FOREST RESOURCE IMPROVEMENT ASSOCIATION OF ALBERTA

1998 OPERATIONAL FISH AND STREAM INVENTORY ANNUAL REPORT & SUMMARY FOR 1995-98

for

Weldwood of Canada Ltd. (Hinton Division)
&
Foothills Model Forest

by
Johnson, C.F. and S.C. Spencer

Foothills Model Forest
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Weldwood

foothills model forest
a growing understanding

SUMMARY

The objectives of this project were to collect current fish and aquatic habitat data, to increase the number of streams where inventory data exist, to develop a pilot monitoring study, and to gain an increased understanding of fish-habitats and the relation of these to fish populations. The 1998 inventory field season began on 5 May and continued through to 29 October 1998. Some of the streams inventoried were sampled in more than one location, resulting in a total of 284 sites in 1998. This represents a total of 765 sites sampled from 1995-1998 inclusive. In 1998 our sampling efforts expanded from streams small enough to backpack electrofish, to float electrofishing on small to mid-size rivers. This resulted in 217 backpack electrofishing sites and 67 float electrofishing sites. The distribution of fish species and size of fish caught by the backpack electrofisher were similar to previous years while float electrofishing sampled larger fish and a different composition of species. This diversity in the sizes and diversity of species captured by float electrofishing will provide us with a better understanding of fish populations within the Foothills Model Forest. In 1998, 7528 fish were captured. This was an increase from previous years. A total of 16774 individual fish have been captured from 1995-1998. Of 18 species captured since 1995, rainbow trout was the most abundant species represented at 48%.

ACKNOWLEDGEMENTS

This Foothills Model Forest project was funded primarily by the Alberta Forest Resource Improvement Association of Alberta (FRIAA), through Weldwood of Canada (Hinton Division) and the Alberta Fish Habitat Development Program through the Alberta Conservation Association. Additional funding and support was received from the Foothills Model Forest and the Hinton Fish and Game Association.

Weldwood of Canada (Hinton Division) has provided logistical support throughout the project. They have provided us access to their GIS system and operators, ortho-photos, as well as direction and advice. Rick Bonar has assisted us throughout late 1998 with program direction and reviews of draft reports. Gordon Stenhouse deserves special recognition. His unequivocal support throughout this project has been greatly appreciated. Thanks.

The Foothills Model Forest staff has provided considerable help with our project. We would like to thank Rick Blackwood, Julie Dugas, and Tammy Kobliuk for their assistance throughout the project. Special mention goes to Leanne Anderson for ensuring that our budgets balanced, bills got paid and of course, payroll.

George Sterling of Alberta Environmental Protection Natural Resources Service, Fisheries Management Division in Edson has provided us with an enormous amount of support, both moral and logistical. Other Services or areas of the department that helped us along the way were Provincial Parks and the Environmental Training Centre in addition to the Land and Forest Service.

The Alberta Conservation Association provided the funding for the third crew that joined and rounded out the FRIP crew. We also appreciate the efforts of Chris Davis in providing us with whatever support he could give us to make our lives easier.

Jasper National Park was able to provide us with an alternate electrofisher, as well as the block-nets that were used for population estimates. The efforts of both Ward Hughson and George Mercer made this possible.

Finally, the most significant contribution to the project was the efforts of the folks in the field. Jason Cooper, Mike Blackburn, Cameron Davis, Chris Ross, and Troy Searson spent more than a little time out in the field (that place that most biologists don't get to see). We are appreciative of all your hard work (and are somewhat envious).

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INTRODUCTION

Up-to-date fish and aquatic inventory data are required for integrated resource planning undertaken by Weldwood of Canada (Hinton Division) in support of their long-term timber harvesting operation. Fish species occurrence, an understanding of fish-habitat relationships and information pertaining to relative importance of a particular resource are required for integrated resource planning to be effective. This information will be useful for developing compartment operating plans and future Forest Management Plans, aquatic ecosystems plans, and for aquatic/terrestrial integration. The purpose of this project was to increase the information known of the fish populations and aquatic habitats found within the Weldwood Forest Management Area (FMA) / Foothills Model Forest. The fish component of this study was focused on four sport species: rainbow trout, *Oncorhynchus mykiss*; arctic grayling, *Thymallus arcticus*; bull trout, *Salvelinus confluentus*; and mountain whitefish, *Prosopium williamsoni*.

This is the fourth field season that this project has collected inventory data on fish populations and their habitats within Weldwood of Canada's (Hinton Division) FMA. This project was initiated in 1995 and was funded solely by the Forest Resource Improvement Program (now the Forest Resource Improvement Association of Alberta or FRIAA). From 1996 to 1998, FRIAA has jointly funded this project with the Alberta Conservation Association (ACA) and the Foothills Model Forest. The original intent of this project was to collect fish and aquatic habitat data from every stream, river, and lake within the Weldwood FMA. Having recognised that this was not feasible, inventory sites were selected based on planned forest harvesting activities and the presence of historical inventory data. In addition to collecting inventory data, this project was to bring together historical data collected by Fish and Wildlife and others within the Weldwood FMA. Both types of inventory data, historical and those that this project has collected, are included in a relational database (Microsoft Access) that is linked to a geographical information system (GIS). Although this project has remained focused on the collection of inventory data from small streams, other types of data have also been collected. A significant component to the 1996 and 1997 programs were the collection of data pertaining to culverts within the Weldwood FMA. Some of these results can be found in Johnson et al. (1998a in prep). In 1998, two additional components were added; the collection of fish population and habitat inventory data from mid-size streams and rivers using float electrofishing and the development of a pilot monitoring program to collect baseline fish and habitat data in basins.

The objectives of this project were to collect current fish and aquatic habitat data, to increase the number of streams where inventory data exist, and to gain a better understanding of fish-habitat relationships in

the Foothills Model Forest. A new objective in 1998 was to develop a pilot-monitoring component that will provide baseline data on fish populations and habitats that can be used for comparisons in the future. A proposal (December 1997) to continue the fish and stream inventory project in the Weldwood FMA and Foothills Model Forest was submitted to the Forest Resource Improvement Association of Alberta through Weldwood of Canada (Hinton Division) from the Foothills Model Forest. This proposal was approved and the deliverables were considered to be the terms of reference for this project (Appendix I).

A proposal from the Foothills Model Forest (FMF) for a third inventory crew was submitted to the Alberta Conservation Association, Fisheries Habitat Development Program (FHDP) for the 1998 field season. This proposal was approved ($40,000) and resulted in a third field crew for 1998. Partner agencies (Weldwood of Canada, Natural Resources Service, and Alberta Conservation Association) agreed that these crews and projects should be run as a single project, sharing both personnel, resources, and data/results. Because of this, it should be noted that those data collected in 1998 and presented in this report are not the results of the FRIAA project exclusively, but are the result of a combined effort between both FRIAA and FHDP.

This annual report is intended to serve as an interim report that summarizes the findings from the 1998 field season and provides a comparison of these preliminary results to those found in 1995-97. More detailed analyses of those data collected from 1995 to 1998 will be presented in another report. A draft of this report should be complete by end-March 1999.

METHODS AND MATERIALS

The following methods, with the exception of monitoring sites and float electrofishing, are also described in the annual reports for 1995 (Johnson and Lech 1996), 1996 (Johnson 1997), and 1997 (Johnson 1998).

Description of study area

The Foothills Model Forest is located in west central Alberta, and encompasses the Weldwood of Canada (Hinton Division) Forest Management Area (FMA), Willmore Wilderness Park, Jasper National Park, and several Crown Forest Management Units. Most of the inventory sites were located within Weldwood's FMA, with a small number of sites surveyed inside Willmore Wilderness Park and Crown Forest Management Units (Figure 1).

Site selection

Data for this project were collected from sites for different reasons. Inventory data were collected from sites that satisfied one or more of the following criteria; either access development or forest harvesting was planned within the next 1-5 years or similar data had not been collected from a specific area or watershed in the past. An example of this would be the lack of data collection on large streams and rivers as this project was not able to work in these areas because of equipment limitations. These criteria helped us determine specific areas, but accessibility to the stream determined the location of the site. This was also true for the float electrofishing component of the inventory project. Start and stop locations were restricted to points that could be accessed by trucks. Data were also collected from locations where Alberta Natural Resources Service and others had collected data in the past (pre-1985). This was done in an attempt to gather current data on these areas.

The final reason that data were collected in 1998 was for the pilot-monitoring component. This component was attempting to collect baseline fish population, community, habitat, and stream condition data for some selected watersheds. The watersheds chosen were Moon Creek, Solomon Creek, MacKenzie Creek, and the Tri-Creeks area (Wampus, Deerlick, and Eunice creeks). These watersheds were chosen because of existing data (Tri-Creeks) and planned forestry activities by Weldwood of Canada (Hinton Division).

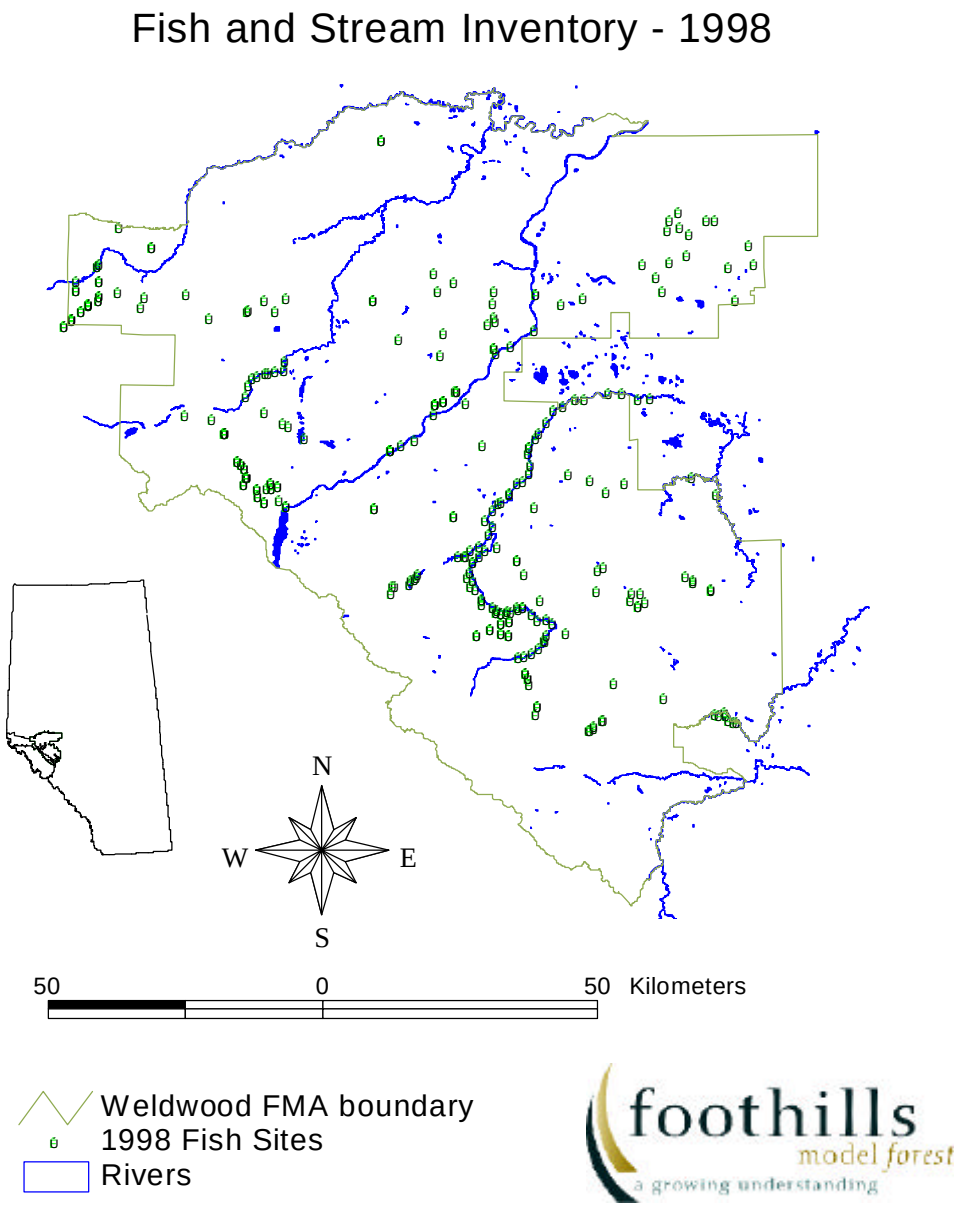

Figure 1. The Foothills Model Forest and location of 1998 inventory sites.

Data collection

Two, 2-person survey crews in 1996 (funding split between FRIP/FRIAA and FHDP) and three, 2-person survey crews in 1997 and 1998 (2 funded by FRIP/FRIAA and 1 funded by FHDP) collected fish and aquatic habitat data from selected sites. As a standard sampling protocol for lotic environments does not yet exist in Alberta, our collection methods were adapted from several sources including: Department Fisheries and Oceans, BC Ministry of Environment (Hawthorn, et al. 1989), Alberta Natural Resources Service (Rimmer 1984), and similar programs ongoing elsewhere in Alberta. We further refined our methods based on analysis of the data collected throughout the project (Jones and Johnson 1998 in prep.). The sampling protocol used throughout the project is described below.

Although most sample sites were 300 meters in length for backpack electrofishing, some were shorter because of physical restrictions within the stream (e.g. excessive depths, stream flows underground, beaverdams, etc.). If it was not possible to sample a 300-meter site, the maximum length possible was inventoried. Sites were divided with transects located in 50 m intervals upstream of the starting point and were oriented at right angles to the thalweg. The start and end of the site was marked with flagging tape, as were each transect. Lengths of site for float electrofishing reaches were not determined by length because of the difficulty associated with measuring a linear distance while floating down-river. Sites were determined by collecting coordinate data (UTM) using a handheld global positioning system (GPS) unit for the start and stop of each site. Fish and habitats were measured at each stop location. Distances between start and stop locations were determined using ArcView.

Fish data

The method used mostly frequently to capture fish was backpack electrofishing. Although different Smith-Root backpack electrofishers with pulsed DC current were used (Type 12-A, XI-A and VII), similar power settings were used whenever possible. Although only 1 crew of 2 people would be required to backpack electrofish a site, on occasions where the stream width was sufficiently wide that electrofishing efficiency was in question, a second electrofishing crew would join the first, forming a tandem electrofishing team. All electrofishing was done in accordance with the Alberta Fish and Wildlife electrofishing policy and safety guidelines (Kraft, et al. 1982). In locations where electrofishing was not possible, fish were also captured by using either a fine mesh gillnet (1 inch/2.5 cm) and/or angling. At the completion of the inventory site, the number of seconds electrofished, or effort, was recorded to allow us to calculate catch per unit effort (fish / second electrofished). Efforts were recorded and catch rates calculated for both gillnetting (number of fish/area/24h) and angling (number of fish/angler-hour).

When streams or rivers became too wide or deep to wade safely or electrofish efficiently, float electrofishing was employed as a capture technique. Float electrofishing was done using a Smith Root 5.0 GPP electrofisher powered by a 5000 watt Honda generator. In addition to the electrofishing equipment, a 14-foot (4.3 m) inflatable raft (model Adventurer) manufactured by Avon transported the standard fish and habitat sampling equipment.

Unlike backpack electrofishing, float electrofishing required a 3-person crew. The crew leader was responsible for manoeuvring the electrofishing raft and controlling the electrofisher output. Two other crewmembers were involved, one controlled the anode pole and switch and the other captured fish with a dipnet. All fish that were captured were placed in a livewell with aerated water. Periodically, the float electrofishing operation was stopped to sample those fish captured and to measure habitat parameters. The same types of fish biological and habitat data were collected for float electrofishing as for backpack electrofishing.

While backpack electrofishing small streams, fish were sampled at each 50 meter transect and released. Biological data collected from fish included: species, fork length (to nearest mm), sex, and state of maturity (when possible). We also collected total body weight from most of the fish captured in 1997 and 1998. Weights were measured using an Ohaus electronic balance to the nearest 0.1g. In 1995, total length (compressed) was also collected from most rainbow and brook trout captured to develop a relationship for comparisons between the two measurements. Fish species captured were recorded using the species codes outlined in Mackay et al. (1990). Complete necropsies of any incidental mortalities were performed with the following data collected: total body weight, sex, state of maturity, and ageing structures.

Habitat Data

In addition to collecting fish biological data, fish habitat data were also collected from each site. Some of these habitat parameters were measured while most were estimated. Wetted widths were recorded in all years while bank-full widths were measured in 1995 and rooted widths were measured in 1996, 1997, and 1998. These were measured to the nearest 0.1 meter at each transect using a 30 meter tape. While float electrofishing, a laser range finder (Bushnell Yardage Pro^{TM} 400, accuracy $\pm$ 1 m) was used to measure wetted and rooted widths as most often the rivers were often too deep to wade safely.

To measure water depths, the stream was visually divided into thirds (left upstream bank (LUB), center, and right upstream bank (RUB) with the center of each measured to the nearest 0.01 meter. Occasionally

these were estimated on deep rivers. Water depths were measured at each transect. Air and water temperature were measured (usually at the first transect) to the nearest 1°C using an alcohol pocket thermometer (-35° to +50°C).

Estimated habitat parameters included substrate composition, available cover composition, bank stability and obstructions to fish passage. To ensure consistency, these estimates were discussed between both workers present. Substrate composition was estimated as the percentage of each substrate type [fines (clay, sand, silt <2mm), small gravel (2-16mm), large gravel (17-64mm), small cobble (65-128mm), large cobble (129-256mm), boulder (>256mm), and bedrock] present at each transect. Substrates were estimated at 3 points across the channel (right, center, and left). Available cover composition was estimated as a percentage of the cover types available between each 50 meter transect. The cover types estimated included: surface turbulence, instream debris, terrestrial canopy, undercuts, and water depth. We ceased to collect aquatic vegetation and rock / boulder as cover types in 1997 as our analysis showed these parameters to be less important than others (Jones and Johnson. In Prep). Bank stability of both banks (RUB and LUB) were ranked on a scale from stable (1) to unstable (4) for the 50m section, between transects. Potential obstructions to fish passage (beaver dams, waterfalls, chutes, etc.) were noted and described as well.

Habitat potential was a subjective rating for the entire inventory site of low, medium or high. The categories for habitat potential were rearing, overwintering, and spawning habitats for salmonids. Rearing habitats were defined as those areas with refugia for small fish; such as debris, rocks, aquatic vegetation, etc. If young-of-the-year were captured in the section, a rating of good for rearing potential was given. Often overwintering habitats were omitted because of our inability to identify what qualified as good wintering habitat. Many large pools within the site may have prompted us to give it a rating of medium or high. Spawning habitats were perhaps the least difficult to assess. If an area of the creek consisted of appropriate sizes of clean gravel, we would give this section a medium to good rating. Also, if spawning fish were present or if redds were located during the electrofishing process, we would give the section a rating of good. Overall, estimating habitat potential was a difficult assessment to make with much confidence (especially in the absence of fish), and as a result was sometimes omitted**.**

In 1998 we incorporated into our habitat collection the methods developed in, A guide to classifying fish habitats in lotic systems of west central Alberta (Johnson *et. al*. 1998b). The collection of visual data was determined by comparative means to be statistically improved when estimated with the aid of this visual

guide (Jones, et al. 1998 *In Prep.*). This was done in an attempt to develop a standard sampling protocol that would allow for data collection in a meaningful manner. A standard sampling protocol should ensure that data re comparable between observers and years.

Survey locations were collected using a hand-held Trimble Navigation GeoExplorer global positioning system (GPS) unit (version 2.00) and differentially corrected using GeoPC (Version 2.01-00, Trimble Navigation Ltd 1995). GPS data are in UTM format and were recorded using the following settings:

- Alaska/Canada NAD27
- metric units
- elevation mask = 15
- SNR mask = 4
- PDOP = 6
- antenna height = 1.00 m
- 2D altitude = +1000.4 m (HAE)
- position mode = auto 2D/3D

Differentially corrected GPS data were not collected for several of the sites surveyed in 1996-1998. This was because only one downloadable and correctable GPS unit was available to the project. A Magellan GPS Trailblazer was used to collect uncorrected position data when possible in 1997 and 1998. Where these data were not collected, sites were digitized using ArcView 3.0 (ESRI Inc., Canada 1997) to generate UTM coordinates for these sites. All though differentially corrected coodinate data are preferred for accuracy, GIS experts (Kobliuk 1997 pers com) agreed that this technique would be the best alternative.

Representative photographs of each site were taken using 35mm cameras. Any unusual phenomenon encountered was photographed as well.

Monitoring Data

Data collected from the monitoring areas differed little from inventory data with the exception of sampling intensity within the watershed and number of visits per year. Several sites were located throughout each watershed on different reaches. Sites on tributary streams were also sampled. Most of these sites or locations were visited twice each year; in spring and fall.

Data management and analyses

Data were entered into a relational database developed for the Foothills Model Forest that is resident in Microsoft Access 97. Each site was given a 5-digit number (e.g. 95001) that became an unique identifier. The first two digits of the number refer to the year (e.g. 1995) while the last three digits are arbitrary. Quality control checks were performed on the entire database to ensure accuracy.

Standard inventory reports and associated GIS map products were generated from the database for each inventory site (FMF 1996, FMF 1997) and distributed to the local land managers and partners including Weldwood of Canada (Hinton Division) and the Natural Resources Service, Edson and the Alberta Conservation Association. Summary statistics were generated for fish data (minimum, maximum and mean fork length) for each species and mean values for habitat parameters. In addition to these summary statistics, fork length frequency distributions (by electrofishing catch rate) were generated when 15 or more individuals of the same species were captured at a site.

Population estimates were completed on several streams where historical population estimate data existed (Natural Resources Service - Edson Library, Sterling 1990). Depletion-removal or Zippin-type population estimates (Zippin 1958) were used. These estimates were typically done over a 300m reach. This was the type of estimate recommended by Rimmer (1984) and by local fisheries managers (C. Hunt, Natural Resource Service, pers. comm. 1995). Efforts were taken to not violate the assumptions of this type of estimate. Population estimate data were analyzed using MicroFish 3.0 (Van Deventer and Platts 1989). These population estimates were then converted to density estimates (number of fish/100m^2) by calculating the surface area of the study section (length * mean wetted width) and applying the population estimate to this value. Confidence intervals (95%) were calculated in a similar manner. This was done to allow for comparisons to fish populations in streams of different size. While performing population estimates, the effort (electrofishing seconds) was calculated for each run. These data will be used to allow for the comparison of 1st pass electrofishing catch per unit effort (CUE) to population density.

RESULTS

The 1998 inventory field season began on 5 May and continued through to 29 October 1998. The field season was terminated because of freeze-up. In 1998, an estimated 675 streams were visited. Of these, 133 streams were sampled. Some of these streams were sampled in more than one location, resulting in 284 sites in 1998 (Figure 1). The number of sites surveyed in 1998 was higher that in any of the years 1995 to 1997. The total number of sites sampled in all surveys from 1995 to 1998 is 765. All of these data were entered into a relational database and site summaries and map products were produced (FMF 1998).

All of the streams sampled in 1998 were within the Athabasca River drainage (Table 1). No sites were sampled in the North Saskatchewan River drainage in 1998 because this area was a low priority for the 1998 objectives. To date, 724 sites have been sampled in the Athabasca River drainage, and 41 sites in the North Saskatchewan River drainage. The numbers of sites per sub-basin (1995-1998) were not divided equally, with most of the sites being in the McLeod River sub-basin (317 sites), followed by the Berland River sub-basin (158 sites), Pembina River sub-basin (37 sites) and the Brazeau sub-basin (41).

Table 1. Number of sites surveyed in Athabasca and North Saskatchewan drainages and sub-basins.

Drainage	**Sub-Basin**	**1995**	**1996**	**1997**	**1998**	**Total**
Athabasca	Berland	9	50	41	58	**158**
Athabasca	McLeod	15	75	83	144	**317**
Athabasca	Pembina	0	15	22	14	**51**
Athabasca	Tributaries to Athabasca R.	9	44	77	68	**198**
North Saskatchewan	Brazeau	0	9	32	0	**41**
Total		**33**	**193**	**255**	**284**	**765**

The total number of sites per working circle (WC, defined by Weldwood) from 1995-1998 were distributed more equally than drainage or sub-basin (mean number of sites/WC = 141, Table 2), with the exception of the Marlboro WC where only 58 sites were surveyed. Most of the sites sampled were in the McLeod WC (205), followed by Embarrass WC (174), Athabasca WC (146), and Berland WC (124). A summary of the sites sampled by working circle and compartment are presented in Appendix IIa-f.

Table 2. Number of sites surveyed in Weldwood's working circles.

Working Circle	1995	1996	1997	1998
Athabasca	0	38	49	59
Berland	10	39	27	48
Embarras	14	53	70	37
Marlboro	0	7	31	20
McLeod	9	54	35	107
Out Of Weldwood FMA	0	2	43	13
Total	**33**	**193**	**255**	**284**

A total of 16774 fish were captured, identified, and measured from 1995 to 1998 inclusive (Table 3). The most common species caught from 1995 to 1998 was rainbow trout, followed by brook trout, mountain whitefish, bull trout, arctic grayling and cutthroat trout. The largest proportion of cold-water sportfish captured in 1998 were rainbow trout (37.6%) compared to mountain whitefish (33.4%), bull trout (11.4%), brook trout (8.4%), and arctic grayling (0.3%). No cutthroat trout were caught in 1998. The species composition of the total catch changed in 1998. Rainbow trout, bull trout, and brook trout decreased in percent composition while mountain whitefish increased.

Table 3. Fish species and number captured during the 1995 to 1998 field seasons.

	1995 totals	% of 1995 total	1996 totals	% of 1996 total	1997 totals	% of 1997 totals	1998 totals	% of 1998 totals	Total (1995-98)
bull trout	3	0.4%	154	3.3%	586	15.0%	861	11.4%	1604
rainbow trout	369	51.3%	2821	60.9%	2037	52.3%	2831	37.6%	8058
mountain whitefish	2	0.3%	21	0.5%	102	2.6%	2515	33.4%	2640
arctic grayling	0	0.0%	9	0.2%	12	0.3%	22	0.3%	43
brook trout (*S. fontinalis*)	258	35.8%	985	21.3%	913	23.4%	637	8.4%	2793
cutthroat trout (*O. clarki*)	0	0.0%	5	0.1%	21	0.5%	0	0%	26
Other species[1]	88	12.2%	636	13.7%	223	5.7%	663	8.8%	1610
Totals	**720**	**100.0%**	**4631**	**100.0%**	**3894**	**100.0%**	**7528**	**100.0%**	**16774**

[1]other species include: burbot (*Lota lota*), northern pike (*Esox lucius*), longnose sucker (*Catostomus catostomus*), white sucker (*C. commersoni*), longnose dace (*Rhinichthys cataractae*), northern redbelly dace (*Phoxinus eos*), finescale dace (*P. neogaeus*), pearl dace (*Margariscus margarita*), trout perch (*Percopsis omiscomaycus*), brook stickleback (*Culaea inconstans*), and spoonhead sculpin (*Cottus ricei*).

There appeared to be differences between the species and sizes of fish collected by backpack inventory, backpack monitoring and float inventory (Figure 2 and Table 4). Fifteen different species were captured during the float and backpack inventory components while only 5 were caught with the backpack monitoring component. Rainbow trout comprised the largest percentage of fish caught for both backpack inventory and monitoring while mountain whitefish were the most numerous in the float inventory catch. Bull trout comprised the second most numerous species captured during backpack monitoring and a larger

percentage of the catch when compared to the 2 other techniques. A more detailed statistical analyses of these data will be completed during winter 1999 and will be presented in the March report mentioned in the Introduction.

In addition to differences in species captured using float and backpack electrofishing, the sizes of fish captured also differed. The mean fork lengths for rainbow, brook and bull trout, mountain whitefish, and arctic grayling were all longer in the sample captured using the float electrofishing technique.

Population estimates

Population estimate data were collected on 6 streams (Table 5) for 23 population estimates. All of the population estimates were done in order to collect density data on those streams where population estimates were done previously. In some situations, there were more than 1 species per site and estimates were done on Anderson Creek in the spring and the fall. Although the focus of these population estimates was on rainbow trout, occasionally other species were present, making it also possible to calculate an estimate for these species. The species encountered most often was rainbow trout followed by mountain whitefish, brook trout, bull trout, burbot and spoonhead sculpin. Population estimates are presented with the calculated 95% confidence interval (CI). As with our other data, these population density data will be compared to density data collected from 1996-1997 and to historical population density data. These results will also be presented in the March report.

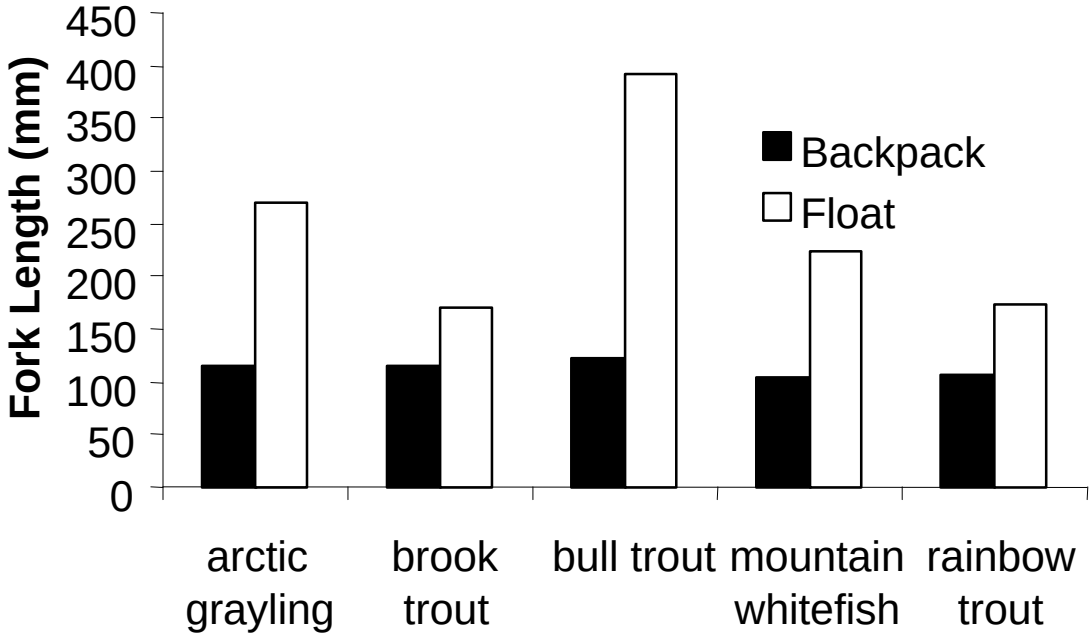

Figure 2. Comparison of mean fork lengths of fish sampled by float and backpack electrofishing

Table 4. Comparison of the fish caught during the float and backpack inventory component and the backpack monitoring component; Foothills Model Forest, 1998.

	Float Inventory		Backpack Inventory		Backpack Monitoring		Total
	Number	Percent	Number	Percent	Number	Percent	
bull trout	45	1.8%	155	5.3%	660	30.2%	**860**
rainbow trout	228	9.3%	1468	50.6%	1135	52.0%	**2831**
mountain whitefish	1932	79.1%	286	9.9%	297	13.6%	**2515**
arctic grayling	12	0.5%	10	0.3%	0	0.0%	**22**
brook trout	56	2.3%	498	17.2%	83	3.8%	**637**
brook stickleback	0	0.0%	25	0.9%	0	0.0%	**25**
Burbot	3	0.1%	115	4.0%	7	0.3%	**125**
finescale dace	1	0.0%	29	1.0%	0	0.0%	**30**
longnose dace	9	0.4%	38	1.3%	0	0.0%	**47**
longnose sucker	119	4.9%	31	1.1%	0	0.0%	**150**
northern redbelly dace	0	0.0%	2	0.1%	0	0.0%	**2**
pearl dace	13	0.5%	35	1.2%	0	0.0%	**48**
spoonhead sculpin	14	0.6%	68	2.3%	0	0.0%	**82**
trout perch	3	0.1%	23	0.8%	0	0.0%	**26**
white sucker	5	0.2%	119	4.1%	0	0.0%	**124**
northern pike	3	0.1%	0	0.0%	0	0.0%	**3**
yellow perch	1	0.0%	0	0.0%	0	0.0%	**1**
Total	**2444**	**100%**	**2902**	**100%**	**2182**	**100%**	**7528**

Monitoring Data

Data on fish populations and habitats were collected from four monitoring areas (Table 6 and Figure 3). Typically data were collected from each site twice yearly; once in the spring and fall. The most intensive data collection occurred on Solomon and Moon creeks, with a total of 24 and 20 sites in each respectively. Within the Tri-Creeks area, three sites were sampled in each of Wampus, Deerlick, and Eunice creeks. These included the sites sampled historically during the Tri-Creeks Experimental Watershed Area study (Sterling 1990) and an additional site located mid-way between each of these. MacKenzie Creek received more sporadic sampling than the other watersheds, with at total of 8 sites sampled in this watershed. This occurred because of proposed sampling by Cardinal River Coals for the proposed Cheviot expansion that was not completed in 1998 (Sterling 1998 pers. comm).

Table 5. Summary of population estimates completed in 1998.

Creek Name	Type of estimate	Date	Species[1]	Site ID	Run #1	Run #2	Run #3	Run #4	Number of Passes	Section length (m)	Mean wetted width (m)	Section Area (m^2)	Population estimate	+/- 95% CI	Density (#/100m^2)
Anderson	Depletion-removal	7-May-98	RNTR	98002	55	12	4		3	300	3.8	1140	71	2.0	6.2
Anderson	Depletion-removal	7-May-98	BLTR	98002	10	5	4		3	300	3.8	1140	22	8.9	1.9
Wampus (upper)	Depletion-removal	5-Sep-98	RNTR	98132	190	46	27	5	4	500	2.7	1350	270	3.7	20.0
Eunice (upper)	Depletion-removal	5-Sep-98	RNTR	98133	2	1	0		3	300	2.3	690	3	1.1	0.4
Eunice (upper)	Depletion-removal	5-Sep-98	BLTR	98133	3	2	0		3	300	2.3	690	5	1.2	0.7
Deerlick (lower)	Depletion-removal	6-Sep-98	RNTR	98136	123	30	15		3	500	2.7	1350	172	5.6	12.7
Deerlick (lower)	Depletion-removal	6-Sep-98	BKTR	98136	22	5	0		3	500	2.7	1350	27	0.7	2.0
Deerlick (lower)	Depletion-removal	6-Sep-98	MNWH	98136	90	54	38		3	500	2.7	1350	244	50.6	18.1
Deerlick (lower)	Depletion-removal	6-Sep-98	BURB	98136	0	1	1		3	500	2.7	1350	2	23.8	0.1
Wampus (lower)	Depletion-removal	7-Sep-98	RNTR	98137	46	19	7		3	300	5.8	1740	76	6.5	4.4
Wampus (lower)	Depletion-removal	7-Sep-98	MNWH	98137	18	8	1		3	300	5.8	1740	27	1.9	1.6
Wampus (lower)	Depletion-removal	7-Sep-98	BKTR	98137	3	1	0		3	300	5.8	1740	4	0.7	0.2
Wampus (lower)	Depletion-removal	7-Sep-98	BURB	98137	2	0	1		3	300	5.8	1740	3	3.1	0.2
Deerlick (upper)	Depletion-removal	8-Sep-98	RNTR	98139	119	33	16		3	300	2.5	750	174	6.9	23.2
Mary Gregg	Depletion-removal	30-Sep-98	RNTR	98182	20	13	7		3	300	6.9	2070	48	14.6	2.3
Mary Gregg	Depletion-removal	30-Sep-98	MNWH	98182	37	22	20		3	300	6.9	2070	119	54.0	5.7
Mary Gregg	Depletion-removal	30-Sep-98	BLTR	98182	2	2	1		3	300	6.9	2070	5	3.3	0.2
Mary Gregg	Depletion-removal	30-Sep-98	BURB	98182	2	4	3		3	300	6.9	2070	40	350.5	1.9
Anderson	Depletion-removal	1-Oct-98	BLTR	98183	20	9	11	4	4	300	5.2	1560	51	11.9	3.3
Anderson	Depletion-removal	1-Oct-98	RNTR	98183	31	9	4	2	4	300	5.2	1560	46	1.8	2.9
Antler	Depletion-removal	2-Oct-98	RNTR	98184	32	25	8	9	4	250	9.9	2475	84	13.0	3.4
Antler	Depletion-removal	2-Oct-98	SPSC	98184	9	2	4	1	4	250	9.9	2475	16	2.4	0.6
Antler	Depletion-removal	2-Oct-98	BKTR	98184	2	1	0	1	4	250	9.9	2475	4	2.5	0.2
Antler	Depletion-removal	2-Oct-98	MNWH	98184	0	2	0	1	4	250	9.9	2475	3	6.5	0.1

[1] Species codes; BKTR = brook trout, BLTR = bull trout, BURB = burbot, MNWH = mountain whitefish, RNTR = rainbow trout, SPSC = spoonhead sculpin

Table 6. Summary of the watersheds visited during the 1998 pilot monitoring study.

Watershed	Number of sites (visits)	Percent of Monitoring sites	Percent of the total for sites, 1998
Moon Creek	20	29.0	7.0
Solomon Creek	24	34.8	8.5
MacKenzie Creek	8	11.6	2.8
Tri-Creeks	17	24.6	6.0
TOTAL	**69**	**100.0**	**24.3**

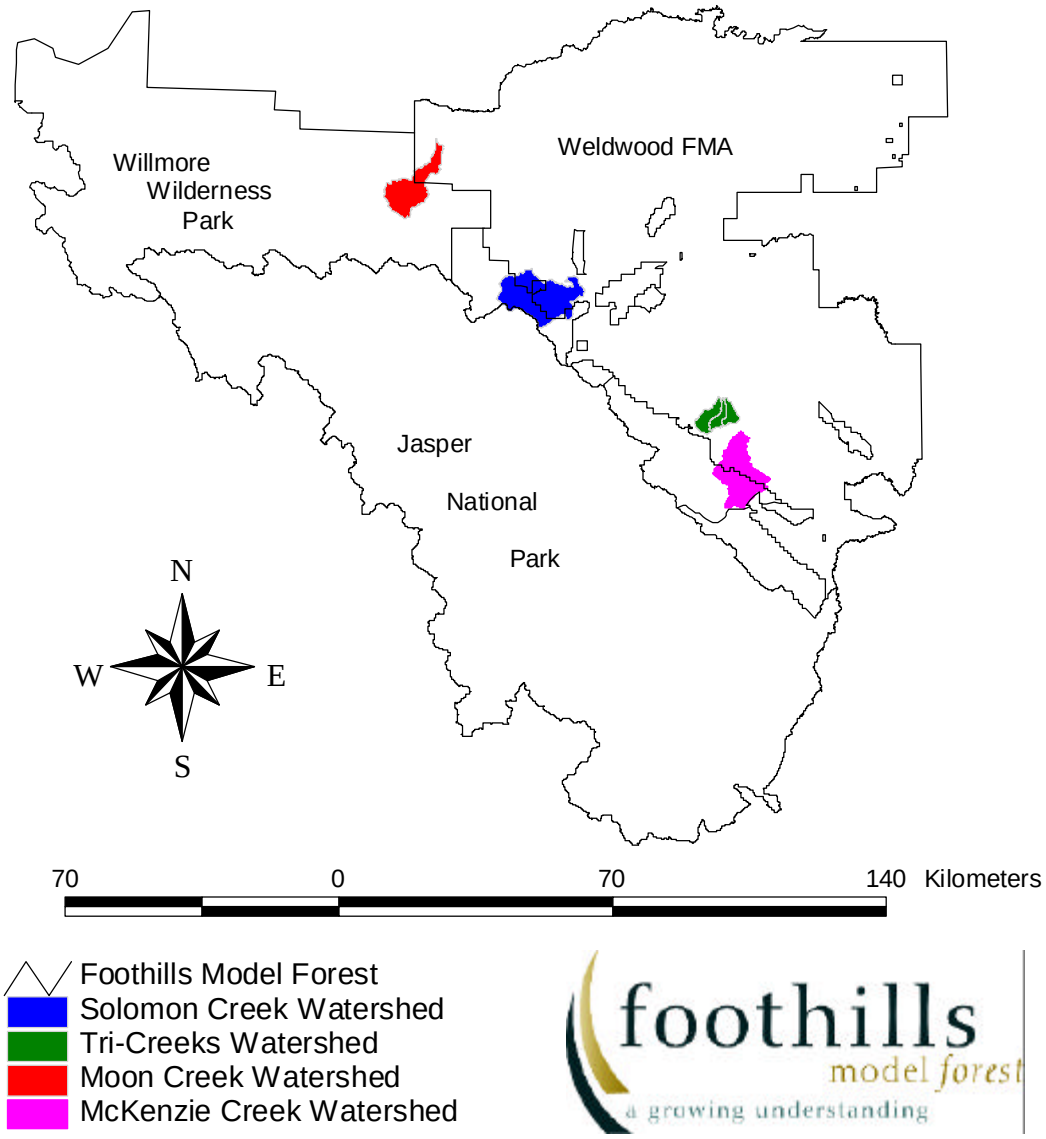

Figure 3. Location of monitoring watersheds within the Foothills Model Forest.

DISCUSSION

The combination of 3 field crews, 2 from FRIAA and 1 from FHDP, was again advantageous from an efficiency perspective. The increased number of crews resulted in a greater number of sites that were sampled. Given the results of the 1996-1998 field seasons, we recommend this project continue to combine field crews from different funding agencies, as long as the respective objectives are similar and are not compromised between projects.

The inventory component of this project surveyed more sites than had been surveyed in previous years. In addition to sampling streams in areas of pre-harvest and pre-access development, we focused our efforts on data gaps that were identified from the 1995- 1997 inventories and analyses (Jones and Johnson *in prep*) and on the pilot monitoring study. Comparing 1998 to previous years, the proportions of bull trout, and mountain whitefish increased while rainbow trout decreased. This was likely due to our change in sampling techniques. The float electrofisher was used in larger watercourses like the McLeod and Pembina rivers that may have different species compositions than smaller streams. Also, the difference in sizes of fish captured between electrofishing techniques was likely a result of sampling in these larger systems. This suggests that in order to obtain a more accurate representation of fish populations within an area or watershed, researchers must utilise different sampling techniques and sample all stream and river classes. This is especially true when sampling migratory populations like mountain whitefish and bull trout.

This interim report serves to provide a brief summary of work completed in 1998. More detailed analyses of both the inventory and monitoring data will be completed in 1999. To date, a draft report describing the monitoring efforts and results on the Solomon Creek watershed has been completed and reviewed and the remaining reports are in preparation. These analyses and reports will be complete by April 1999.

CONCLUSIONS

- Inventory and monitoring data were collected from 284 sites in 1998. This was an annual increase from previous years. The total number of sites sampled to date is 765.
- Backpack and float electrofishing appeared to capture different sizes of fish and proportions of species. This suggests that both are valuable techniques when attempting to describe fish populations or communities at a watershed perspective.
- Monitoring data were collected from four areas or watersheds in 1998. This will provide baseline data that can be used to compare with other years and watersheds.

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Appendix I. Deliverables from the 1998 FRIAA - Weldwood detailed proposal: Operational Fisheries and Stream Inventory - Weldwood FMA and Foothills Model Forest

1. Fish and aquatic habitat information for use in operation planning and harvest scheduling. **(1998 data collection completed end-October 1998)**

2. Computer database of inventory information linked to the Weldwood GIS. **(database complete – will be delivered early January 1999)**

3. Standard inventory reports generated from the database and associated maps for all sample sites. **(standard inventory reports complete for each site along with maps – delivered December 1998)**

4. Appropriate reports describing results to date including inventory, status of fish populations and habitats from different levels of human-use and access. **(analyses for this deliverable will be complete winter 1999 and report delivered end-March 1999)**

5. Publications where appropriate. (**Foothills Model Forest activity team will assess the above products and determine which are appropriate for publication)**

Appendix II a. Summary of sites surveyed in the Athabasca Working Circle; Foothills Model Forest, 1998.

Site ID	Creek Name	Drainage	Tributary To	Weldwood Compartment #	Total # of Fish
98001	UNNAMED CREEK	ATHABASCA	ATHABASCA	9	0
98003	BASELINE CREEK	ATHABASCA	ATHABASCA	9	27
98004	BASELINE CREEK	ATHABASCA	ATHABASCA	9	50
98005	BASELINE CREEK	ATHABASCA	ATHABASCA	9	25
98012	CANYON CREEK	ATHABASCA	ATHABASCA	8	31
98014	CANYON CREEK	ATHABASCA	ATHABASCA	8	22
98023	UNNAMED CREEK	ATHABASCA	JARVIS CK	20	0
98024	UNNAMED CREEK	ATHABASCA	OLDMAN CK	27	0
98026	UNNAMED CREEK	ATHABASCA	ATHABASCA	9	0
98027	ICEWATER CREEK	ATHABASCA	WILDHAY	4	0
98028	UNNAMED CREEK	ATHABASCA	ICE WATER CK	1	0
98036	GORGE CREEK	ATHABASCA	ATHABASCA	16	44
98037	GORGE CREEK	ATHABASCA	ATHABASCA	16	70
98038	CANYON CREEK	ATHABASCA	ATHABASCA	8	15
98039	CANYON CREEK	ATHABASCA	ATHABASCA	8	37
98040	FISH CREEK	ATHABASCA	ATHABASCA	8	17
98042	SOLOMON CREEK	ATHABASCA	ATHABASCA	4	9
98047	SHEBA CREEK	ATHABASCA	WEST SOLOMON CK	4	25
98048	WEST SOLOMON CREEK	ATHABASCA	SOLOMON CK	4	28
98049	SOLOMON CREEK	ATHABASCA	ATHABASCA	4	5
98057	OLDHOUSE CREEK	ATHABASCA	SOLOMON CK	4	0
98058	PRINE CREEK	ATHABASCA	SOLOMON CK	4	0
98059	OLDHOUSE CREEK	ATHABASCA	SOLOMON CK	4	0
98060	WEST SOLOMON CREEK	ATHABASCA	SOLOMON CK	4	10
98061	CANYON CREEK	ATHABASCA	ATHABASCA	8	6
98071	UNNAMED CREEK	ATHABASCA	OLDHOUSE CK	4	0
98072	PRINE CREEK	ATHABASCA	SOLOMON CK	4	0
98075	GORGE CREEK	ATHABASCA	ATHABASCA	18	13
98076	PLANTE CREEK	ATHABASCA	ATHABASCA	21	3
98077	OBED CREEK	ATHABASCA	ATHABASCA	13	14
98124	PRINE CREEK	ATHABASCA	SOLOMON CK	4	0
98126	PRINE CREEK	ATHABASCA	SOLOMON CK	4	0
98128	SOLOMON CREEK	ATHABASCA	ATHABASCA	4	5
98129	SOLOMON CREEK	ATHABASCA	ATHABASCA	4	11
98141	WEST SOLOMON CREEK	ATHABASCA	SOLOMON CK	4	29
98142	SHEBA CREEK	ATHABASCA	WEST SOLOMON CK	4	83
98143	WEST SOLOMON CREEK	ATHABASCA	SOLOMON CK	4	45
98144	OLDHOUSE CREEK	ATHABASCA	SOLOMON CK	4	0
98145	UNNAMED CREEK	ATHABASCA	OLDHOUSE CK	4	0
98146	PRINE CREEK	ATHABASCA	SOLOMON CK	4	0
98147	UNNAMED CREEK	ATHABASCA	OLDMAN CK	27	0
98149	UNNAMED CREEK	ATHABASCA	ATHABASCA	9	0
98154	UNNAMED CREEK	ATHABASCA	ICE WATER CK	1	0
98155	ICEWATER CREEK	ATHABASCA	WILDHAY	1	0
98158	UNNAMED CREEK	ATHABASCA	WILDHAY	1	2
98159	UNNAMED CREEK	ATHABASCA	WILDHAY	1	12
98170	OLDMAN CREEK	ATHABASCA	ATHABASCA	16	39
98171	MARSH CREEK	ATHABASCA	OLDMAN CK	24	12
98179	UNNAMED CREEK	ATHABASCA	OLDMAN CK	24	11
98180	FELIX CREEK	ATHABASCA	OLDMAN CK	24	9
98181	UNNAMED CREEK	ATHABASCA	PLANTE CK	17	4
98202	UNNAMED CREEK	ATHABASCA	PLANTE CK	22	0
98218	UNNAMED CREEK	ATHABASCA	APETOWUN CK	34	27
98219	APETOWUN CREEK	ATHABASCA	PLANTE CK	17	97
98220	PLANTE CREEK	ATHABASCA	ATHABASCA	22	39
98225	TWELVE MILE CREEK	ATHABASCA	WILDHAY	3	5
98226	WINTER CREEK	ATHABASCA	JARVIS CK	3	0
98227	POWDER CREEK	ATHABASCA	JARVIS CK	3	10
98232	APETOWUN CREEK	ATHABASCA	PLANTE CK	11	11
Total Number of Sites=59				**Total**	**902**

Appendix II b. Summary of sites surveyed in the Berland Working Circle; Foothills Model Forest, 1998.

Site ID	Creek Name	Drainage	Tributary To	Weldwood Compartment #	Total # of Fish
98006	MOON CREEK	ATHABASCA	BERLAND	3	10
98016	LITTLE BERLAND RIVER	ATHABASCA	BERLAND	3	5
98017	LITTLE BERLAND RIVER	ATHABASCA	BERLAND	3	50
98025	UNNAMED CREEK	ATHABASCA	BEAVER CK	33	0
98031	UNNAMED CREEK	ATHABASCA	BERLAND	3	0
98032	MOON CREEK	ATHABASCA	BERLAND	3	31
98033	STAR CREEK	ATHABASCA	MOON CK	3	0
98034	PASTURE CREEK	ATHABASCA	BERLAND	1	0
98050	MOON CREEK	ATHABASCA	BERLAND	3	12
98051	MOON CREEK	ATHABASCA	BERLAND	3	25
98052	MOON CREEK	ATHABASCA	BERLAND	3	11
98053	MOON CREEK	ATHABASCA	BERLAND	3	24
98054	MOON CREEK	ATHABASCA	BERLAND	3	17
98055	UNNAMED CREEK	ATHABASCA	MOON CK	3	4
98056	UNNAMED CREEK	ATHABASCA	MOON CK	3	1
98107	MOON CREEK	ATHABASCA	BERLAND	3	33
98108	MOON CREEK	ATHABASCA	BERLAND	3	22
98109	MOON CREEK	ATHABASCA	BERLAND	3	65
98110	MOON CREEK	ATHABASCA	BERLAND	3	43
98111	STAR CREEK	ATHABASCA	MOON CK	3	1
98112	UNNAMED CREEK	ATHABASCA	MOON CK	3	1
98113	UNNAMED CREEK	ATHABASCA	BERLAND	3	0
98114	UNNAMED CREEK	ATHABASCA	MOON CK	3	3
98115	MOON CREEK	ATHABASCA	BERLAND	3	26
98116	MOON CREEK	ATHABASCA	BERLAND	3	51
98117	MOON CREEK	ATHABASCA	BERLAND	3	21
98118	FOX CREEK	ATHABASCA	LITTLE BERLAND	3	0
98148	UNNAMED CREEK	ATHABASCA	BEAVER CK	33	0
98160	MOBERLY CREEK	ATHABASCA	WILDHAY	9	45
98161	TWELVE MILE CREEK	ATHABASCA	WILDHAY	9	34
98166	PASTURE CREEK	ATHABASCA	BERLAND	1	1
98167	BIG CREEK	ATHABASCA	BERLAND	1	1
98203	BERLAND RIVER	ATHABASCA	ATHABASCA	6	31
98204	BERLAND RIVER	ATHABASCA	ATHABASCA	6	108
98212	PINTO CREEK	ATHABASCA	WILDHAY	18	14
98213	UNNAMED CREEK	ATHABASCA	WILDCAT CK	5	1
98214	UNNAMED CREEK	ATHABASCA	HIGHTOWER CK	5	0
98215	UNNAMED CREEK	ATHABASCA	PINTO CK	18	2
98216	UNNAMED CREEK	ATHABASCA	PINTO CK	18	0
98217	UNNAMED CREEK	ATHABASCA	PINTO CK	18	0
98224	MARIA CREEK	ATHABASCA	PINTO CK	11	7
98361	WILDHAY RIVER	ATHABASCA	BERLAND	9	17
98362	WILDHAY RIVER	ATHABASCA	BERLAND	9	54
98363	WILDHAY RIVER	ATHABASCA	BERLAND	9	69
98364	WILDHAY RIVER	ATHABASCA	BERLAND	9	28
98365	WILDHAY RIVER	ATHABASCA	BERLAND	9	38
98366	WILDHAY RIVER	ATHABASCA	BERLAND	9	22
98367	WILDHAY RIVER	ATHABASCA	BERLAND	9	6
Total Number of Sites=48				**Total**	**934**

Appendix II c. Summary of sites surveyed in the Embarras Working Circle; Foothills Model Forest, 1998.

Site ID	Creek Name	Drainage	Tributary To	Weldwood Compartment #	Total # of Fish
98018	UNNAMED CREEK	ATHABASCA	CENTRE CK	13	0
98021	UNNAMED CREEK	ATHABASCA	BEAVERDAM CK	6	0
98022	UNNAMED CREEK	ATHABASCA	BEAVERDAM CK	6	0
98068	LITTLE MACKENZIE CREEK	ATHABASCA	MACKENZIE CK	6	17
98069	UNNAMED CREEK	ATHABASCA	MCLEOD	6	0
98070	UNNAMED CREEK	ATHABASCA	MACKENZIE CK.	6	0
98090	MEADOW CREEK	ATHABASCA	MACKENZIE CK	6	16
98091	UNNAMED CREEK	ATHABASCA	MACKENZIE CK	6	13
98092	MACKENZIE CREEK	ATHABASCA	MCLEOD	6	72
98093	UNNAMED CREEK	ATHABASCA	PEMBINA	22	5
98094	PEMBINA RIVER	ATHABASCA	ATHABASCA	22	11
98102	UNNAMED CREEK	ATHABASCA	EMBARRAS	8	0
98103	UNNAMED CREEK	ATHABASCA	PEMBINA	22	0
98104	PEMBINA RIVER	ATHABASCA	ATHABASCA	22	1
98105	UNNAMED CREEK	ATHABASCA	PEMBINA	22	0
98106	UNNAMED CREEK	ATHABASCA	PEMBINA	22	1
98133	EUNICE CREEK	ATHABASCA	MCLEOD	24	8
98162	WICKMAN CREEK	ATHABASCA	ERITH	10	27
98165	WICKMAN CREEK	ATHABASCA	ERITH	10	43
98205	EMBARRAS RIVER	ATHABASCA	MCLEOD	23	17
98206	EMBARRAS RIVER	ATHABASCA	MCLEOD	7	59
98207	ERITH RIVER	ATHABASCA	EMBARRAS	10	25
98208	ERITH RIVER	ATHABASCA	EMBARRAS	9	43
98209	BRYAN CREEK	ATHABASCA	EMBARRAS	23	62
98210	UNNAMED CREEK	ATHABASCA	ERITH	9	2
98211	UNNAMED CREEK	ATHABASCA	ERITH	9	11
98222	UNNAMED CREEK	ATHABASCA	ERITH	11	60
98223	UNNAMED CREEK	ATHABASCA	ERITH	11	0
98230	UNNAMED CREEK	ATHABASCA	MCLEOD	6	1
98231	UNNAMED CREEK	ATHABASCA	MACKENZIE CK.	6	0
98344	PEMBINA RIVER	ATHABASCA	ATHABASCA	13	27
98345	PEMBINA RIVER	ATHABASCA	ATHABASCA	13	59
98346	PEMBINA RIVER	ATHABASCA	ATHABASCA	13	47
98347	PEMBINA RIVER	ATHABASCA	ATHABASCA	13	37
98348	PEMBINA RIVER	ATHABASCA	ATHABASCA	13	49
98349	PEMBINA RIVER	ATHABASCA	ATHABASCA	13	40
98350	PEMBINA RIVER	ATHABASCA	ATHABASCA	13	17

Total Number of Sites=37 **Total Number of Fish 770**

Appendix II d. Summary of sites surveyed in the Marlboro Working Circle; Foothills Model Forest, 1998.

Site ID	Creek Name	Drainage	Tributary To	Weldwood Compartment #	Total # of Fish
98029	EMERSON CREEK	ATHABASCA	ATHABASCA	13	31
98030	EMERSON CREEK	ATHABASCA	ATHABASCA	13	32
98156	UNNAMED CREEK	ATHABASCA	UNNAMED	4	42
98157	UNNAMED CREEK	ATHABASCA	ATHABASCA	23	27
98185	UNNAMED CREEK	ATHABASCA	EDSON RIVER	7	35
98186	UNNAMED CREEK	ATHABASCA	UNNAMED CREEK	17	0
98187	UNNAMED CREEK	ATHABASCA	EDSON	17	41
98188	UNNAMED CREEK	ATHABASCA	EDSON	17	53
98189	UNNAMED CREEK	ATHABASCA	UNNAMED	9	0
98190	UNNAMED CREEK	ATHABASCA	EDSON	8	20
98191	UNNAMED CREEK	ATHABASCA	EDSON	8	44
98192	EDSON RIVER	ATHABASCA	MCLEOD	16	20
98193	UNNAMED CREEK	ATHABASCA	EDSON	16	23
98194	EDSON RIVER	ATHABASCA	MCLEOD	8	69
98196	UNNAMED CREEK	ATHABASCA	EDSON	8	0
98197	UNNAMED CREEK	ATHABASCA	UNNAMED CREEK	7	8
98198	UNNAMED CREEK	ATHABASCA	EDSON	8	0
98199	UNNAMED CREEK	ATHABASCA	EDSON	8	9
98200	EDSON RIVER	ATHABASCA	MCLEOD	8	20
98201	UNNAMED CREEK	ATHABASCA	EDSON	7	49

Total Number of Sites=20 **Total Number of Fish 523**

Appendix II e. Summary of sites surveyed in the McLeod Working Circle; Foothills Model Forest, 1998.

Site ID	Creek Name	Drainage	Tributary To	Weldwood Compartment #	Total # of Fish
98002	ANDERSON CREEK	ATHABASCA	MCLEOD	9	90
98007	UNNAMED CREEK	ATHABASCA	MCLEOD	18	0
98008	WAMPUS CREEK	ATHABASCA	MCLEOD	3	12
98009	WAMPUS CREEK	ATHABASCA	MCLEOD	3	23
98010	DEERLICK CREEK	ATHABASCA	MCLEOD	3	14
98011	DEERLICK CREEK	ATHABASCA	MCLEOD	3	56
98019	UNNAMED CREEK	ATHABASCA	COLD CK	10	0
98020	UNNAMED CREEK	ATHABASCA	FELTON CK	6	0
98063	EUNICE CREEK	ATHABASCA	MCLEOD	3	2
98064	WAMPUS CREEK	ATHABASCA	MCLEOD	3	15
98065	DEERLICK CREEK	ATHABASCA	MCLEOD	3	15
98066	EUNICE CREEK	ATHABASCA	MCLEOD	3	10
98067	EUNICE CREEK	ATHABASCA	MCLEOD	24	2
98073	UNNAMED CREEK	ATHABASCA	ATHABASCA	16	88
98074	UNNAMED CREEK	ATHABASCA	ATHABASCA	12	32
98078	UNNAMED CREEK	ATHABASCA	GREGG RIVER	7	4
98079	UNNAMED CREEK	ATHABASCA	MCLEOD	5	8
98080	MERCOAL CREEK	ATHABASCA	MCLEOD	4	4
98081	UNNAMED CREEK	ATHABASCA	MCLEOD	5	0
98082	UNNAMED CREEK	ATHABASCA	MCLEOD	5	14
98083	UNNAMED CREEK	ATHABASCA	MCLEOD	5	6
98084	McCARDELL CREEK	ATHABASCA	MCLEOD	5	2
98095	MCPHERSON CREEK	ATHABASCA	MCLEOD	17	33
98096	WHITE CREEK	ATHABASCA	MCLEOD	20	27
98097	UNNAMED CREEK	ATHABASCA	MCLEOD	12	38
98101	LAMBERT CREEK	ATHABASCA	EMBARRAS	18	33
98131	NEAT CREEK	ATHABASCA	MCLEOD	4	13
98132	WAMPUS CREEK	ATHABASCA	MCLEOD	3	289
98134	DEERLICK CREEK	ATHABASCA	MCLEOD	3	57
98135	EUNICE CREEK	ATHABASCA	MCLEOD	24	2
98136	DEERLICK CREEK	ATHABASCA	MCLEOD	3	399
98137	WAMPUS CREEK	ATHABASCA	MCLEOD	3	115
98138	WAMPUS CREEK	ATHABASCA	MCLEOD	3	126
98139	DEERLICK CREEK	ATHABASCA	MCLEOD	3	171
98150	UNNAMED CREEK	ATHABASCA	COLD CK	10	0
98151	UNNAMED CREEK	ATHABASCA	FELTON CK	6	1
98152	UNNAMED CREEK	ATHABASCA	FELTON	6	2
98153	UNNAMED CREEK	ATHABASCA	MERCOAL	6	14
98163	UNNAMED CREEK	ATHABASCA	WICKMAN	9	12
98164	UNNAMED CREEK	ATHABASCA	WICKMAN	9	28
98168	UNNAMED CREEK	ATHABASCA	ERITH	9	73
98169	UNNAMED CREEK	ATHABASCA	WICKMAN	9	0
98174	WARDEN CREEK	ATHABASCA	GREGG RIVER	2	29
98175	UNNAMED CREEK	ATHABASCA	WARDEN	2	0
98176	WHITE CREEK	ATHABASCA	MCLEOD	20	16
98177	UNNAMED CREEK	ATHABASCA	MCLEOD	20	0
98178	UNNAMED CREEK	ATHABASCA	WARDEN	2	5
98182	MARY GREGG CREEK	ATHABASCA	MCLEOD	4	166
98183	ANDERSON CREEK	ATHABASCA	MCLEOD	13	90
98184	ANTLER CREEK	ATHABASCA	MCLEOD	4	115
98195	BARIL CREEK	ATHABASCA	LAMBERT	19	37
98221	UNNAMED CREEK	ATHABASCA	FELTON	6	1
98228	LAMBERT CREEK	ATHABASCA	EMBARRAS	25	16
98229	LAMBERT CREEK	ATHABASCA	EMBARRAS	19	12
98300	GREGG RIVER	ATHABASCA	MCLEOD	2	26
98301	GREGG RIVER	ATHABASCA	MCLEOD	2	27
98302	GREGG RIVER	ATHABASCA	MCLEOD	2	31
98303	GREGG RIVER	ATHABASCA	MCLEOD	2	39
98304	GREGG RIVER	ATHABASCA	MCLEOD	2	29
98305	GREGG RIVER	ATHABASCA	MCLEOD	5	22

Site ID	Creek Name	Drainage	Tributary To	Weldwood Compartment #	Total # of Fish
98306	GREGG RIVER	ATHABASCA	MCLEOD	5	50
98307	GREGG RIVER	ATHABASCA	MCLEOD	5	50
98308	GREGG RIVER	ATHABASCA	MCLEOD	5	42
98309	MCLEOD RIVER	ATHABASCA	ATHABASCA	23	24
98310	MCLEOD RIVER	ATHABASCA	ATHABASCA	23	43
98311	MCLEOD RIVER	ATHABASCA	ATHABASCA	23	53
98312	MCLEOD RIVER	ATHABASCA	ATHABASCA	23	23
98313	MCLEOD RIVER	ATHABASCA	ATHABASCA	23	42
98314	MCLEOD RIVER	ATHABASCA	ATHABASCA	23	19
98315	MCLEOD RIVER	ATHABASCA	ATHABASCA	23	47
98316	MCLEOD RIVER	ATHABASCA	ATHABASCA	23	41
98317	MCLEOD RIVER	ATHABASCA	ATHABASCA	24	40
98318	MCLEOD RIVER	ATHABASCA	ATHABASCA	24	13
98319	MCLEOD RIVER	ATHABASCA	ATHABASCA	4	34
98320	MCLEOD RIVER	ATHABASCA	ATHABASCA	4	35
98321	MCLEOD RIVER	ATHABASCA	ATHABASCA	4	58
98322	MCLEOD RIVER	ATHABASCA	ATHABASCA	4	23
98323	MCLEOD RIVER	ATHABASCA	ATHABASCA	4	40
98324	MCLEOD RIVER	ATHABASCA	ATHABASCA	4	46
98325	MCLEOD RIVER	ATHABASCA	ATHABASCA	4	26
98326	MCLEOD RIVER	ATHABASCA	ATHABASCA	4	56
98327	MCLEOD RIVER	ATHABASCA	ATHABASCA	4	29
98328	MCLEOD RIVER	ATHABASCA	ATHABASCA	2	28
98329	MCLEOD RIVER	ATHABASCA	ATHABASCA	2	42
98330	MCLEOD RIVER	ATHABASCA	ATHABASCA	1	49
98331	MCLEOD RIVER	ATHABASCA	ATHABASCA	20	55
98332	MCLEOD RIVER	ATHABASCA	ATHABASCA	20	29
98333	MCLEOD RIVER	ATHABASCA	ATHABASCA	20	30
98334	MCLEOD RIVER	ATHABASCA	ATHABASCA	20	39
98335	MCLEOD RIVER	ATHABASCA	ATHABASCA	17	29
98336	MCLEOD RIVER	ATHABASCA	ATHABASCA	17	35
98337	MCLEOD RIVER	ATHABASCA	ATHABASCA	17	33
98338	MCLEOD RIVER	ATHABASCA	ATHABASCA	20	36
98339	MCLEOD RIVER	ATHABASCA	ATHABASCA	18	59
98340	MCLEOD RIVER	ATHABASCA	ATHABASCA	12	55
98341	MCLEOD RIVER	ATHABASCA	ATHABASCA	12	40
98342	MCLEOD RIVER	ATHABASCA	ATHABASCA	18	61
98343	MCLEOD RIVER	ATHABASCA	ATHABASCA	18	38
98351	MCLEOD RIVER	ATHABASCA	ATHABASCA	19	47
98352	MCLEOD RIVER	ATHABASCA	ATHABASCA	19	18
98353	MCLEOD RIVER	ATHABASCA	ATHABASCA	19	27
98354	MCLEOD RIVER	ATHABASCA	ATHABASCA	19	18
98355	MCLEOD RIVER	ATHABASCA	ATHABASCA	19	13
98356	MCLEOD RIVER	ATHABASCA	ATHABASCA	19	27
98357	MCLEOD RIVER	ATHABASCA	ATHABASCA	19	38
98358	MCLEOD RIVER	ATHABASCA	ATHABASCA	19	24
98359	MCLEOD RIVER	ATHABASCA	ATHABASCA	19	35

Total Number of Sites=107 **Total Number of Fish 4230**

Appendix II f. Summary of sites surveyed in the Foothills Model Forest and outside the Weldwood of Canada (Hinton Division) FMA, 1998.

Site ID	Creek Name	Drainage	Tributary To	Weldwood Compartment #	Total # of Fish
98013	FISH CREEK	ATHABASCA	ATHABASCA	Hinton Townsite	9
98015	FISH CREEK	ATHABASCA	ATHABASCA	Hinton Townsite	20
98035	FISH CREEK	ATHABASCA	ATHABASCA	Hinton Townsite	20
98041	SOLOMON CREEK	ATHABASCA	ATHABASCA	FMU E4	32
98043	SOLOMON CREEK	ATHABASCA	ATHABASCA	FMU E4	9
98044	UNNAMED CREEK	ATHABASCA	SOLOMON	FMU E4	0
98045	LEVI CREEK	ATHABASCA	SOLOMON	FMU E4	5
98062	CENTRE CREEK	ATHABASCA	ATHABASCA	Hinton Townsite	3
98125	UNNAMED CREEK	ATHABASCA	SOLOMON	FMU E4	1
98127	SOLOMON CREEK	ATHABASCA	ATHABASCA	FMU E4	22
98130	SOLOMON CREEK	ATHABASCA	ATHABASCA	FMU E4	22
98140	LEVI CREEK	ATHABASCA	SOLOMON	FMU E4	5
98360	MCLEOD RIVER	ATHABASCA	ATHABASCA	Out of FMA	21

Total Number of Sites=13 **Total Number of Fish** **169**