull trout distribution and status are displayed in Figure 1. This forest-wide GIS coverage and database will be updated annually, as new information is acquired. In addition, present agency direction is to also compile resource inventory data on the National Resource Information System (NRIS). Forest bull trout monitoring sites listed by Ranger District and their planned bull trout monitoring strategies are noted in Table 1.

At least three MIS streams on each Ranger District will be monitored for bull trout occurrence and population trends each year; in this manner, half of the total thirty-six streams would be monitored annually. Monitoring will be conducted on each stream at least three times within the next six years, in order to establish minimum data for determining population density and trend (Numbers of fish and density per 100 square meters) and/or recruitment density and trend (Number of redds and estimated recruitment per 100 square meters.). Available baseline population density and trend information for selected MIS streams are noted in Table 2 and Table 3.

Annually, the Salmon-Challis National Forest, will report on new fisheries data collected each year, as well as updates to population trend analyses for the selected MIS streams, similar to the summaries illustrated in Figure 2.

Conclusion

Present bull trout distribution and status, Figure 2, provides a meta-population perspective of on-forest distribution and status throughout the upper Salmon River sub-basin. With the change in Idaho bull trout fishing regulations in the mid-1990's, basin-wide populations of bull trout appear to be gradually recovering as older, larger, more fecund fluvial individuals within the meta-population begin rebuilding and reestablishing spawning runs to tributary streams within the sub-basin. The increase of spawning activity from these mature fluvial adults, in association with increased spawning activity of protected smaller resident individuals (now reaching maturity at five to seven years of age) have set the stage for a potential broad scale, upward trend of bull trout populations throughout the basin.

Review of available baseline data for the thirty-six selected bull trout MIS streams indicates that while this trend may generally be underway at basin scales, at sub-watershed scales a large degree of variation still exists both between streams, as well as between year classes of bull trout within each sub-watershed. Redd count data illustrate a large degree of recruitment activity both between years, as well as between different reaches within the same stream, by year. However, fish density data, whether by snorkeling or electro-fishing, illustrate the variability of both year/size classes and total numbers of fish within individual streams, between years.

Comparisons of selected S-C National Forest MIS streams indicate that while some streams exhibit possibly low but stable numbers of fish between years, others indicate fewer numbers of fish now than in the past, some indicate a slight increasing trend, while several streams have incomplete data from which to draw a definitive conclusion at this point in time. In general, considering all of the above factors and their variability between streams, it is concluded that forest-wide, bull trout population trends are generally stable to slightly increasing, as can be seen from the available baseline data. However, individual sub-watersheds may have specific management or habitat issues that result in sub-populations, which can be either better or below the forest-wide average condition. It is the goal of bull trout MIS monitoring program over the next seven years to better define these local sub-population status and trends, and to develop a more complete assessment of forest-wide conditions at a meta-population scale.

Table 1 – Aquatic Habitat/Community Type on the Salmon-Challis National Forest

GIS PVT Layer Designation	Acres
Water	3,763 Acres

Figure 1 – Distribution of Aquatic Habitat/Community Type

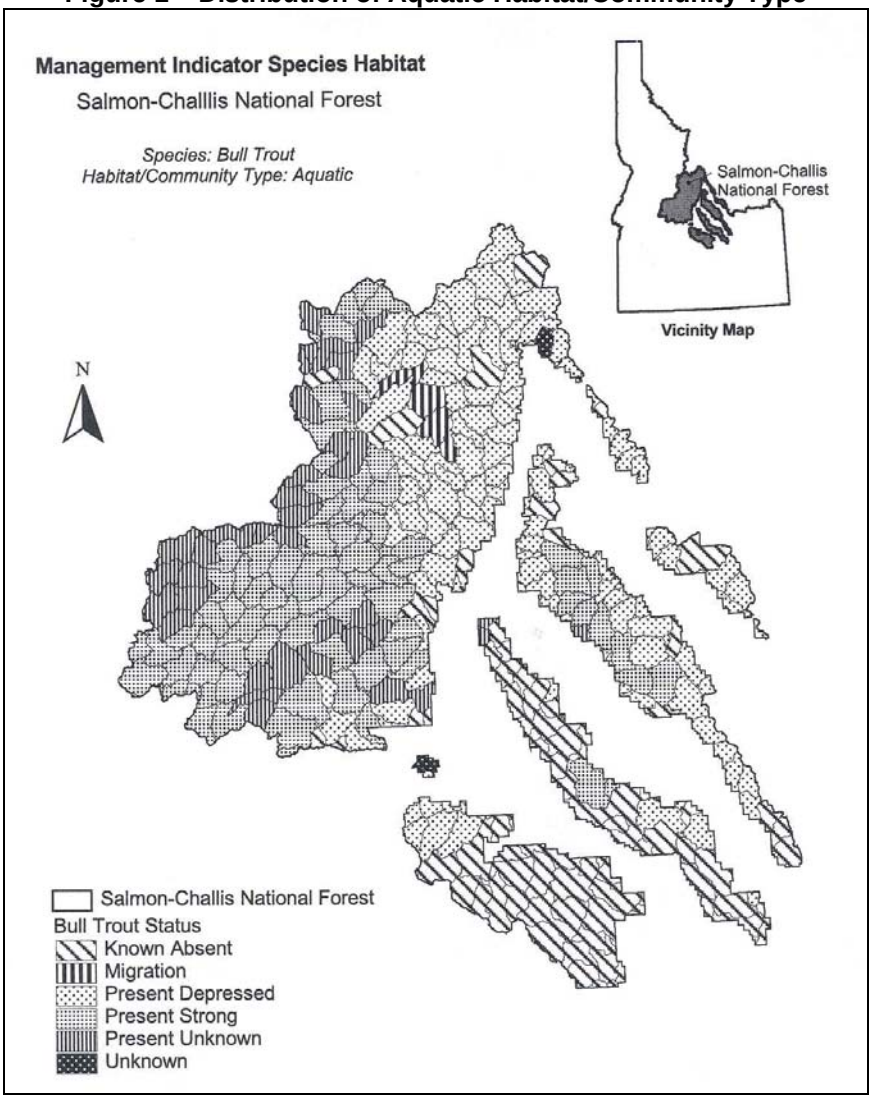


Table 2 - Salmon-Challis National Forest Selected Bull Trout MIS Monitoring Streams

Stream	Ranger District	Electrofishing	Snorkeling	Redd Counts	1st Yr. Completed
1. Napias	Salmon Cobalt			X	1999
2. Little Deep	Salmon Cobalt			X	1999
3. Panther Headwaters	Salmon Cobalt			X	2000
4. Little Deep	Salmon Cobalt		X		1999
5. Panther Headwaters	Salmon Cobalt		X		2001
6. Hat	Salmon Cobalt		X		2000
7. E. Fork Mayfield	Middle Fork			X	2004
8. Ten Mile	Yankee Fork			X	2002
9. McKay	Yankee Fork		X	X	1998
10. Yankee Fork	Yankee Fork	X	X		1998
11. W. Fork Yankee Fork	Yankee Fork		X		1998
12. Jordan	Yankee Fork	X	X		2001
13. Squaw	Yankee Fork	X	X		2001
14. Thompson	Yankee Fork	X	X		2004
15. Carmen	North Fork	X			1997
16. Fourth of July	North Fork	X			1997
17. Squaw	North Fork	X			1997
18. Boulder	North Fork	X			1997
19. Moose	North Fork	X			1997
20. Twin	North Fork	X			1997
21. Hughes	North Fork	X			1997
22. Wood	North Fork	X			1997
23. Horse	North Fork	X			1997
24. Timber	Lost River	X			1995
25. Sawmill	Lost River	X			1995
26. Williams	Lost River	X			2000
27. Wet	Lost River	X			1995
28. Challis	Challis	X			2002
29. E. Fork Pahsimeroi	Challis	X			2001
30. Morgan	Challis	X			2001
31. Big	Challis	X			2002
32. E. Fork Hayden	Leadore	X		X	2004
33. Bear Valley	Leadore	X		X	2001
34. Everson	Leadore	X		X	2001
35. Big Timber	Leadore	X		X	1997
36. Big Bear	Leadore	X		X	2004

Table 3 - Bull Trout Monitoring Baseline Trend Data - Number of Redds Counted

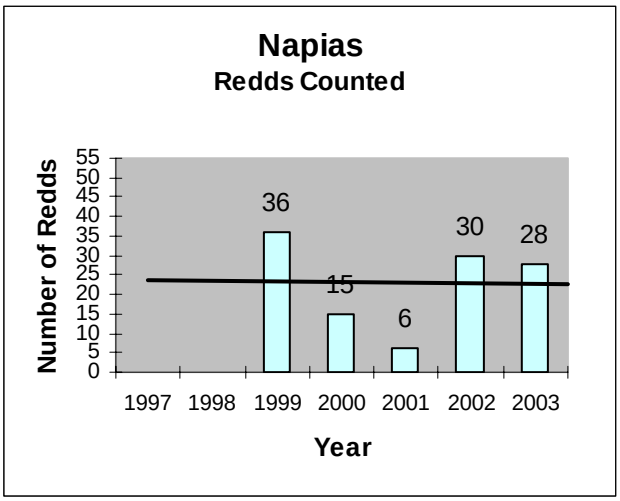
Stream	Ranger District	1997	1998	1999	2000	2001	2002	2003
1. Napias	Salmon Cobalt	-	-	36	15	6	30	28
2. Little Deep	Salmon Cobalt	-	-	20	19	10	49	30
3. Panther Headwaters	Salmon Cobalt	-	-	-	53	33	40	35
4. E. Fork Mayfield	Middle Fork	-	-	-	-	-	-	-
5. Ten Mile	Yankee Fork	-	-	-	-	-	5	4
6. McKay	Yankee Fork	-	-	-	-	-	10	9
7. E. Fork Hayden	Leadore	-	-	-	-	-	-	-
8. Bear Valley	Leadore	-	-	-	-	7	18	-
9. Everson	Leadore	-	-	-	-	-	-	-
10. Big Timber	Leadore	-	-	-	-	-	-	-
11. Big Bear	Leadore	-	-	-	-	-	-	-

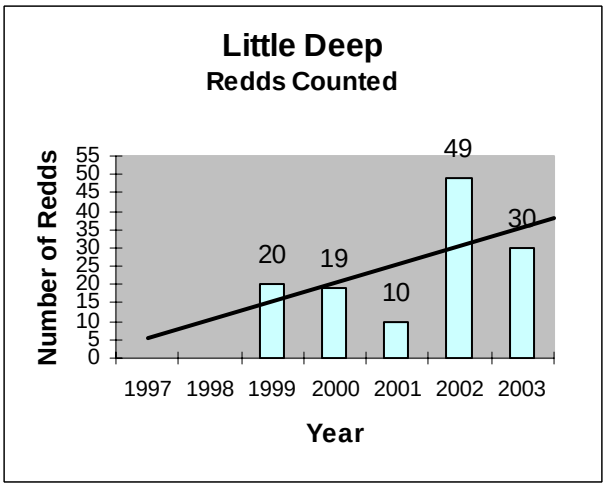
Table 4 - Bull Trout Snorkeling (S) and Electrofishing (E) Monitoring Baseline Trend Data - Numbers of Bull Trout per 100 Square Meters

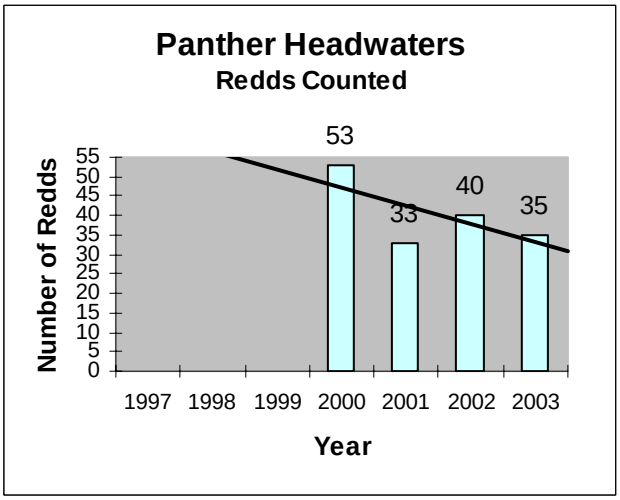
Stream	Ranger District	1997	1998	1999	2000	2001	2002	2003
1. Little Deep (S)	Salmon Cobalt	-	-	4	-	-	4	1
2. Panther Headwaters (S)	Salmon Cobalt	-	-	-	-	3	6	4
3. Hat (S)	Salmon Cobalt	-	-	-	3	2	3	3
4. McKay (E)	Yankee Fork	-	11	4	-	-	-	-
5. Yankee Fork (E)	Yankee Fork	-	1.7	0.5	-	0.3	-	-
6. W. Fork Yankee Fork (E)	Yankee Fork	-	2.7	-	-	-	-	-
7. Jordan (E)	Yankee Fork	-	-	-	-	0.9	-	-
8. Squaw (E)	Yankee Fork	-	-	-	-	0.1	-	-
9. Thompson (E)	Yankee Fork	-	-	-	-	-	-	-
10. Carmen (E)	North Fork	10	-	19	-	-	0	0
11. Fourth of July (E)	North Fork	5	-	8	-	-	5	-
12. Squaw (E)	North Fork	2.2	-	-	3	-	1.5	0.2
13. Boulder (E)	North Fork	4	0	0	-	2	3	-
14. Moose (E)	North Fork	0	0	0	-	-	4	-
15. Twin (E)	North Fork	5	10	-	9	-	7	-
16. Hughes (E)	North Fork	0	2	-	-	0	0	0
17. Wood (E)	North Fork	4	-	7	-	8	4	-
18. Horse (E)	North Fork	14	7	8	10	10	4	-
19. Timber (E)	Lost River	6.6	-	-	14.1	-	-	-
20. Sawmill (E)	Lost River	0	-	-	-	-	-	-
21. Williams (E)	Lost River	-	-	-	5.4	-	-	-
22. Wet (E)	Lost River	8.3[1]	-	12.2	-	-	0.3	-
23. Challis (E)	Challis	-	-	-	-	-	0.2	-
24. E. Fork Pahsimeroi (E)	Challis	-	-	-	-	1.7	-	-
25. Morgan (E)	Challis	-	-	-	-	0.2	-	-
26. Big (E)	Challis	-	-	-	-	-	1.5	-
27. E. Fork Hayden (E)	Leadore	-	-	-	-	-	-	-
28. Bear Valley (E)	Leadore	-	-	-	-	1.1	-	-
29. Everson (E)	Leadore	-	-	-	-	3	-	-
30. Big Timber (E)	Leadore	0.9	-	-	-	-	-	5.5
31. Big Bear (E)	Leadore	-	-	-	-	-	-	-

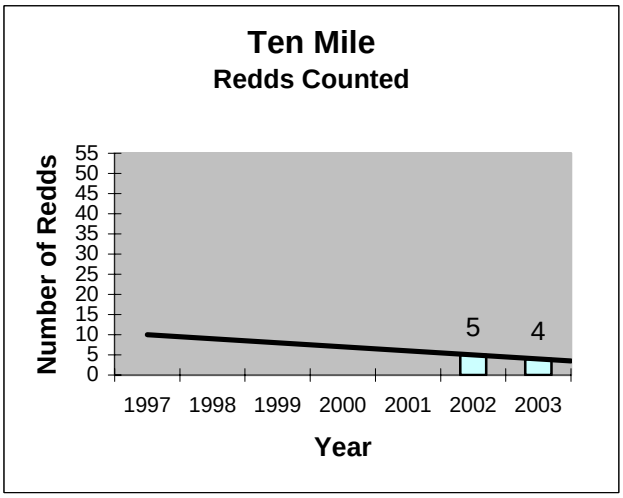
[1] 1995 data

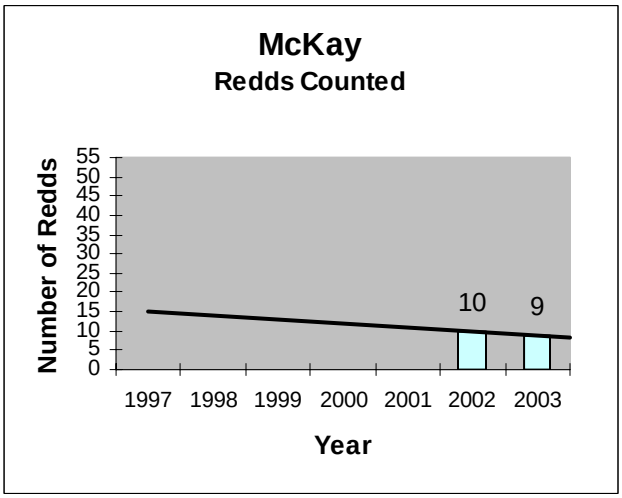
Figure 2 - Bull Trout Monitoring Baseline Trend Data - Number of Redds Counted

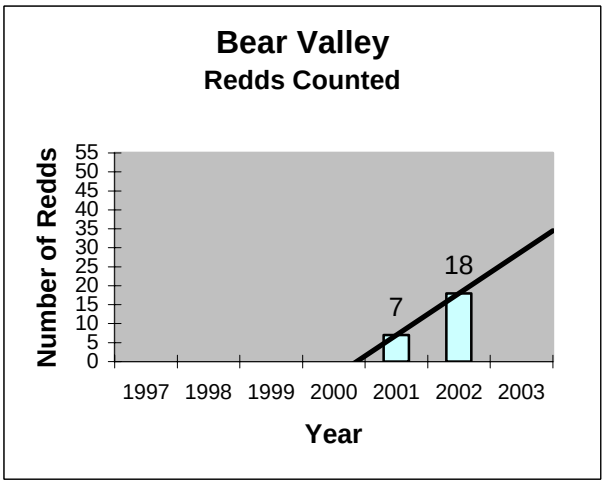












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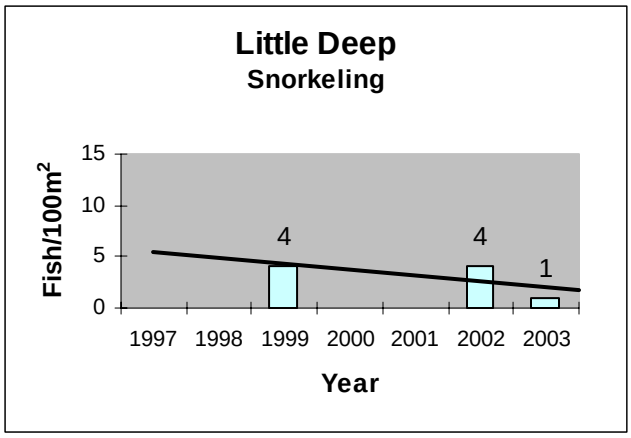

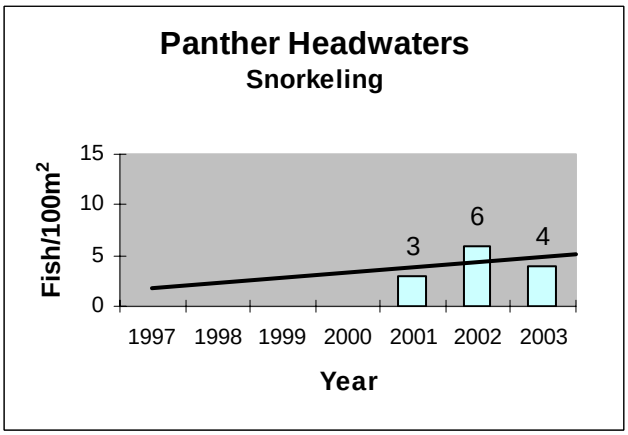

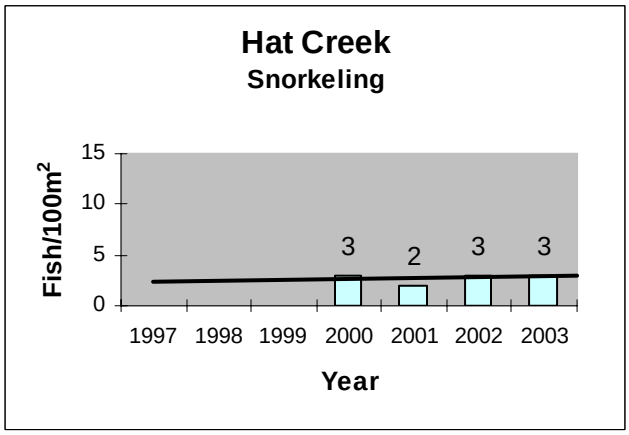

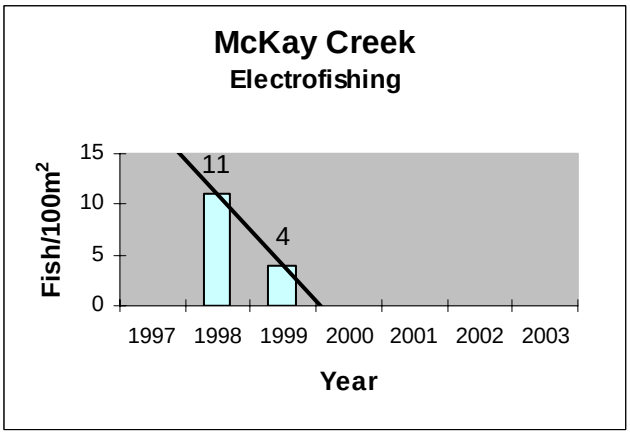

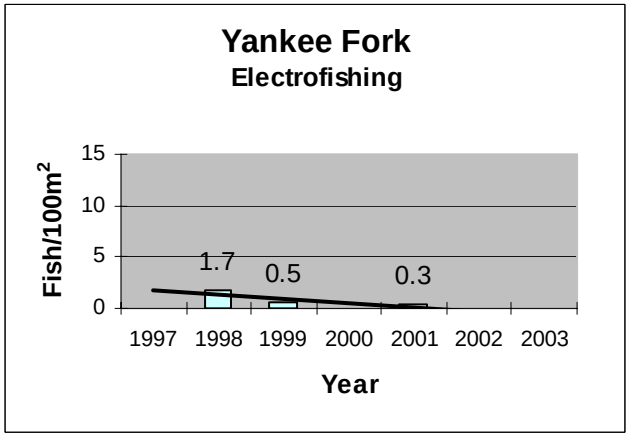

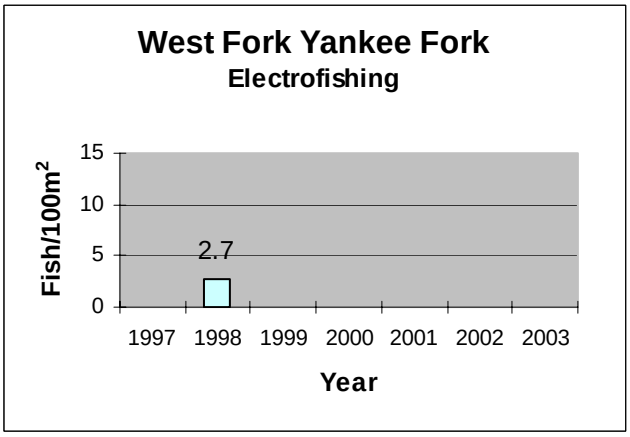

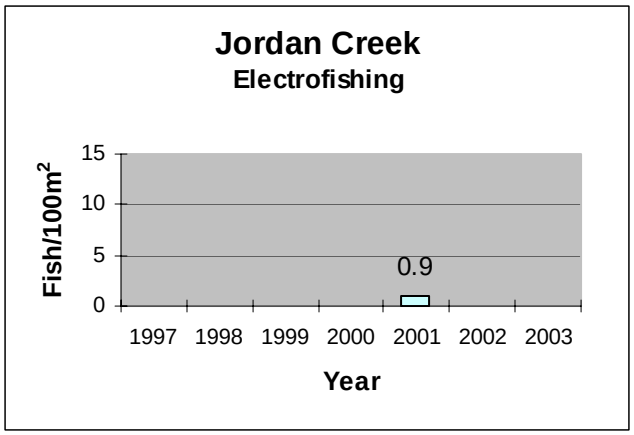
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Electrofishing
Fish/100m2
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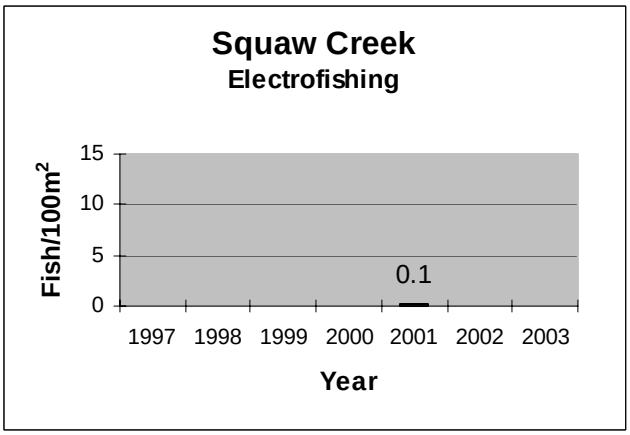
10
5
0
0.9
1997 1998 1999 2000 2001 2002 2003
Year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Fish/100m2
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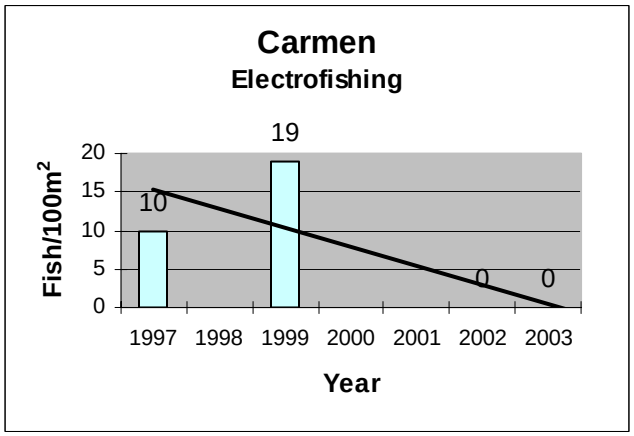
Year


Carmen
Electrofishing
Fish/100m2
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19
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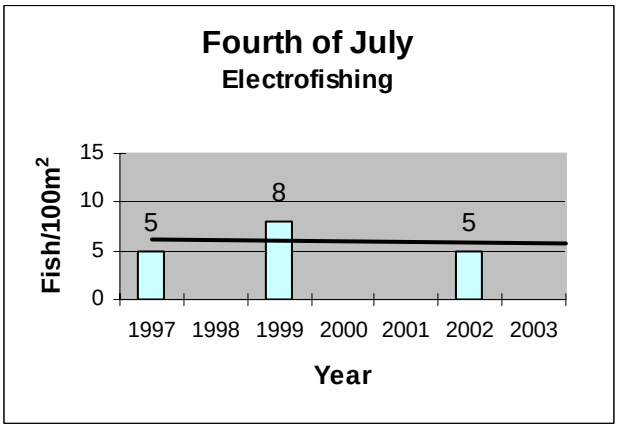
1997 1998 1999 2000 2001 2002 2003
Year


Fourth of July
Electrofishing
Fish/100m2
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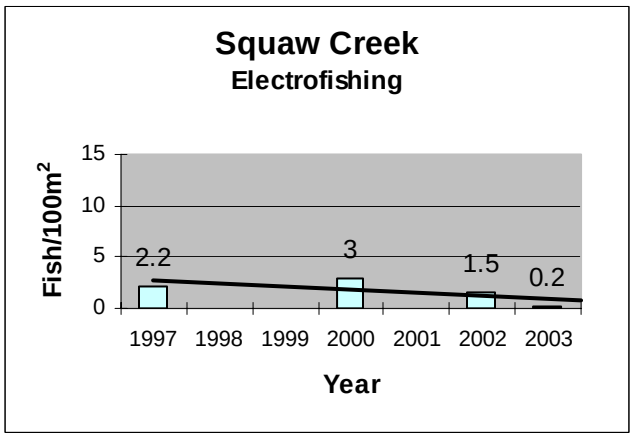
8
5
5
1997 1998 1999 2000 2001 2002 2003
Year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Electrofishing
Fish/100m2
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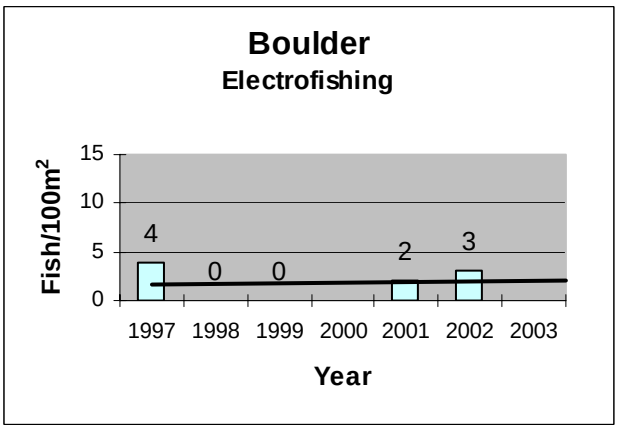
1997 1998 1999 2000 2001 2002 2003
Year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Fish/100m2
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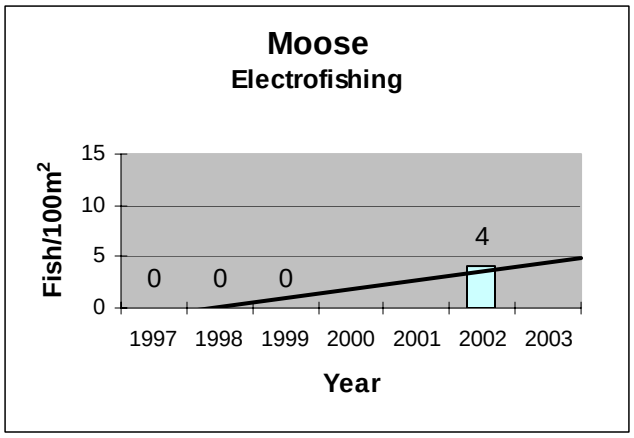
Year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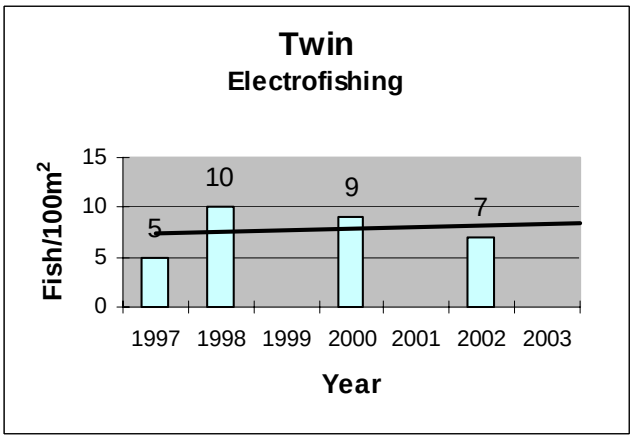
Year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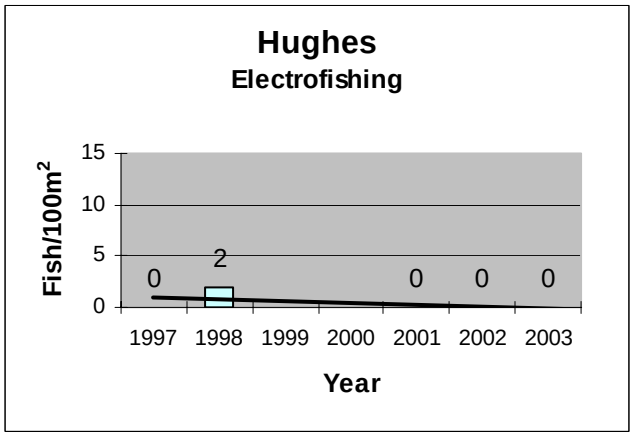
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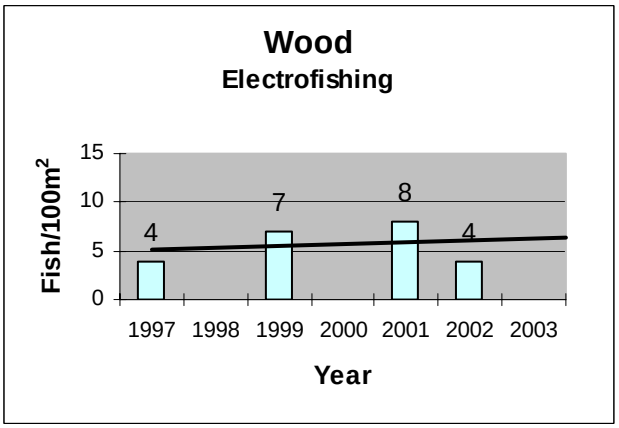
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Fish/100m2
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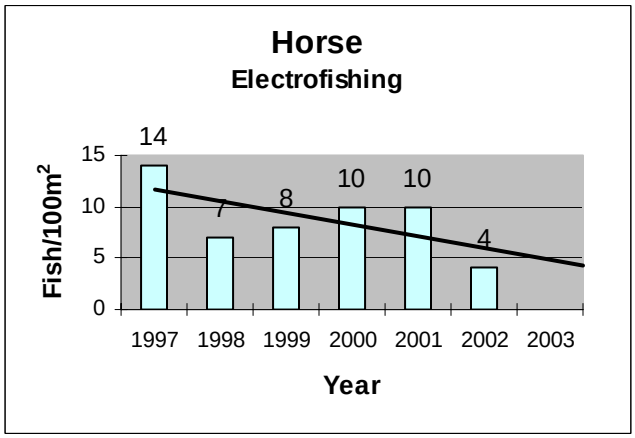
Year


Horse
Electrofishing
Fish/100m2
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10
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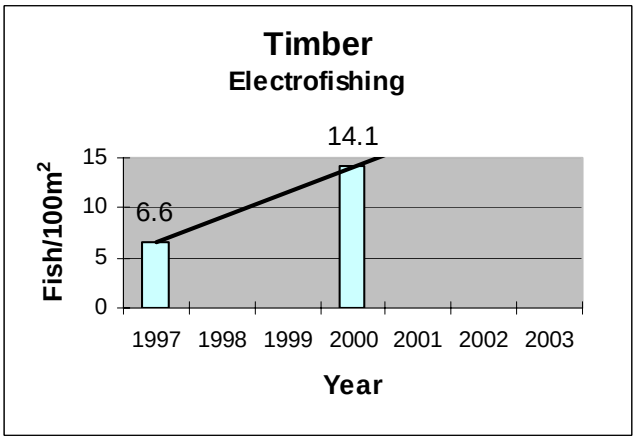
14 7 8 10 10 4
1997 1998 1999 2000 2001 2002 2003
Year


Timber
Electrofishing
Fish/100m2
15
10
5
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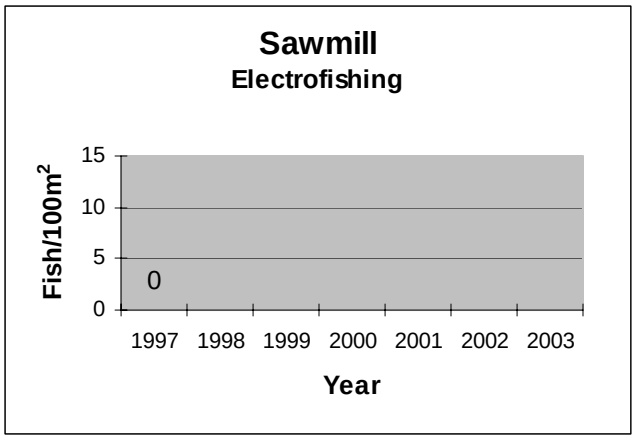
6.6 14.1
1997 1998 1999 2000 2001 2002 2003
Year


Sawmill
Electrofishing
Fish/100m2
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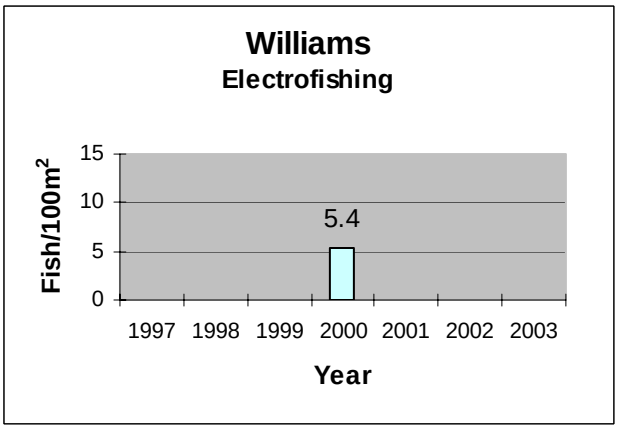
1997 1998 1999 2000 2001 2002 2003
Year


Williams
Electrofishing
Fish/100m2
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10
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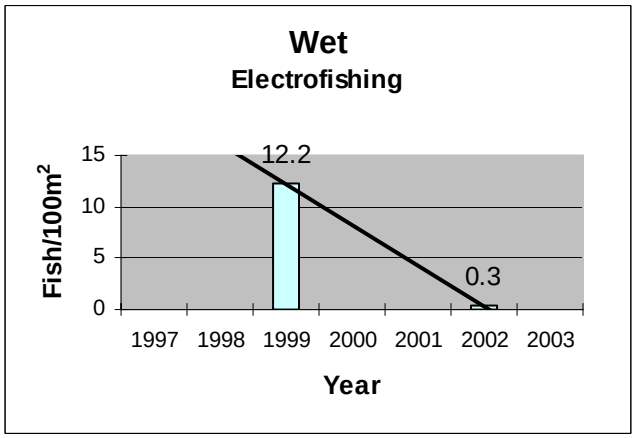
5.4
1997 1998 1999 2000 2001 2002 2003
Year


Wet
Electrofishing
Fish/100m2
15
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5
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12.2
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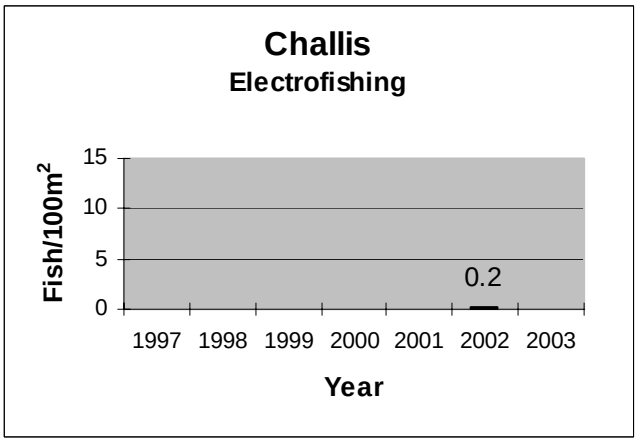
1997 1998 1999 2000 2001 2002 2003
Year


Challis
Electrofishing
Fish/100m2
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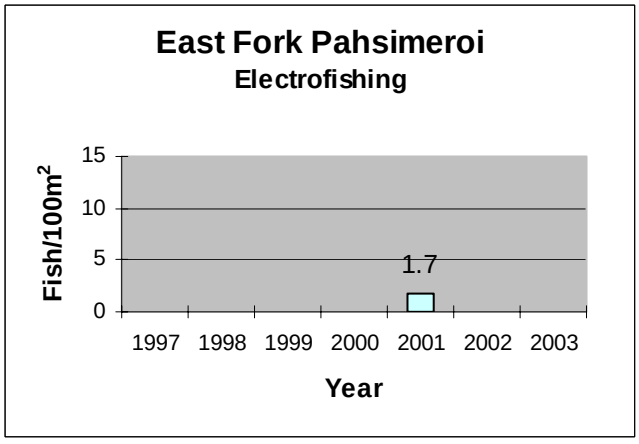
1997 1998 1999 2000 2001 2002 2003
Year


East Fork Pahsimeroi
Electrofishing
Fish/100m2
15
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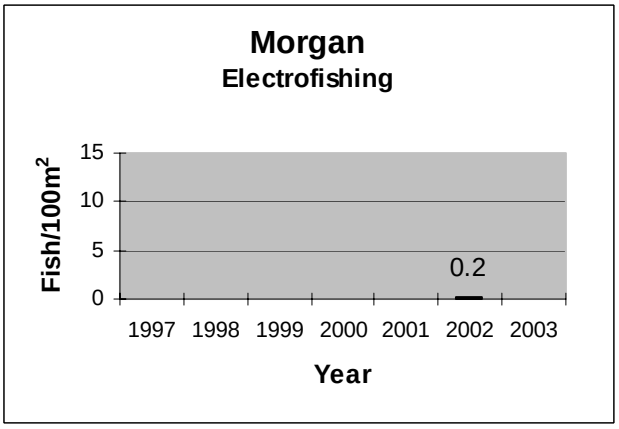
1.7
1997 1998 1999 2000 2001 2002 2003
Year


Morgan
Electrofishing
Fish/100m2
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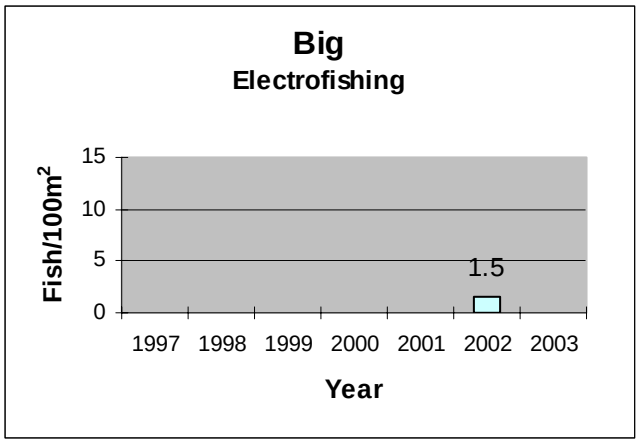
0.2
1997 1998 1999 2000 2001 2002 2003
Year


Big
Electrofishing
Fish/100m2
15
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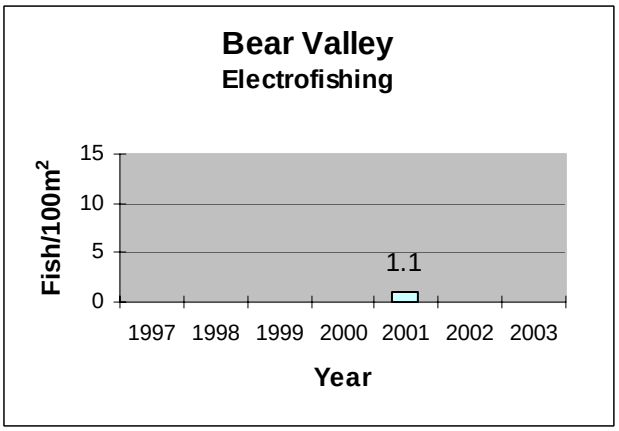
1.5
1997 1998 1999 2000 2001 2002 2003
Year


Bear Valley
Electrofishing
Fish/100m2
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10
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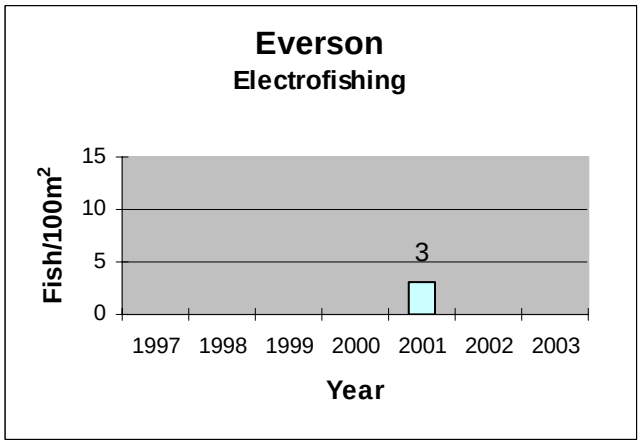
1.1
1997 1998 1999 2000 2001 2002 2003
Year


Everson
Electrofishing
Fish/100m2
15
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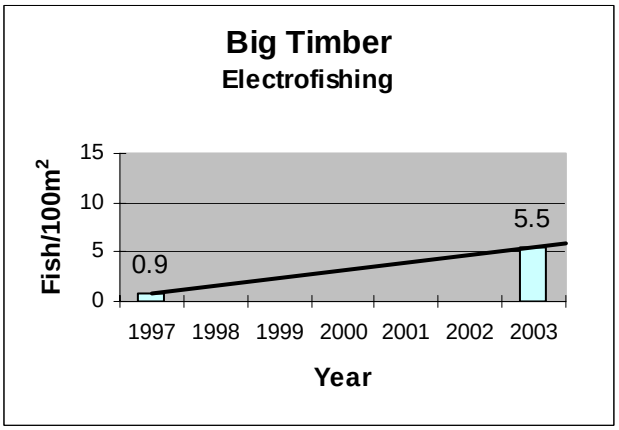
5
0
3
1997 1998 1999 2000 2001 2002 2003
Year


Big Timber
Electrofishing
Fish/100m2
15
10
5
0
0.9
5.5
1997 1998 1999 2000 2001 2002 2003
Year