Tchesinkut Lake, lake trout (*Salvelinus namaycush*) stock assessment and evaluation of short set small mesh experimental gill netting procedure.

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BRITISH COLUMBIA

Skeena Report # 132

March 2002

Giroux, P.A.
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Skeena Report Series ; no.

Published by the
Fish and Wildlife Science and Allocation Section
BC Ministry of Water, Land and Air Protection
Skeena Region
3726 Alfred Avenue
Bag 5000
Smithers, BC V0J 2N0

Abstract

Tchesinkut Lake was sampled during daylight hours between May 28th – 31st using: 1) two short set (min. 1hr) 60ft sinking gill nets per site with three 20ft panels of 1.5”, 2.5” and 3”; and 2) short set (min 1hr) 90m standard Resource Inventory Committee (RIC) sinking gill nets. Tchesinkut lake was sampled at an intensity of 1.77 sets/km^2 of lake area. Water temperature and dissolved oxygen levels were measure to 30m and the lake was found to be unstratified. Twenty-five lake trout were captured and ranged from 40 –to- 70cm in length. All lake trout sampled were less than 15 years of age and catch results were supplied to the creel survey efforts undertaken by Maniwa *et al.* (2001). Lake trout growth rates showed a significant increase since 1988 and combined with harvest data support the conclusion that Tchesinkut Lake’s lake trout population is being over harvested (Maniwa *et al.* 2001).

The short-set, small mesh experimental gill nets demonstrated significant bias towards shorter, younger lake trout (*t*-cal: 2.1; 2.07 p=0.05) and lake whitefish (*t*-cal: 1.99; 2.02 p=0.05) when compared against the 90m RIC catch results. Using crew effort/time as an evaluation measure, short-set, small mesh gill nets (18.3m nets) were found to be approximately half as efficient as short set 90m RIC experimental sinking gill nets when comparing lake trout catch results. A lake trout mortality rate of 8% was observed for the short-set small mesh and 90 m sinking gill nets, indicating that the technique shows promise as an effective method for lake trout live capture and release. However, the apparent bias towards smaller and younger fish causes concern for comparing small mesh netting results versus conventional netting techniques using in the past. The comparison of small mesh netting to 90m RIC should remain under study to increase sample size and improve confidence regarding observed size and age bias.

Acknowledgements

Funding for this project was provided by Fisheries Renewal BC, through a contirbution agreement with the Upper Fraser & Nechako Fisheries Council, and administered by Todd French. Karen Geertsema and Rhonda Reynolds of the British Columbia Conservation Foundation (BCCF) of Prince George are acknowledged for their assistance with project administration. The proposal was submitted by Peter Hall under a partnership between Skeena Region Ministry of Water, Land and Air Protection (WLAP) and the Tchesinkut Watershed Protection Society (TWPS). Tom Blair of the TLPS and Ian Sharpe of Skeena Region WLAP, Environmental Protection Section are acknowledged for their support of the project. Dana Atagi, Mark Beere, Sig Hatlevik, Jeff Lough, Ron Tetreau and Murray Booth, all of Skeena Region WLAP assisted with fish netting, handling and data capture. The efforts of Matt Jessop, BCCF Smithers, for assistance with data collection and data entry are also acknowledged. Lynn Miers of Aquatic Information Branch of Min. of Sustainable Resource Management is also acknowledged for supplying MS Access database entry tool. Jeff Lough provided editorial comments.

Table of Contents

List of Figures

List of Tables

1.0 Introduction

BC Environmental Youth Team members, under the direction of the BC Ministry Water, Land and Air. Protection and employed by the Nechako & Lakes District, conducted a creel survey on Tchesinkut Lake (Figure 1) over the later portion of the summer of 2000, the winter of 2000/01 and the entire summer of 2001 (Maniwa et al. 2001). The creel survey was initiated to address concerns of the Tchesinkut Lake Protection Society and local anglers that Tchesinkut Lake's lake trout (*Salvelinus namaycush*) population was in decline. The Skeena Region's, Fisheries Section of the Ministry of Water Land and Air Protection conducted experimental small mesh gill net sampling to accomplish the following objectives:

- capture a sample of lake trout (n=30-50) representing all length and age classes;
- contribute age and length data from smaller lake trout to the creel survey data set in an attempt to address the size bias associated with creel surveys;
- obtain age structures from all lake trout captured to determine growth rates;
- capture, handle and release lake trout, while minimizing mortalities to less than 10%; and,
- evaluate effectiveness of experimental gill nets to capture representative samples of lake trout;

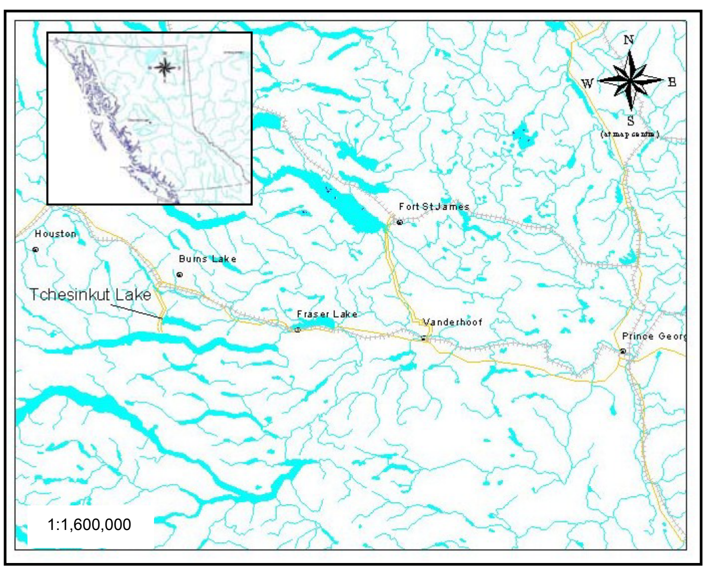

Figure 1: Location of Tchesinkut Lake in BC (inset) and in central BC.

2.0 Methods

2.1 Timing

Sampling was conducted over a four day period between May 28th – 31st, when Tchesinkut Lakes water temperatures are predicted to be unstratified. Uniform water temperatures would permit unbiased sampling of the littoral zone for lake char who normally avoid warmer water temperatures typical of the littoral zone in summer and early fall months (Scott and Crossman 1973). Lake water temperature and dissolved oxygen (DO) levels were sampled to 30m using an Oxyguard™ DO/temp probe.

2.2 Site Selection

A minimum sampling intensity of 0.75 site/km^2 of lake area was used and corresponded to methods described by Osborn et al. (1997). Twenty-five site locations were selected systematically, spacing sites approximately 1-1.5km apart along the shoreline (Fig. 2). An attempt was made to cover all areas of the lake, including bathymetric profiles, shoreline features, aspect, as well as, tributary stream inlets and outlets.

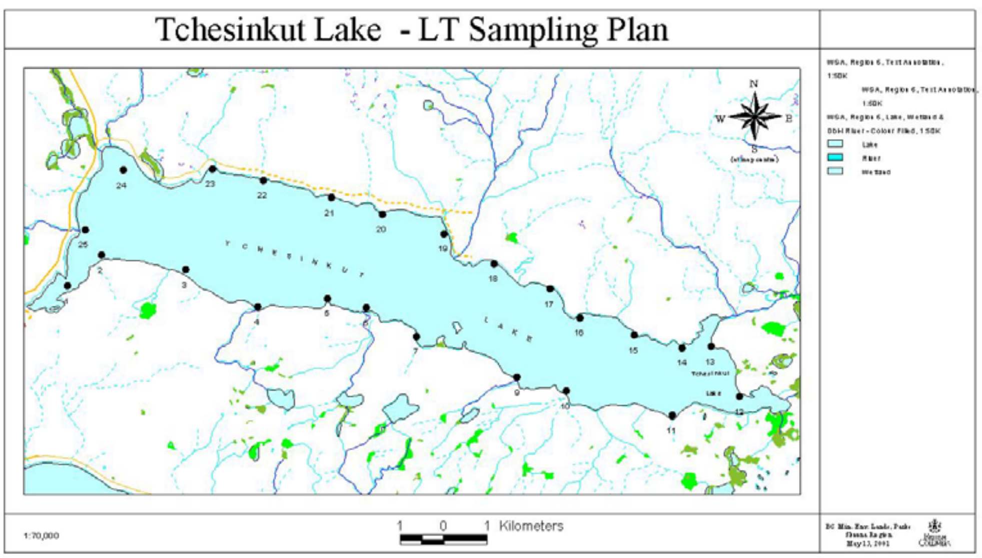

Figure 2: Location of lake trout gill net sample sites on Tchesinkut Lake.

2.3 Fish Sampling

Two small mesh mono-filament sinking gill nets comprised of three panels; 1) 20ft (6.1m) 1.5" mesh, 2) 20ft(6.1m) 2.5" mesh, and 3) 20ft(6.1m) 3" mesh were anchored perpendicular to the shore with a 10 or 20m line. A standard Resource Inventory Committee (RIC) 90m experimental sinking gill net was also employed at sites following the use of the smaller nets to improve catch efficiency.

All nets were left to soak for a minimum of one hour and a maximum of three hours prior to hauling. Where lake trout were captured, sites may have been sampled repeatedly over the four day period as time permitted.

Fork length was recorded for all fish captured and lake trout were tagged with Floy, T-anchor tags. Scale samples were collected from lake whitefish (*Coregonus clupeaformis*) and rainbow trout (O*ncorhynchus mykiss*). Lake trout had a two cm section of the leading pectoral fin ray, located closest to the body removed for aging. Lake trout that suffered mortality had both otoliths and fin rays removed.

All fish species age structures were sent to North South Consultants of Winnipeg for aging.

2.4 Net Evaluation

Eighteen meter and 90 m nets were evaluated for efficiency by converting recorded catches to a standard catch/100m net/day, as described by deLeeuw (1991). Meters per net hour was calculated by multiplying net length (m) by hours for each net set (net length (m) x hrs = m.net hrs). The result was used to calculate catch/100m net/day (Equation 1).

Equation 1: Correction factor equation applied to standardize net catch for different net lengths and soak times.

$$[(2400 \times (x_i) \div (a)] \div x_i = \textit{Correction factor (catch/100m net/day)}$$

where:

x_i= no. of nets
a = total m.net hrs
2400 = 24 hrs x 100m net length

The correction factor is then multiplied against the actual catch by species and catch results to allow for equal comparisons between separate net lengths and soak times

2.5 Data Management

All fisheries data generated as a result of the sampling effort were entered into a Microsoft Access database provided by the Aquatic Information Unit of the Ministry of Sustainable Resource Management (MSRM). When the completed database is supplied to MSRM it will be uploaded into the Provincial Fisheries Data Warehouse. Once in MS Access, fisheries data were then exported into Microsoft Excel (v7) for analysis and graphics preparation.

3.0 Results

Tchesinkut Lake was unstratified on May 30th, 2001 as water temperature and dissolved oxygen showed little variation between the surface and 30m (Fig.3). Therefore, the assumption that lake trout were vulnerable to capture at all depths was satisfied.

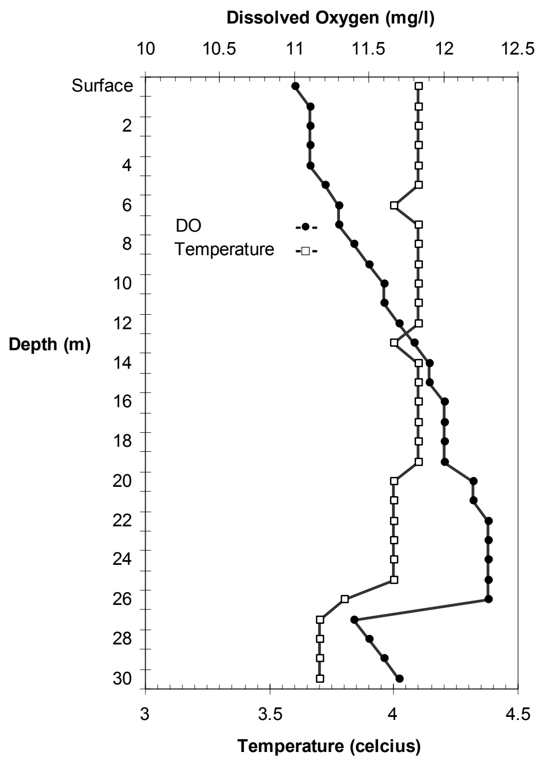

Figure 3: Dissolved oxygen (mg/l) and temperature (C^o) profile for Tchesinkut Lake, May 29, 2001

3.1 Fish Sampling

3.1.1 Effort and Catch Distribution

Over the four day sampling period (May 28-May 31, 2001) 109 fish were captured; 25 lake trout, 79 lake whitefish and 6 rainbow trout. Gillnetting conducted by Webber and Tupniak (1981) in Tchesinkut Lake resulted in similar species composition as in 2001. The BC Fisheries warehouse lists burbot (*Lota lota*) and kokanee (*O. nerka*) as present in Tchesinkut Lake, but they were not captured during the sampling period.

Total gill net effort, measured by number of net sets, was completed at a rate of 1.77 sets/km^2 of lake area, which is two-times greater than that recommended by Osborn et al. (1997). Netting effort was heaviest at sites 8-11 and 13 where between 8-18% of total effort was expended. The remaining sites were sampled between 2-5% of total effort (Figures 2 & 4).

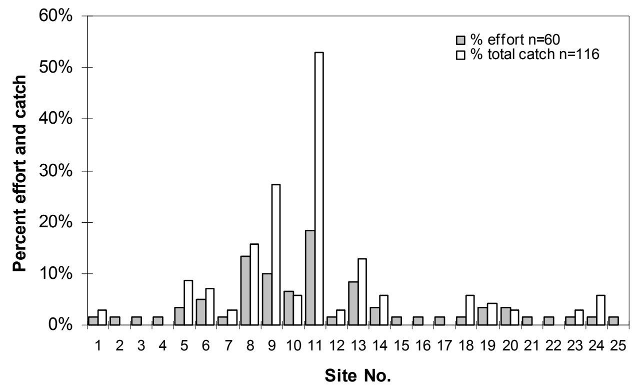

Figure 4: Distribution of gill-netting effort (shaded bars) and total catch (white bars) of all species by site within Tchesinkut Lake, May 28-31, 2001.

Catch results corresponded directly to effort, as nets were set repeatedly at sites in which lake trout were captured (Fig. 5).

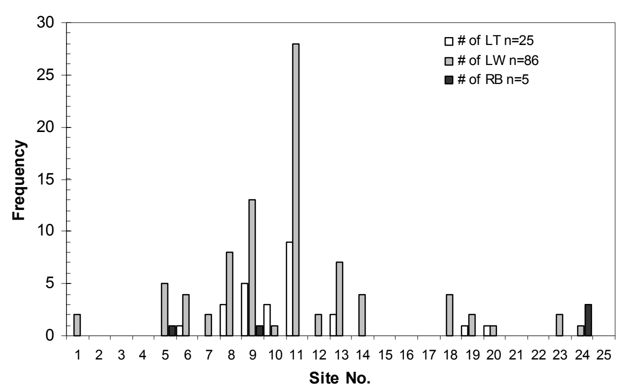

Figure 5: Catch frequency distribution of lake trout (LT; white bars), lake whitefish (LW; grey bars) and rainbow trout (RB; black bars) catch by site, Tchesinkut Lake, May 28-31, 2001.

Sites 11 and 9, which had the greatest amount of effort produced the greatest number of fish. Of interest is the generally low catch results for the northern shore of Tchesinkut Lake contrasted against the high catch results from the south-eastern shore. Sites 9-11 generated the highest catch of lake trout per set, whereas sites 1, 5, 9, 11, 12, 14, 18 and 23 produced high catch rates of whitefish. Sites 18 and 24 produced the highest catch rates, however, species diversity was low and not of the target species, lake trout (Fig. 6).

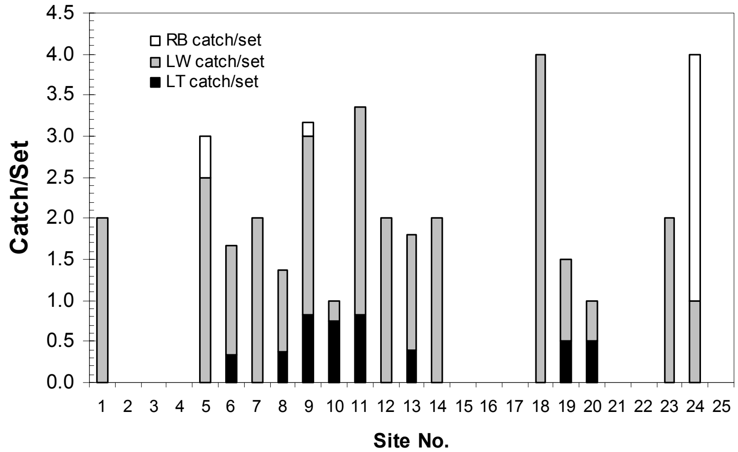

Figure 6: Catch per net set for lake trout (LT; black), lake whitefish (LW; grey) and rainbow trout (RB; white) in Tchesinkut Lake, May 28-31, 2001.

3.1.2 Lake Trout

Twenty-five lake trout were captured over the four day sampling period and comprised 23% of the total catch. Lake trout catch rate was 0.42/set. Only two lake trout suffered immediate mortality as a result of netting, resulting in an 8% immediate mortality rate. Mean fork length of lake trout netted was 52.89cm (Table 1). Lake trout greater than 40 cm and less than 50cm were the most frequent size class captured (n=11), followed by 50 – 60 cm (n=8) and 60-70cm (n=6; Fig. 6). Lake trout greater than 70 cm were not captured.

Table 1: Summary of lake trout frequency, mean length, standard error (±SE), maximum and minimum length by length-class (cm) captured in Tchesinkut Lake, May 28-31, 2001.

Length Class (cm)	Frequency	Mean Length (cm)	±SE	Max (cm)	Min. (cm)
<40	0				
40-45	6	43.1	0.602	44.5	41
45-50	5	46.7	0.43	48	45.5
51-55	4	52.75	0.92	55	51
55-60	4	57.4	0.37	58	56.6
60-65	4	63.62	0.8	65	62
65-70	2	67.6	2.4	70	65.2
>70	0	0	0	0	0
Total	25	52.89	1.72	70	41

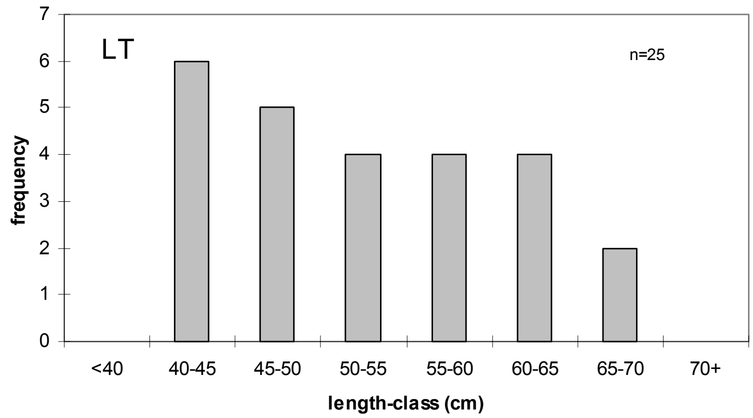

Figure 7: Length-class (cm) frequency distribution for lake trout captured in short set sinking gill nets, Tchesinkut Lake May 28-31, 2001.

Mean lake trout age was 9.3 years, while minimum age sampled was five and maximum was 15 years (Table 2).

Table 2: Summary of mean age, standard error (±SE), minimum and maximum (yrs) for length classes of lake trout captured in Tchesinkut Lake, May 28-31, 2001.

Length Class (cm)	n	Mean Age (yrs)	±SE	Min	Max
<40	0	0	0	0	0
40-45	6	7.16	0.6	5	9
45-50	5	8	0.63	6	10
50-55	4	10	0.41	9	11
55-60	4	11.5	1.75	8	15
60-65	4	10.5	1.44	7	14
65-70	2	11	2	9	13
70+	0	0	0	0	0
Total	25	9.3	1.14	5	15

The 7-10 year age classes were the most abundant in the sample, followed by 13-14 and 5-6 (Fig.7). Only one lake trout was captured in the 11 and 15 year age class and lake trout aged 12 or 16 years were absent in the sample (Fig. 8).

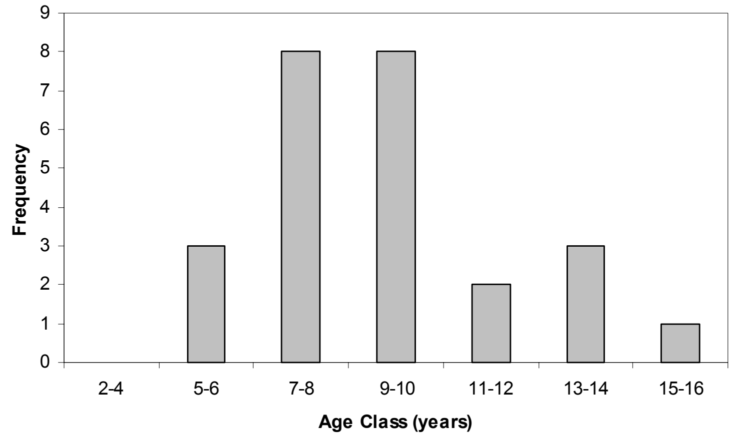

Figure 8: Age frequency histogram for lake trout captured in Tchesinkut Lake, May 28-31, 2001.

Table 3: Summary of mean length (cm), standard error (±SE), minimum and maximum length (cm) by age class (yrs) for lake trout captured in Tchesinkut Lake, May 28-31, 2001.

Age Class (yrs)	n	Mean Length (cm)	±SE	Min	Max
2-4	0	0	0.00	0	0
5-6	3	43.6	0.01	41.5	45.5
7-8	8	48.5	2.56	41	62.5
9-10	8	54.53	2.45	44.1	65.2
11-12	2	58	7.00	51	65
13-14	3	64.3	3.48	58	70
15-16	1	58	0.00	58	58
Total	25	54.5	2.6	41	70

Lake trout growth appears to be rapid up to age 11, whereas maximum length appears to be reached by age 13 (Fig. 9). Considerable variation length variation exists for lake trout aged between 7 and 11 years of age. However, interpretation of the age data must be viewed with caution due to the small sample size.

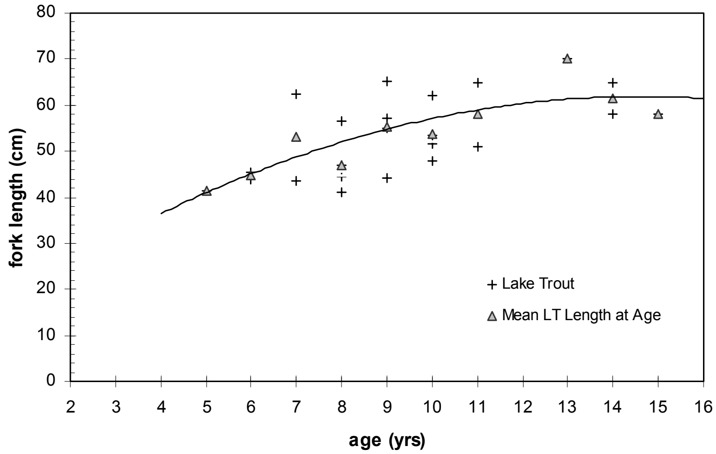

Figure 9: Individual (cross) and mean (shaded triangles) length-at-age for lake trout captured in gill nets, Tchesinkut Lake, May 28-31, 2001. Line represents best fit through mean length-at-age points.

3.1.3 Lake Whitefish Catch

Lake whitefish were the most abundant fish species captured over the four day sampling period, comprising 72.5% of the total catch (n=86). Four whitefish were captured and released without being measured for length or having scale samples collected. Mean lake whitefish fork length for all whitefish sampled was 34.9cm, and 39.7cm for lake whitefish sampled for age (Table 4). Of the 86 lake whitefish captured, 32% (n=28) suffered mortality, whereas 68% (n=58) were live released. The catch rate for lake whitefish was 0.67/set.

Table 4: Summary of lake whitefish sub-sampled for age analysis, age-class frequency, mean length, standard error (±SE), minimum and maximum (cm) for Tchesinkut Lake, May 28-31, 2001.

Age Class (yrs)	Frequency (n)	Mean Length (cm)	±SE	Min. (cm)	Max. (cm)
<3	2	22.25	0.25	22	22.5
4-5	16	31.89	0.851	27	37.5
6-7	10	33.10	1.314	28	39.8
8-9	5	46.90	4.007	37	56
10-11	4	44.00	3.75	39	55
12-13	2	47.50	5.5	42	53
<14	1	52.30	0	52.3	52.3
Total	40	39.7	2.2	22	52.3

Lake whitefish 30-40cm were the most abundant length class captured, followed by fish smaller than 30cm and fish larger than 40cm (Fig. 10).

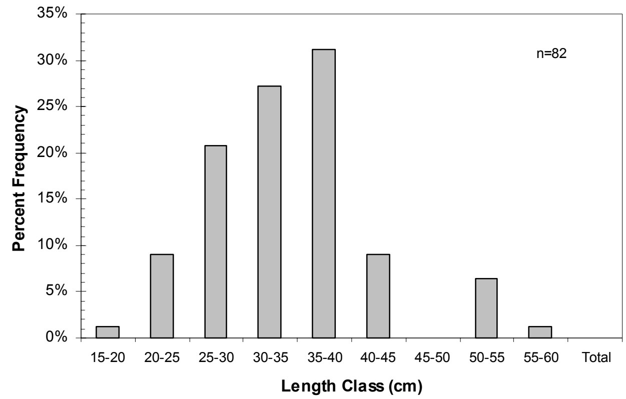

Figure 10: Length (cm) frequency (%) histogram for lake white fish captured by gill net in Tchesinkut Lake, May 28-31, 2001. Mean lake whitefish length was 34.9cm.

Of the lake whitefish sub-sampled for age, the mean age was 6.8 years, whereas the majority of the whitefish captured were less than seven years of age (Fig. 11). Juvenile lake whitefish (*i.e.* < 2yrs) were absent from the sample (Fig.11).

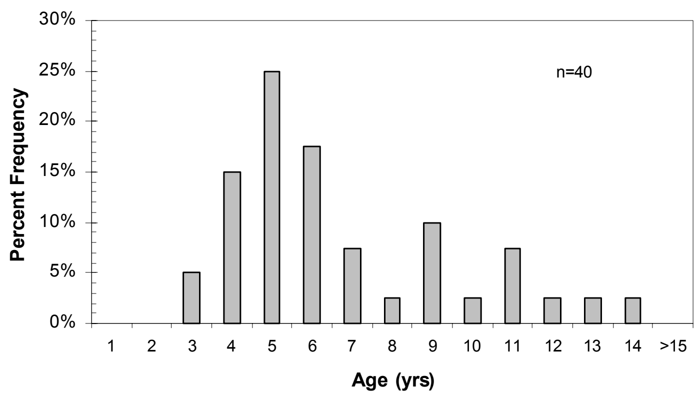

Figure 11: Age (years) frequency (%) histogram for lake whitefish captured in Tchesinkut Lake, May 28-31, 2001.

Tchesinkut Lake lake whitefish display consistent growth over all age classes (Fig. 11). A reduction in the growth rate does appear evident at the age of 11, however the relatively high amount of size variation for fish greater than eight years old and a low sample size for lake whitefish older than 11 years of age limits the rigour of this observation (Fig. 11, Table 5).

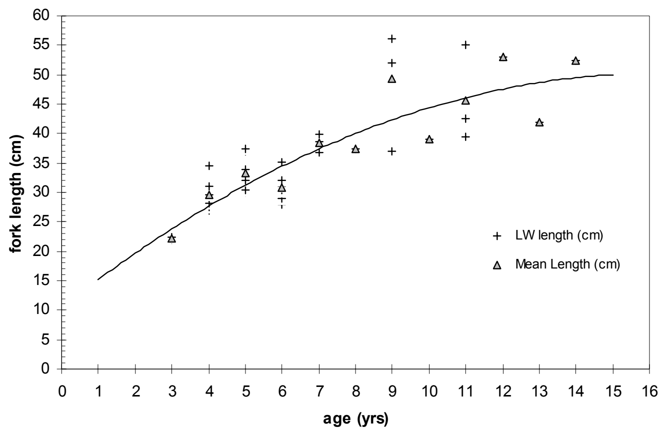

Figure 12: Individual (crosses) and mean (shaded triangles) lake whitefish age (years) at length (cm) for 40 lake whitefish sampled in Tchesinkut Lake, May 28-31, 2001. Line represents best fit through mean lake whitefish age.

Table 5: Summary of lake whitefish sub-sampled for age analysis, age-class frequency (n), mean age (yrs) and standard error (±SE), minimum and maximum (cm) for Tchesinkut Lake, May 28-31, 2001

Length Class (cm)	Frequency (n)	Mean Age (yrs)	±SE	Min. (cm)	Max. (cm)
20-25	2	3	0	3	3
25-30	8	4.75	0.313	4	6
30-35	11	5.18	0.226	4	6
35-40	11	7.27	0.619	5	11
40-45	2	12	1	11	12
45-50	0				
50-55	5	11	0.949	9	14
55-60	1	9	0	9	9
Total	40	6.8	0.4	3	14

3.2 Net Efficiency

Short set 18.3m small mesh gill nets captured younger and smaller lake trout compared to the longer 90m RIC experimental sinking gill nets (Table 6). The observed differences were shown to be statistically significant following comparison of mean length and age using student's t-Test (unequal variances) (Table 7).

Table 6: Summary of mean length (cm) and age (yrs) of lake trout captured in 18.3m and 90 sinking gill nets in Tchesinkut Lake, May 28-31, 2001.

LT	Mean Length (cm)	±SE	Mean Age (yrs)	±SE
18.3m net	51.85	3.008	8.36	0.71
90m net	53.71	2.056	10.07	0.68

Table 7: Results of t-Test (unequal variances) between mean age and length of lake trout (LT) captured in 18.3 and 90 sinking gill nets in Tchesinkut Lake, May 28-31, 2001.

LT Age	*n*	*df*	*t*-Cal.	*t*-Crit. *p*=0.05
18.3m net	11	22	0.098	2.07
90m net	14			
LT Length				
18.3m net	11	18	0.614	2.1
90m net	14			

Lake whitefish demonstrated a similar pattern to that observed for late trout, where smaller and younger fish were captured in the shorter, smaller mesh nets (Table 8.). Like lake trout, the observed mean differences were shown to be significantly different (Table 9).

Table 8: Summary of lake whitefish mean length and age standard error (SE) for 18.3m and 90m long sinking gill nets set in Tchesinkut Lake, May 28-31, 2001.

Net length	Mean Length (cm)	±SE	Mean Age (yrs)	±SE
18.3m	33.83	0.988	6.54	0.65
90m	35.68	1.48	6.94	0.61

Table 9: Results of t-Test (unequal variances) between mean age and length of lake whitefish (LW) captured in 18.3 and 90 sinking gill nets in Tchesinkut Lake, May 28-31, 2001.

LW Age	*n*	*df*	*t*-Cal.	*t*-Crit. *p*=0.05
18.3m net	22	38	0.658	2.02
90m net	18			
LW Length				
18.3m net	47	62	0.305	1.99
90m net	35			

When netting techniques are compared against one another from a perspective of efficiency of time, effort and catch ability, the two netting techniques generate contrasting results. Following standardizing catch results into catch/100m net/day units (Table 10), the 90m experimental mesh nets captured similar amounts of lake trout, whereas greater numbers of lake whitefish and rainbow trout were captured in the shorter, smaller meshed nets (Table 11). However, the time and effort required to haul, set and move the smaller 18.3 m nets to catch virtually equal numbers of lake trout was two times greater than that for the

90m nets (Table 11, Table12). This is primarily a function of a high number of net sets (n=52 for 18.3m nets) and the use of the smaller nets for the initial netting efforts of the first 25 sites.

Table 10: Results of correction factor calculations for 18.3 m and 90m sinking gill nets used in Tchesinkut Lake May 28-31, 2001.

100m/24hr Net Day Correction Factor			
net length	hrs	m.net hrs	Correction Factor
18.3	60.6	1108.98	2.16
90	17.07	1536.3	1.56

Table 11: Results of correction factor conversion of species and total catch results to catch/100m net/day (LT = lake trout, LW = lake whitefish, RB = rainbow trout).

net type (m)	Species	Catch	Correction Factor	Catch/100m net/day
18.3	LT	10	2.16	22
	LW	50	2.16	108
	RB	4	2.16	9
	Total	64	2.16	139
90	LT	13	1.56	20
	LW	25	1.56	39
	RB	1	1.56	2
	Total	39	1.56	61

Table 12: Summary of estimated effort (hrs) between 18.3m and 90m nets.

Activity	Time Estimate	Net Type	
		18.3m	90m
Setting	5sec/m	7.63	37.5
Hauling	10sec/m	15.25	75
Moving	30min/site	30	30
	hrs/set/site	0.88	2.38
	total # sets	52	8
	total hrs effort	45.83	19

4.0 Discussion

4.1 Catch Evaluation

Lake trout catch per unit effort (net set) was comparable to that reported by Connor (2000) for efforts on Atlin Lake, and exceeded results for Tagish and Teslin lakes. However, net dimensions are not equal among projects; nets used on Atlin Lake were 68.58m (225ft) in total length. The results reported by Connor (2000) were also not standardized to 100m net/day, making direct comparison difficult.

3.2 Mortality

Although the effort required to set and retrieve nets is intensive (Table 10), short set, small mesh gill net sampling proved effective at capturing fish. Lake trout mortality rates were low (8%) and equal to those reported by Conner (2001) who applied similar techniques on Atlin Lake. However, lake whitefish suffered high mortality rates (32%) compared to lake trout. This was especially evident for mid-sized, lake whitefish that become trapped in larger mesh sizes (2.5" and 3") panels. Once trapped in the mesh to the mid portion of their bodies, scale loss became a serious injury from which many fish would not recover. External and internal gill structures were also often damaged in the process of freeing captured lake whitefish. Other than attending nets at the hourly interval, or sacrificing net structures to free severely entangled fish, there are no suggestions to reduce lake whitefish mortality.

3.3 Lake Trout Stock Assessment

Comparison of the 2001 netting results to earlier sampling efforts is not possible due to low sample size (Webber and Tupniak, 1981) or free of bias due to differences in methodology (Bustard, 1989). When comparing catch results from 2001 to 1988 for lake trout less than 15 years of age using formats developed by deLeeuw (1991), there appears to be an increase in the frequency of younger fish in the catch (Figure 13). However, because of the comparison of catch results from two separate capture techniques (eg. netting *vs.* angling) the value in the interpretation of this result is significantly reduced.

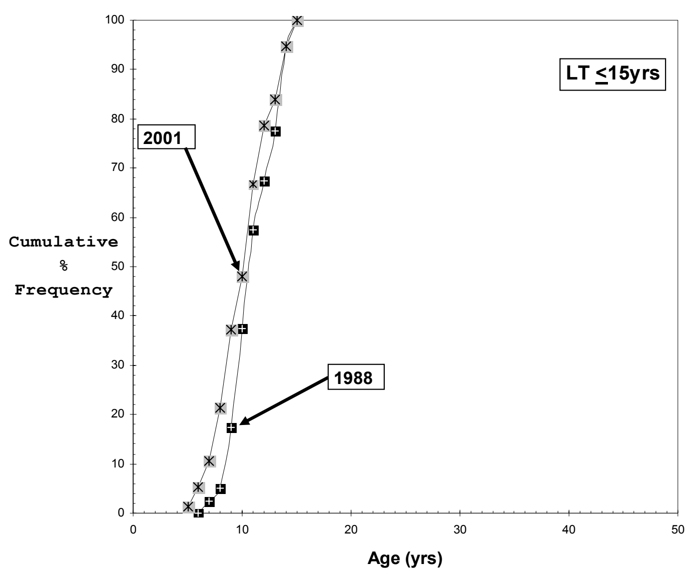

Figure 13: Cumulative frequency (%) of lake trout less than 15 years of age. Lake trout captured by gill net in 2001 (n=25) and by creel survey in 1988 (n=40).

Analysis of lake trout growth for char less than 15 years of age demonstrated that lake trout captured in 2001 are experiencing accelerated growth when compared to age and length data collected in 1988 (Fig. 14). Following their examination of the data, Maniwa *et al.* (2001) found that the mean length of lake trout less than 15 years of age was significantly greater in 2001 than in 1988. This lead to the conclusion that Tchesinkut Lake's present lake trout population is experiencing an accelerated growth rate when compared to the growth rate measured in 1988. This observation, combined with the 2001 creel survey findings that the annual harvest for Tchesinkut Lake's lake trout is exceeding the theoretical mean sustainable yield (MSY=716kg/yr) by three times (2,266kg/yr) contributed to the conclusion that the lake trout population is likely responding to overharvest (Healy, 1978, Maniwa *et al.* 2001).

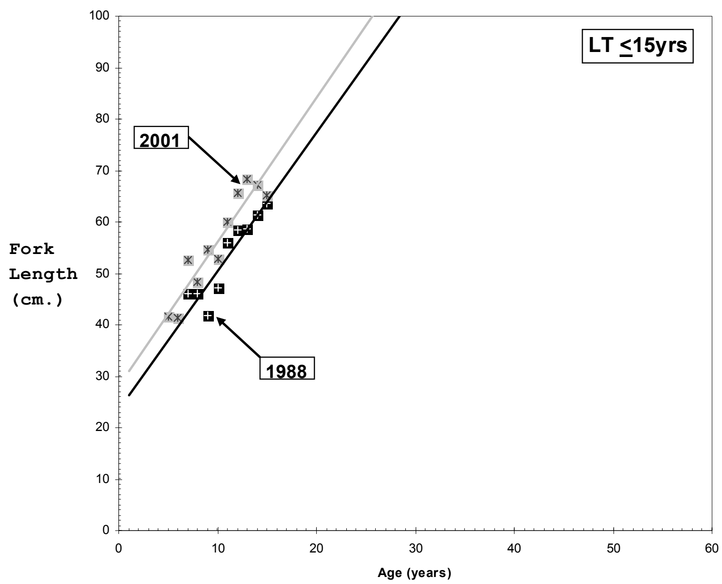

Figure 14: Growth (length-at-age) plot for lake trout captured in the 1989 Tchesinkut Lake creel survey (Bustard, 1989; n=40) and the 2001 gill netting (n=25).

3.4 Net Efficiency

Using a basis of staff time and catch results, the 90m RIC experimental nets were a more effective method in which to capture lake trout when compared to the 18.3 m small mesh nets. This observation is based on comparably equal numbers of lake trout being captured using the 90m (100m/net/day, n=20) and 18.3m gill nets (100m/net/day, n=22), despite expending more than twice the effort setting, retrieving and moving the 18.3m nets (Table 12) in addition to the 18.3m nets being set for 28% more net hours (Table 10).

The 18.3m, small mesh nets captured smaller and younger lake trout in comparison to the longer 90m nets. Combining the netting results with the catch data collected with the Tchesinkut creel survey (Maniwa et al. 2001) contributed towards accomplishing the objective of addressing the size bias of the creel data.

The observed size bias associated with the 18.3m small mesh nets causes concern however, for their utility in comparing catch results from previous netting programs that used 90m RIC experimental gill nets.

The use of high intensity, short, small mesh net sets was demonstrated to be effective at sampling lake whitefish. The size selectivity of the smaller mesh lends well to the capture of smaller bodied fish such as lake whitefish.

5.0 Conclusions

Twenty-five lake trout were captured in Tchesinkut Lake over a four day sampling period. Lake trout from 40 –to- 70cm in length were captured and handled. All lake trout sampled were less than 15 years of age and catch results were supplied to the creel survey efforts undertaken by Maniwa *et al.* (2001). Lake trout growth rates showed a significant increase since 1988 and lend support to the conclusion that Tchesinkut Lake's lake trout population is being over harvested.

The short-set, small mesh experimental gill nets proved to be an effective method to capture lake trout and lake whitefish; however, when compared to catch results using 90m RIC experimental sinking gill nets, they demonstrated bias towards shorter, younger lake trout and lake whitefish. This sheds some concern over the utility of using this method to compare catch results against historical netting methods. It was also determined that the crew effort/time efficiency when using the short-set small mesh gill nets was approximately half of the effort to set and process the 90m RIC experimental sinking gill nets.

An immediate mortality rate of 8% was observed for the 25 lake trout sampled using short set small mesh and 90 m sinking gill nets, indicating that the technique shows promise as an effective method for live capture and release of lake trout.

6.0 Recommendations

The following recommendations are provided following review of the discussion and conclusions:

1. Increase the overall small mesh gill net length to a minimum of 45m (150ft), while maintaining equal lengths of mesh sizes and configurations (eg. 1.5", 2.5" and 3" panels).
2. Future netting efforts using small mesh nets should continue with minimum one-hour set 90m RIC sinking gill nets. The goal of increasing the sample size of fish to permit the re-evaluation of age and size bias of small mesh nets versus larger RIC nets.
3. Continue the use and support of provincial standard database entry tools to assist with the storage and access of regional fisheries data.

4. Evidence presented in this report, Bustard (1989), and Maniwa *et al.* (2001) indicates that lake trout overharvest has been occurring, and that regulation changes are justified to manage Tchesinkut Lake for trophy or natural lake trout population. Regulations for Tchesinkut Lake should be modified only after consultation with local anglers and stakeholder groups.
5. Regulation changes that reduce harvest to within the theoretical harvest level of 716kg/yr (Bustard, 1989; Healy 1978) and are in effect for a long period of time (min. 20yrs) should be considered.
6. Sampling of lake whitefish and other possible lake trout prey species should continue to be sampled in any additional sampling episodes to assist with the evaluation of possible changes to lake fish community structure.

7.0 References

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8.0 Appendices: Data used in this report

te Location	Site Numbe	p UTM Zon	UTM East	UTM North	mp Method	Method	Haul/Pass #	Start Date	Start Time	End Time	Net Type	Length	Depth	Species	Length	Weight	Sex	Maturity	Tag Type 1	Tag Colour	ag Number	Age	ge Structur	Fate
211	1	10	322122	5996718	192	GN	1	28/05/2001	16:43	17:43	SK	18.3	4.0	LW	280		F	MT					SC	K
211	1	10	322122	5996718	192	GN	1	28/05/2001	16:43	17:43	SK	18.3	4.0	LW	330		F	MT					SC	K
212	2	10	322930	5997388	193	GN	1	28/05/2001	15:38	16:49	SK	18.3	15.0	NFC										
215	5	10	328073	5996184	194	GN	1	29/05/2001	14:40	15:45	SK	18.3		RB	375		F	IM				4	SC	K
215	5	10	328073	5996184	194	GN	1	29/05/2001	14:40	15:45	SK	18.3		LW	302.5		F	IM				6	SC	K
215	5	10	328073	5996184	194	GN	1	29/05/2001	14:40	15:45	SK	18.3		LW	302.5		F	IM				6	SC	K
215	5	10	328073	5996184	195	GN	2	30/05/2001			SK	18.3		LW	228									R
215	5	10	328073	5996184	195	GN	2	30/05/2001			SK	18.3		LW	360									R
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215	5	10	328073	5996184	196	GN	3	30/05/2001	8:43	10:05	SK	18.3		NFC										
216	6	10	328959	5995935	197	GN	1	29/05/2001	12:53	13:55	SK	18.3		LT	435		U	U				7	FR	R
216	6	10	328959	5995935	197	GN	1	29/05/2001	12:53	13:55	SK	18.3		LW	305		M	IM				5	SC	K
216	6	10	328959	5995935	198	GN	2	30/05/2001	8:32	9:30	SK	18.3	15.0	NFC										
216	6	10	328959	5995935	199	GN	3	30/05/2001	8:44	9:45	SK	18.3	4.0	LW	390		U	IM				10	SC	K
216	6	10	328959	5995935	199	GN	3	30/05/2001	8:44	9:45	SK	18.3	4.0	LW	345		U	IM				4	SC	K
216	6	10	328959	5995935	199	GN	3	30/05/2001	8:44	9:45	SK	18.3	4.0	LW	420		F	MT				13	SC	K
217	7	10	330086	5995229	200	GN	1	29/05/2001	11:00	12:15	SK	18.3		LW	300		F	IM				5	SC	K
217	7	10	330086	5995229	200	GN	1	29/05/2001	11:00	12:15	SK	18.3		LW	340		F	IM				5	SC	K
218	8	10	331095	5995093	201	GN	1	29/05/2001	9:30	10:30	SK	18.3		NFC										
218	8	10	331095	5995093	202	GN	2	31/05/2001	10:12	13:00	SK	90.0	13.0	LW	400		U	U						R
218	8	10	331095	5995093	202	GN	2	31/05/2001	10:12	13:00	SK	90.0	13.0	LW	420		U	U						R
218	8	10	331095	5995093	202	GN	2	31/05/2001	10:12	13:00	SK	90.0	13.0	LW	360		U	U						R
218	8	10	331095	5995093	202	GN	2	31/05/2001	10:12	13:00	SK	90.0	13.0	LT	515		U	U	FF	W	14465	10	FR	R
218	8	10	331095	5995093	203	GN	3	31/05/2001	13:10	14:35	SK	90.0	20.0	LW	550		U	U				11	SC	R
218	8	10	331095	5995093	203	GN	3	31/05/2001	13:10	14:35	SK	90.0	20.0	LW	360		U	U						R
218	8	10	331095	5995093	203	GN	3	31/05/2001	13:10	14:35	SK	90.0	20.0	LW	380		U	U						R
218	8	10	331095	5995093	203	GN	3	31/05/2001	13:10	14:35	SK	90.0	20.0	LW	340		U	U						R
218	8	10	331095	5995093	203	GN	3	31/05/2001	13:10	14:35	SK	90.0	20.0	LW	390		U	U						R
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218	8	10	331095	5995093	203	GN	3	31/05/2001	13:10	14:35	SK	90.0	20.0	LT	550		U	U	FF	W	14471	9	FR	R
219	9	10	332355	5994194	204	GN	1	29/05/2001	13:19	14:19	SK	18.3	8.0	LW	367		F	IM				7	SC	K
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219	9	10	332355	5994194	208	GN	5	31/05/2001	13:35	15:50	SK	18.3	8.0	LT	620		U	U	FF	W	14469	10	FR	R
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219	9	10	332355	5994194	209	GN	6	31/05/2001	15:20	17:10	SK	90.0	13.0	LW	320		U	U						R
219	9	10	332355	5994194	209	GN	6	31/05/2001	15:20	17:10	SK	90.0	13.0	LW	360		U	U						R
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219	9	10	332355	5994194	209	GN	6	31/05/2001	15:20	17:10	SK	90.0	13.0	LW	520		U	U				9	SC	R
219	9	10	332355	5994194	209	GN	6	31/05/2001	15:20	17:10	SK	90.0	13.0	LT	470		U	U	FF	W	14472	8	FR	R
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220	10	10	333473	5993842	214	GN	5	31/05/2001	10:34	14:50	SK	90.0	20.0	LT	580		U	U	FF	W	14467	15	FR	R
221	11	10	335877	5993176	215	GN	1	29/05/2001	10:14	11:18	SK	13.8	8.0	LT	440		F	IM				6	OT	K
221	11	10	335877	5993176	215	GN	1	29/05/2001	10:14	11:18	SK	13.8	8.0	LW	305		F	IM				5	SC	K
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221	11	10	335877	5993176	217	GN	3	30/05/2001	12:30	13:30	SK	18.3		LW	344		U	U						R
221	11	10	335877	5993176	217	GN	3	30/05/2001	12:30	13:30	SK	18.3		LT	455		U	U	FF	W	14453	6	FR	R
221	11	10	335877	5993176	218	GN	4	30/05/2001	13:40	16:00	SK	90.0		LT	570		U	U	FF	W	14454	9	FR	R
221	11	10	335877	5993176	218	GN	4	30/05/2001	13:40	16:00	SK	90.0		LT	625		U	U	FF	W	14456	7	FR	R

te Location	Site Numbe	p UTM Zon	UTM East	UTM North	mp Method	Method	Haul/Pass #	Start Date	Start Time	End Time	Net Type	Length	Depth	Species	Length	Weight	Sex	Maturity	Tag Type 1	ag Colour	ag Number	Age	ge Structur	Fate
221	11	10	335877	5993176	218	GN	4	30/05/2001	13:40	16:00	SK	90.0		LT	410		U	U	FF	W	14457	8	FR	R
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221	11	10	335877	5993176	218	GN	4	30/05/2001	13:40	16:00	SK	90.0		LT	535		U	U	FF	W	14459	10	FR	R
221	11	10	335877	5993176	218	GN	4	30/05/2001	13:40	16:00	SK	90.0		LT	460		U	U	FF	W	14460	8	FR	R
221	11	10	335877	5993176	218	GN	4	30/05/2001	13:40	16:00	SK	90.0		LT	480		U	U	FF	W	14461	10	FR	R
221	11	10	335877	5993176	218	GN	4	30/05/2001	13:40	16:00	SK	90.0		LW	430		U	U						R
221	11	10	335877	5993176	218	GN	4	30/05/2001	13:40	16:00	SK	90.0		LW	320		M	IM				6	SC	K
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221	11	10	335877	5993176	218	GN	4	30/05/2001	13:40	16:00	SK	90.0		LW	320		U	U						R
221	11	10	335877	5993176	218	GN	4	30/05/2001	13:40	16:00	SK	90.0		LW	425		F	MT				11	SC	K
221	11	10	335877	5993176	218	GN	4	30/05/2001	13:40	16:00	SK	90.0		LW	310		U	U				6	SC	R
221	11	10	335877	5993176	218	GN	4	30/05/2001	13:40	16:00	SK	90.0		LW	375		U	U				8	SC	R
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221	11	10	335877	5993176	222	GN	8	30/05/2001	15:30	17:30	SK	18.3		LW	370		U	U						R
221	11	10	335877	5993176	223	GN	9	30/05/2001	17:00	18:40	SK	90.0		LW	375		M	MT				5	SC	K
221	11	10	335877	5993176	223	GN	9	30/05/2001	17:00	18:40	SK	90.0		LW	398		U	U				7	SC	R
221	11	10	335877	5993176	223	GN	9	30/05/2001	17:00	18:40	SK	90.0		LW	380		U	U						R
221	11	10	335877	5993176	223	GN	9	30/05/2001	17:00	18:40	SK	90.0		LW	300		U	U				5	SC	R
221	11	10	335877	5993176	223	GN	9	30/05/2001	17:00	18:40	SK	90.0		LW	300		U	U						R
221	11	10	335877	5993176	223	GN	9	30/05/2001	17:00	18:40	SK	90.0		LW	351		M	MT				6	SC	K
221	11	10	335877	5993176	223	GN	9	30/05/2001	17:00	18:40	SK	90.0		LW	300		U	U						R
221	11	10	335877	5993176	223	GN	9	30/05/2001	17:00	18:40	SK	90.0		LW	560		U	U				9	SC	R
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221	11	10	335877	5993176	225	GN	11	30/05/2001	16:04	17:15	SK	18.3		LW										R
221	11	10	335877	5993176	225	GN	11	30/05/2001	16:04	17:15	SK	18.3		LW										R
221	11	10	335877	5993176	225	GN	11	30/05/2001	16:04	17:15	SK	18.3		LW										R
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223	13	10	336839	5994708	227	GN	1	29/05/2001	9:50	11:10	SK	18.3		LT	565		U	U	FF	W	14451	8	FR	R
223	13	10	336839	5994708	227	GN	1	29/05/2001	9:50	11:10	SK	18.3		LW	360		U	U						R
223	13	10	336839	5994708	228	GN	2	30/05/2001	11:49	12:50	SK	18.3		NFC										
223	13	10	336839	5994708	229	GN	3	30/05/2001	11:54	12:56	SK	90.0		LW	300		U	IM						R
223	13	10	336839	5994708	229	GN	3	30/05/2001	11:54	12:56	SK	90.0		LW	220		U	IM				3	SC	R
223	13	10	336839	5994708	229	GN	3	30/05/2001	11:54	12:56	SK	90.0		LW	220		U	IM					SC	R
223	13	10	336839	5994708	229	GN	3	30/05/2001	11:54	12:56	SK	90.0		LW	225		U	IM						R
223	13	10	336839	5994708	230	GN	4	30/05/2001	13:37	14:42	SK	18.3		LW	380		F	IM				7	SC	K
223	13	10	336839	5994708	231	GN	5	30/05/2001	14:30	16:15	SK	90.0		LT	445		U	U				8	FR	R
223	13	10	336839	5994708	231	GN	5	30/05/2001	14:30	16:15	SK	90.0		LW	225		U	IM				3	SC	R
224	14	10	336178	5994713	232	GN	1	29/05/2001	10:10	11:20	SK	18.3		LW	370		U	U				5	SC	R
224	14	10	336178	5994713	232	GN	1	29/05/2001	10:10	11:20	SK	18.3		LW	305		U	U						R
224	14	10	336178	5994713	233	GN	2	30/05/2001	13:42	14:47	SK	18.3		LW	300		U	U						R
224	14	10	336178	5994713	233	GN	2	30/05/2001	13:42	14:47	SK	18.3		LW	300		U	U						R
225	15	10	335082	5995041	234	GN	1	29/05/2001	12:05	13:20	SK	18.3		NFC										
226	16	10	333850	5995493	235	GN	1	29/05/2001	12:15	13:35	SK	18.3		NFC										
227	17	10	333195	5996178	236	GN	1	29/05/2001	13:50	14:50	SK	18.3		NFC										
228	18	10	331947	5996818	237	GN	1	29/05/2001	14:15	15:20	SK	18.3		LW	310							4	SC	K
228	18	10	331947	5996818	237	GN	1	29/05/2001	14:15	15:20	SK	18.3		LW	295									R
228	18	10	331947	5996818	237	GN	1	29/05/2001	14:15	15:20	SK	18.3		LW	250									R
228	18	10	331947	5996818	237	GN	1	29/05/2001	14:15	15:20	SK	18.3		LW	220									R
229	19	10	330935	5996931	238	GN	1	29/05/2001	14:50	15:58	SK	18.3	6.0	LT	441		M	IM				9	OT	K
229	19	10	330935	5996931	239	GN	2	30/05/2001	10:14	11:15	SK	18.3		NFC										
229	19	10	330935	5996931	240	GN	3	30/05/2001	10:19	11:18	SK	18.3		NFC										
230	20	10	330577	5997860	241	GN	1	29/05/2001	15:55	16:55	SK	18.3		LW	295		U	U						R
230	20	10	330577	5997860	241	GN	1	29/05/2001	15:55	16:55	SK	18.3		LW	370		U	U						R
230	20	10	330577	5997860	241	GN	1	29/05/2001	15:55	16:55	SK	18.3		LT	415		U	U	FF	W	14452	5	FR	R
231	21	10	329426	5998051	242	GN	1	29/05/2001	16:10	17:20	SK	18.3		LW	390		U	U						R
232	22	10	327845	5998471	243	GN	1	29/05/2001	16:32	17:45	SK	18.3	18.0	NFC										
233	23	10	326157	5999619	244	GN	1	28/05/2001	17:30	18:30	SK	18.3		LW	321		F	IM				5	SC	K
233	23	10	326157	5999619	244	GN	1	28/05/2001	17:30	18:30	SK	18.3		LW	295		M	IM				4	SC	K
234	24	10	322892	6061012	245	GN	1	28/05/2001	17:15	18:15	SK	18.3		RB	350		M	IM				3	SC	K
234	24	10	322892	6061012	245	GN	1	28/05/2001	17:15	18:15	SK	18.3		RB	355		F	IM				4	SC	K
234	24	10	322892	6061012	245	GN	1	28/05/2001	17:15	18:15	SK	18.3		RB	325		M	IM				3	SC	K
234	24	10	322892	6061012	245	GN	1	28/05/2001	17:15	18:15	SK	18.3		LW	281		M	IM				4	SC	K