Mackay, W. C., M. K. Brewin, and M. Monita. 1997.
Friends of the Bull Trout Conference Proceedings. 45 -51.

A Survey of Alberta Anglers' Attitudes Towards Bull Trout and Fisheries Man

Peter C. Boxall
Canadian Forest Service, Social Science Research Project, Northwest Region
5320 122 Street, Edmonton, Alberta T6H 3S5, Canada

Roger LeFrancois
H.L.A. Consultants Ltd,
210 Capilano Mall, 5004 98 Avenue, Edmonton, Alberta T6A 0A1, Canada

Abstract. - A survey of Alberta anglers was conducted to examine the attitudes, awareness, and m towards bull trout and fisheries management in general. Random samples were drawn from the Trout U Canada's (TUC) Alberta membership list and the 1992/93 Alberta fishing license records. A question developed and administered by telephone resulting in a total sample of 915 completed interviews. TUC differed from licensed anglers in terms of age, experience, education levels, and awareness. Both gro members and nonmembers, provided similar scores to various management options used to control ov but the distributions of preferred options differed between them. Generally, the knowledge of how to ide trout was low in both groups, as was awareness of the status of Alberta's bull trout populations. While this survey was a simple assessment of current knowledge and awareness, it provides a good starting point for the evaluation of public information and education programs as well as a preliminary instrument to plan more detailed human dimensions research efforts. Such efforts are critical if species like bull trout, which are threatened through overharvest and are poorly understood by the public, are to be protected and restored.

An emerging discipline within natural resource management is called human dimensions research. This discipline is concerned with four human related areas (Kellert and Brown 1985): 1) the identification of constituents: 2) social and economic impact assessment: 3) multiple satisfactions management: and 4) public education and awareness. These human dimensions concerns in fish and wildlife management have been slow to emerge, particularly in Canada. Consequently, many resource managers and decision makers have alienated to some degree members of the general public and interest groups in terms of their involvement and support for management related initiatives. Avoidance of this alienation is particularly important when management of an endangered or threatened species is concerned. The bull trout (*Salvelinus confluentus*) is such a species.

Concern for the status of Alberta's bull trout populations has resulted in the organization of the Bull Trout Task Force (BTTF) containing representation from a wide range of special interest groups and management agencies. The BTTF has undertaken several initiatives to increase the public's awareness of the plight of the bull trout. So far this has included a poster campaign, supporting the bull trout as the official fish emblem of Alberta, involvement in recovery plans, and of course organizing and hosting the Friends of the Bull Trout Conference, May 5-6 in Calgary, Alberta. In the preamble to this conference representatives of the BTTF state: "The BTTF maintains that educational and public support, especially of the angling public, are essential if proposed management strategies designed to rehabilitate bull trout populations are to succeed." These thoughts involve elements of the human dimensions of fisheries management and require considerable effort and research if they are meant to be more than rhetoric. Accordingly, one of the participants in the BTTF, Trout Unlimited Canada (TUC), with funding from the Fisheries Management Enhancement Program, sponsored a study of the awareness, opinions and attitudes of Alberta anglers towards bull trout and fisheries management in general. While the objective of this study was to determine the levels of awareness of the status of the Alberta bull trout population and the potential support for various management options, it also provides a baseline from which other educational and information campaigns in fisheries management can be evaluated. It also serves as a vehicle to assess the differences in knowledge and attitudes between Alberta members of TUC and nonmembers.

Methods

A questionnaire was designed to obtain information on the following subjects: current fishing activities, catch and release practices, motivations for fishing, species fished for, awareness of trout species (including bull trout), bull trout fishing practices and conservation practices, and fisheries management preferences (HLA 1994). The questionnaire was developed with input from staff at TUC.

During the summer of 1993 two samples of anglers were randomly drawn; one from an Alberta membership list of TUC members and the second from 1992/93 Alberta fishing license records. The sampling strategy involved segmentation by broad geographic areas such that, as much as possible, the sample represented the provincial angling population and TUC

[1] An abstract of this paper has been published in:
Boxall, P. C., and R. Lefrancois. 1996. Alberta anglers' knowledge and attitudes towards bull trout and fisheries management. Human Dimensions of Wildlife 1(3):75-77.

Table 1. The size and geographical distribution of the samples used to assess the preferences and motivations of Alberta anglers towards bull trout and sportfishing in general.

Geographical segment	Number of respondents
Alberta Licensed Anglers	
Southwest rural Alberta	114
Calgary and area	123
Southeast rural Alberta	111
Northwest rural Alberta	148
Edmonton and area	95
Northeast rural Alberta	104
Trout Unlimited Canada Membership	
Calgary and southern Alberta	120
Edmonton and northern Alberta	100
Total Number of Respondents	915

membership on a geographic basis. The provincial fishing records had many incomplete or illegible addresses, so a telephone survey was chosen as the appropriate vehicle to administer the survey. Telephone interviews took place during October and November of 1993. Table 1 provides the geographic distribution of completed interviews of anglers from both samples. This sample of 915 completed interviews provides results that can be interpreted with a 3.5% margin of error 95% of the time.

Analysis of the results is still ongoing. Therefore the findings reported in this paper represent preliminary, descriptive analyses and do not assess in detail the statistical significance of many of the data comparisons. A major comparison examined here is the difference between the attitudes and knowledge of TUC members and the Alberta angling public. Information is presented in tables in the form of answers to the following questions:

1. Are the characteristics of TUC members different than other Alberta anglers?
2. Why do respondents fish?
3. Which species of trout are the respondents aware?
4. Do anglers agree with various management options for controlling overfishing?
5. Can anglers identify bull trout from other species?
6. What do anglers know about the status of bull trout?
7. Do anglers fish for bull trout?

Results

Respondents' Characteristics

Table 2 summarizes what we believe are some salient characteristics of the TUC and non-TUC components of the sample. The TUC sample consists of more expert and experienced anglers than the Non-TUC sample and the TUC members report an overall higher number of years fishing in Alberta. The preferred fishing method of TUC members is flyfishing, followed by casting and then trolling. In contrast, more of the licensed angler group report casting as their favourite type of fishing, followed by trolling and ice fishing. Only 31% of the licensed angler group like flyfishing, as opposed to over 81% of the TUC sample. Over 44% of the TUC sample hold university degrees and about 35% reported some trade, technical or university training. Most individuals in this sample were between 30-59 years of age. Of the non-TUC members, about 16% hold university degrees; the majority of people in this group reported high school as their highest education level. In terms of age, both samples had a similar percentage of middle aged members. However, the percentage of licensed angler respondents in young age classes was considerably higher than in

Table 2. Some characteristics of the two samples of Alberta anglers.

Characteristic	Trout Unlimited Canada member (%)	Non Trout Unlimited Canada member (%)
Fishing experience[1]		
Expert	11.7	2.0
Experienced	52.0	22.6
Average	25.1	55.5
Beginner	11.2	19.9
Type of Fishing[1]		
Casting	57.9	92.2
Trolling	39.9	59.9
Flyfishing	81.2	31.2
Ice fish	36.8	58.4
Bait fish	19.8	53.8
Average years fished in Alberta[2]	23.9 yrs	19.9 yrs
Education[1]		
High school or less	21.0	58.8
Trade, technical or some university	34.8	24.7
At least one university degree	44.2	16.4
Age[1]		
18-29 years	8.1	21.0
30-59 years	79.4	72.1
60 years and older	12.6	7.0
Average household size[2]	2.9 persons	3.2 persons

[1] The T U distribution of responses differs from the provincial licensed angler sample, χ^2 tests, $P < 0.01$ or beyond.
[2] The means are significantly different, paired t-tests, $P < 0.01$ or beyond.

the TUC sample.

This information suggests that the TUC membership is not a random sample of the Alberta licensed angler population. TUC members are generally older and more highly educated. The TUC membership also prefers different fishing methods and generally spends more time fishing.

Motivational Factors Underlying Fishing

In order to assess motivations underlying fishing, respondents were asked to score a number of statements on a 4-point Likert scale, where a "1" signified "not important" and a "4" signified "very important". Table 3 presents the results in terms of mean scores for the two samples. The top three motivations were similar for each of the two samples; these were "to enjoy nature", "for relaxation", and "to get away". The lowest motivations were also similar and included "to catch a trophy fish" and "for a sense of achievement". An interesting dissimilarity was the motivation "catch fish to eat". TUC members rated it the lowest (tenth) while the non-TUC sample rated it seventh.

While further statistical analysis of these data are warranted, it nevertheless appears that in general, the motivations underlying recreational fishing are similar among these angler samples.

Awareness of Trout Species

In order to place questions on bull trout management in context, a question was asked relating to knowledge about the presence of trout species in Alberta. Respondents were asked if they had heard of the various trout species found in Alberta. A list was provided and the respondent answered "Yes" or "No" to each species as it was named by the interviewer. One species mentioned was "Roger's trout" which is fictional and was included to examine knowledge more closely.

The proportion of anglers aware of the various trout species is presented in Table 4. Every respondent had heard of rainbow trout, closely followed by lake trout. Generally, most TUC members had heard of all of the trout species. About 83% of TUC respondents were aware of Golden trout and this species was the one members were least aware of. Respondents from the licensed anglers were less familiar with the various species than those in the TUC sample. Golden trout was the species with the lowest level of awareness at 51%. About 95.5% of the TUC sample was aware of bull trout, while 75.1% of non-TUC members were. Due to the recent popular name change from Dolly Varden to bull trout, Dolly Varden was included in the species list. Awareness levels for Dolly Varden were higher than bull trout, particularly for the non-TUC sample. Finally, awareness of the fictional Roger's trout was very low; only 5.4% of TUC members and 3.6% of non-TUC members indicated they had heard of this species. It is noteworthy that the TUC level for this species is higher than the licensed angler sample.

Agreement with Management Options for Overfishing

Overfishing has been identified as a major concern regarding bull trout populations and other fisheries in Alberta. In order to assess the level of agreement with various management options available to control overfishing, respondents were asked to score various options on a 4-point Likert scale where 1 represented "strong disagreement" and 4 represented "strong agreement". The mean scores are summarized by option and angler group in Table 5.

The establishment of catch-and-release regulations scored highest or second highest and was the most frequently selected option by anglers in both TUC and the licensed angler samples. Other options with high scores included increased fines for violations, closing the season at specific times, more

Table 3. Mean rating of motivational factors relating to reasons why Alberta anglers fish. The rating scale used was a 4-point Likert scale where 1=not important and 4=very important.[1]

Reasons to Fish	Trout Unlimited Canada member	Non-Trout Unlimited Canada member
to enjoy nature	3.71	3.58
for relaxation	3.61	3.43
to get away	3.50*	3.42*
for the challenge and excitement	3.20	2.93
for companionship	2.69*	2.75*
to improve my fishing skills	2.51	2.18
for family togetherness	2.34	3.03
for a sense of achievement	2.31	2.00
to catch trophy fish	1.63	1.44
catch fish to eat	1.35	2.34
Sample Size	224	693

[1] All pairwise comparisons of means are significantly different (*t*-tests, $P < 0.05$) except those marked by an asterisk (*).

Table 4. The awareness of Alberta anglers of various species of trout found in the province.

	Percent indicating they have heard of a particular species	
Trout species	Trout Unlimited Canada members	Non-Trout Unlimited Canada members
Rainbow trout	100.0	100.0
Brook trout	98.2	95.1
Cutthroat trout	96.4	85.6
Dolly varden	96.4	82.2
Brown trout	96.4	89.1
Roger's trout	5.4	3.6
Bull trout	95.5	75.1
Golden trout	82.6	51.0
Lake trout	100.0	96.7

Table 5. The level of agreement and preferred choice by Alberta anglers of various fisheries management options that could be directed towards overfishing.

Management options	Importance of option: Mean score on a 4-point Likert scale [1,2]		Most preferred management option: % respondents choosing that option	
	Trout Unlimited Canada member	Non Trout Unlimited Canada member	Trout Unlimited Canada member	Non Trout Unlimited Canada member
Catch-and-release regulations	3.86	3.43	43.1	23.9
Increases fines for violations	3.80	3.60	2.2	11.9
Close season at specific times	3.52	3.23	17.0	10.7
More enforcement	3.46	3.19	9.5	11.3
Impose size limits	3.41 *	3.40 *	1.3	6.6
No bait fishing	3.39	2.71	2.7	0.3
Compulsory use of barbless hooks	3.30	2.86	4.0	3.2
Increased stocking	2.62	3.35	4.5	7.5
Shorter season	2.32 *	2.46 *	2.7	6.9
Increase license fees	2.27	1.81	1.0	0.1

[1] A score of one indicated strong disagreement while a score of 4 strong agreement.
[2] All means are significantly different (t-tests, all $P < 0.05$) except were noted with an asterisk (*).

enforcement, and size limits. While catch-and-release regulations were clearly the most preferred option, it is more difficult to derive second, third, and fourth alternatives from these data. About 17% of the TUC sample chose season closures as an option. This option represents the second most frequently chosen option by this sample group; the frequency with which they preferred other options dropped significantly below the 17% level. For the licensed angler sample, increased fines, season closures, and more enforcement were chosen with similar frequency, at about 11-12% each. The next set of preferred options were increased stocking, shorter seasons, and size limits. These options were each chosen by approximately 7% of this respondent group. Increasing license fees was the lowest rated and least frequently chosen management option by respondents in both angler groups.

Activities and Knowledge Relating to Bull Trout

A number of questions on the survey instrument were used to determine the frequency with which anglers chose to fish in areas where bull trout are found. Table 6 summarizes the answers to these questions. First, anglers were asked if they had ever fished in foothill or mountain streams. Over 83% of TUC members indicated that they had, compared to about 50% of the licensed angler sample. TUC members fished an average of 13.8 times/year in these areas while non-TUC members fished significantly less at 6.2 times. Since angling behaviours may have changed over time, respondents that reported not fishing in foothill and mountain areas now were asked if they used to fish in these areas. About half of the TUC members and two-thirds of the non-TUC members who have not fished recently in these areas indicated that they had in the past. Reasons for discontinuing fishing in these areas were largely related to distance and lack of time. Only 10.5% of the TUC subsample and 5.6% of the non-TUC group perceived that the foothill and mountain streams were "fished out".

Since a major objective of the survey was to determine the attitudes towards bull trout, a number of questions were used to address respondents' knowledge of bull trout; particularly the identification of this species as compared to other trout species. In order to do this respondents were asked in an open-ended question to list at most three characteristics that distinguish bull trout from brook trout. Following this question, they were also asked if it is true that one of the features distinguishing bull trout is the presence of black spots on their dorsal fins. Table 7 provides a summary of responses to these questions by both angler groups.

The most frequently cited features distinguishing bull from brook trout were the presence of wormlike veins, differences in coloration, and that the bull trout was larger and generally has a larger head. About 30% of TUC members and 70% of non-TUC members indicated they didn't know how to distinguish the two species. Similarly, about two-thirds of the TUC sample and over 80% of the non-TUC sample didn't know if black spotting was a distinguishing feature of bull trout.

Awareness of the Status of Bull Trout and Fishing Bull Trout

Finally, a series of questions was asked about awareness of the status of bull trout and the frequency and methods of fishing bull trout. A summary of responses to these questions is shown in Table 8.

First, very few members in each sample were aware that bull trout were listed as a "vulnerable species." Only 20% of TUC members knew this while only about 6% of non-TUC members did. In fact, 13% of the TUC angler sample suggested that bull

Table 6. The past activities of Alberta anglers relating to fishing in areas where bull trout may be encountered.

Activity and Reasons	Trout Unlimited Canada member	Non Trout Unlimited Canada member
	Percent answering Yes	
Ever fished in foothill or mountain streams?	83.0	50.1
	Mean (S.E.) Number of Times[1]	
If Yes, how many times/year on average	13.8 (1.29)	6.2 (0.62)
	Percent answering Yes	
Did you used to fish in foothill and mountain streams?	50.0	66.7
If Yes, why not now?		
I fish on vacations	0	7.4
Distance	26.3	40.7
Family obligations	0	1.9
Too old	5.3	1.9
No time	10.5	12.0
Fished out	10.5	5.6

[1] These means are significantly different, *t*-test, $P < 0.001$.

Table 7. A summary of descriptions of the characteristics that differentiate bull trout from brook trout provided by respondents to the Alberta angling survey.

Distinguishing characteristics	Trout Unlimited Canada member (%)			Non Trout Unlimited Canada member (%)		
	1st Reason	2nd Reason	3rd Reason	1st Reason	2nd Reason	3rd Reason
Brook's veins are wormlike	14.9	12.9	15.4	1.6	2.5	14.3
Color	13.0	11.8	3.9	10.6	14.8	7.1
Bull has a larger mouth	0.7	0	0	3.2	2.5	0
Heads are different	12.4	9.7	15.4	10.6	2.5	28.6
Size	0.7	1.1	3.9	1.6	1.2	0
Bull is larger	10.4	7.5	7.5	20.5	7.4	0
Coloration	22.6	33.3	34.6	25.6	30.1	21.4
Other	25.4	23.7	19.2	26.6	38.3	28.5
Don't Know	29.0			68.8		
Sample Size	217			661		
Responses to the question: "Is the black spot on the dorsal fin the only distinguishing feature?"						
Yes		26.7			13.1	
No		6.3			6.6	
Don't Know		67.0			80.3	

Table 8. The awareness and activity relating to bull trout fishing in Alberta by Alberta anglers.

Questions about bull trout	Percent answering YES	
	Trout Unlimited Canada members	Non - Trout Unlimited Canada members
Aware bull trout is listed vulnerable (N=919)	20.1	5.5
Feel bull trout negatively influence other fish (N=105)	14.6	21.9
Bull trout populations are: (N=118)		
Increasing	13.0	4.2
Decreasing	45.7	41.7
Not Changing	41.3	54.2
Ever fish for bull trout? (N=907)	20.5	12.7
Specifically go for bull trout (N=137)	28.6	26.1
Incidentally catch bull trout (N=137)	71.4	74.0
Practice conservation measures when fishing for bull trout (N=130)	85.4	51.2
Catch only what I use	0	8.0
Release small ones	0	22.0
Catch-and-release	65.0	59.0
Use flies	5.0	0
Use barbless hooks	16.0	10.0

trout populations were increasing; another 41% felt their numbers were stable. Of the non-TUC sample, 4.2% felt that bull trout were increasing in numbers and over half suggested bull trout populations were stable. This knowledge of bull trout population status may be related to the opportunity for anglers to catch these fish. Only about 20% of TUC members responded that they have fished for bull trout; of these anglers, only about 29% indicated that they specifically fish for bull trout. For the non-TUC group, only about 13% indicated they have fished for bulls and of these, about 26% indicated they specifically targeted bull trout. The majority of bull trout anglers in each sample group felt they incidentally captured bull trout while fishing for other species.

It is interesting that most TUC anglers and about half of the non-TUC group who specifically fish for bull trout practice conservation measures while doing so. The majority release the bull trout they catch. More TUC members use barbless hooks, while more non-TUC members release small fish and only keep fish they can consume.

Discussion

What have we learned in this preliminary analysis of angler attitudes and awareness? First, a not surprising result is that members of TUC tend to be more knowledgeable, experienced, fished more, and are as a group, demographically different than the licensed angler population in Alberta. Other studies comparing members of fishing organizations and non-members have found similar results (e.g. Gigliotti and Peyton, 1993). However, the motivations for fishing among anglers in the two samples appear remarkably similar, as were the levels of agreement with various management options. It is important for fisheries managers to be aware of these differences and similarities when including the various "publics" in fisheries management in Alberta. Although this study represents an exploratory examination, it would be useful to conduct an in depth attitudinal analysis similar to that for birdwatchers (McFarlane 1994) and others in order to examine possible influences outside of fishing club memberships.

Second, management of recreational fishing, like hunting, is more complex than simply providing adequate numbers of fish. The motivations of respondents to fish (Table 3) suggests that social and leisure - related factors are more important than many factors related to the actual harvest or hooking of fish. What this suggests is that satisfying anglers should also include consideration of the setting, interactions with other anglers and recreationists, and the provision of a wide range of fishing experiences and opportunities. This points to the need to consider multiple satisfactions in managing recreational fisheries and the need for the various resource management agencies to get together and harmonize management efforts.

Third, while catch-and-release regulations to manage over-fishing are preferred by a majority of anglers in the two Alberta samples (Table 5), the levels of agreement may differ between TUC members and non-TUC members. This implies that the imposition of catch-and-release may be a harder sell for most of the Alberta angling public. Preliminary research suggests that these individuals feel that more emphasis should be placed on enforcement and temporary season closures. Generally, our research points to TUC members being more consistent in their opinions about fishery management options, while the general Alberta angling public less so. This should be taken into consideration in planning future public information, education and awareness campaigns.

Fourth, the BTTF should now be aware that anglers have limited knowledge about how to identify bull trout and are not aware of their population status. Generally, knowledge about the species is low in the TUC membership, but is particularly low among the licensed anglers. This survey can be used as a benchmark to gauge the success of future information efforts. The goal should be to move the percentage of anglers aware of the vulnerability of bull trout beyond 20% in the TUC membership and the 5.5% level among other licensed anglers. These can be used to set measureable awareness goals.

In conclusion, this study represents a good starting point for information on sportsfishing and particularly bull trout. In Alberta, recent knowledge of the human dimensions of recreational fishing has lagged behind those of wildlife-related recreation. The consequence is that there is little information on the levels of knowledge and attitudes of anglers toward current

sportsfishing issues. This hinders the success that fisheries managers could have in their attempts to address current management problems. This survey, in conjunction with the other efforts undertaken by the BTTF to address bull trout management issues, will go a long way toward educating and involving the public in this management issue. Given the recent shift by government to downsize, partnerships such as the BTTF, are urgently required to identify and plan successful resource management programs.

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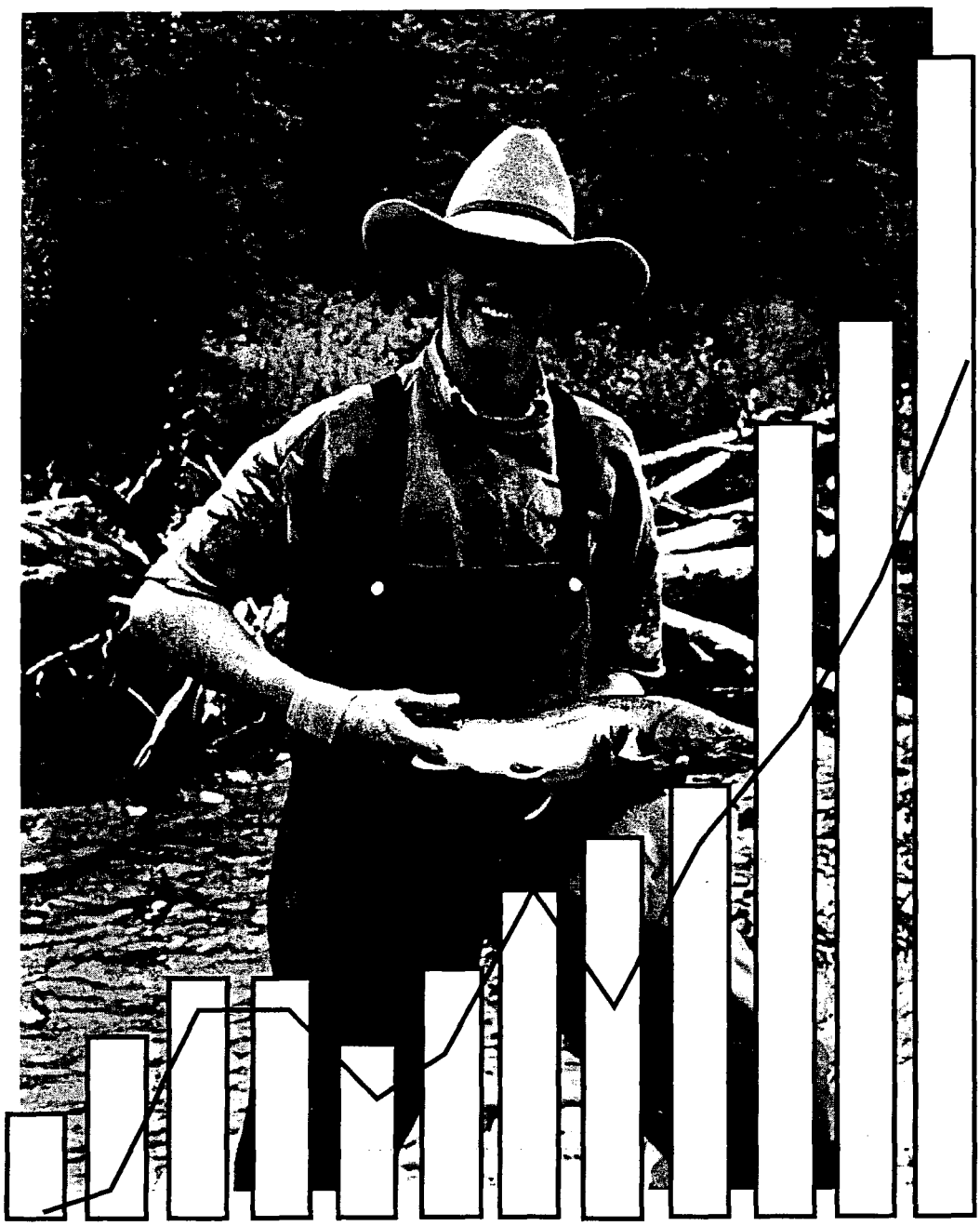

Conference Proceedings

W. C. Mackay, M. K. Brewin, and M. Monita, editors
The Bull Trout Task Force (Alberta)

Suggested citation formats for this publication:

Entire Book

Mackay, W. C., M. K. Brewin, and M. Monita. 1997. Friends of the bull trout conference proceedings. Bull Trout Task Force (Alberta), c/o Trout Unlimited Canada, Calgary.

Article Within the Book

Van Tighem, K. 1997. My grandfather's trout. Pages 83 - 85 *in* Mackay, W. C., M. K. Brewin, and M. Monita, editors. Friends of the bull trout conference proceedings. Bull Trout Task Force (Alberta), c/o Trout Unlimited Canada, Calgary.

ISBN Number: 0-9682637-0-4

Members of the Bull Trout Task Force (Alberta), 1993 - 1997

Jim Allan - Pisces Environmental Consulting Services Ltd., Red Deer, Alberta
Garnet Anthony - Sherwood Park, Alberta
Dave Berry - Fisheries Management Division, Natural Resources Service, Edmonton, Alberta
Tony Blake - Trout Unlimited Canada, Red Deer, Alberta
Bill Bond - Department of Fisheries and Oceans, Winnipeg, Manitoba
Kerry Brewin - Trout Unlimited Canada, Calgary, Alberta
Trent Enzol - Manalta Coal Ltd., Calgary, Alberta
Brad Fenson, Alberta Fish and Game Association, Edmonton, Alberta
Fred Girdwood - Alberta Fish and Game Association, Edmonton, Alberta
Jim Harvie - Alberta Fish and Game Association, Edmonton, Alberta
Mel Kraft - Fisheries Management Division, Natural Resources Service, Rocky Mountain House, Alberta
Albert Lees, Nova Gas Transmission Ltd., Calgary, Alberta
Bill Mackay - Edmonton, Alberta
Wayne Roberts - Federation of Alberta Naturalists, Alberta Wilderness Association, Canadian Parks and Wilderness Society
Garry Szabo, Trout Unlimited Canada, Calgary Alberta
Kevin Van Tighem - Federation of Alberta Naturalists, Alberta Wilderness Association, Canadian Parks and Wilderness Society, Waterton Lakes, Alberta
Percy Wiebe - Parks Canada, Calgary, Alberta