

## Executive Summary

## Mackenzie Lake East 2003

Stocking assessments were conducted at Mackenzie Lake #2 East in 2000 and 2003 to determine the status of the fishery. Mackenzie Lake #2 East is 25.9 ha and is situated 42 km South West of Prince George along the Blackwater Forest Service Road. Mackenzie Lake has rough 2wd public access and a Forest Service Recreation Site with a launch suitable for car-top boats. The original management goal for Mackenzie Lake was to maintain an average quality fishery. In 2004 this goal was changed to management for an above average fishery with the objective of providing an average fish size of greater than 40 cm.

One standard floating gillnet 90 m in length (standard mesh) was set on October 26, 2003 and two sinking gill nets were set on June 26 and 28, 2000. The total sampling effort in 2003 was 22 hours resulting in a gillnet catch per unit effort (CPUE) of 3.41 fish per net hour. The total sampling effort in 2000 was 5.83 hours resulting in a gillnet catch per unit effort (CPUE) of 6.00 fish per net hour. The rainbow trout sampled during the 2000-2003 assessments are reaching sizes suitable to provide for a average quality angling experience. Mean fish size in the net catch was approximately 30 cm in both years. Maximum fish size in 2003 was 42 cm at four years of age, however this sample was collected at the end of the open water fishing season and it is likely that many of the larger, more aggressive trout were captured in the fishery over the summer.

In 2004, the stocking rate for Mackenzie East was reduced by 40% in conjunction with fishery regulation changes to improve growth rates and increase the proportion of older, larger fish in the fishery. For 2006, the stocking strain was changed from Pennask AF to Blackwater AF3N for in consultation with the Freshwater Fisheries Society of British Columbia to further enhance angling quality. Mackenzie Lake is a relatively high-use fishery in Omineca region in summer by anglers due to its close proximity to Prince George and good fishery potential.

It is recommended that the next stock assessment on Mackenzie Lake East should be completed in 2007 in conjunction with Mackenzie Lake West; the objective of these follow-up assessment are 1) to evaluate management changes and 2) evaluate the connectivity of these two lakes using adipose fin marked fish.



Figure 1. Photo of boat launch at the forest recreation site on Mackenzie Lake #2 (East).

**OMINECA REGION  
LAKE STOCK ASSESSMENT REPORT**

**LAKE NAME:** Q **ALIAS:** MACKENZIE #2 (EAST) **BC WBID:** 01250LCHL

**LAKE LOCATION:** *Nearest center:* 42 km SSW Prince Georg *Drainage:* FRASER  
*UTM:* 10.503725.5932092

**LAKE ATTRIBUTES:** *Surface Area:* 25.9 Ha *Elevation:* 854 m  
*Littoral Area:* 25.9 Ha *T.D.S.:* 97 ppm  
*Max Depth:* 4.1 m *Mean depth:* 2.3 m

**MANAGEMENT OBJECTIVE (mean length in gillnet (cm)):**

- Objective 1 Family Fishery (High CPUE <30 cm)
- Objective 2 Average Quality (30-40 cm)
- Objective 3 Above Average (40-50 cm)
- Objective 4 Trophy ( 20% > 50 cm for RB, 20% > 40 cm for EB)

**MANAGEMENT/SURVEY HISTORY :**

Previous gill net assessment(s): no  yes  Little and Combs, 1984; CSTC 2000  
Year(s) Surveyed: 1984, 1988, 2000, 2003 PG Lakes Files 1988

**STOCKING DATA:**

*Current Stocking Rate* 58 Fish/Ha annually  
*Stock Type* **PENNASK AF**  
*Species* RB, Mixed  
*Previous Stocking Rate* 97

**SURVEY METHODS:**

Method	Date (yy.mm.dd)	Survey Agency	Crew
Fish	SGN 2003-10-25	BCCF	Grant Carlson, Marcel Macullo
Chem.	Profile 1984	MOE	B Little, MOE, PG Lakes Files
Physical	Bathymetric 1984	MOE	B Little, MOE, PG Lakes Files
Temp.	Profile 1984	MOE	B Little, MOE, PG Lakes Files

**Netting Specs:** *Net type:* Standard Experimental *Net length:* 90m (3x30m)  
*Setting:* Floating *Panel Mesh:* Standard

**SURVEY RESULTS:**

**Catch**

	RB	EB	RSC	LKC	LSU	CSU	NSC	CAS	BT	LT
<b>2003</b>	76	0	0	11	1	0	0	0	0	0
<b>2000</b>	35	0	0	0	0	0	0	0	0	0
<b>1988</b>	0	0	0	0	0	0	0	0	0	0
<b>1984</b>	37	0	0	0	0	0	0	0	0	0

Survey Year	2003	2000	1988	1984	
Effort Hours	22.3	5.83	n/a	13.25	
RB CPUE:	3.41	6.00	0.00	6.35	RB/Net Hour
EB CPUE:	0.00	0.00	0.00	0.00	EB/Net Hour
# of Sets:	1	2		1	

**Next Assessment 2008**

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**SURVEY CONCLUSIONS:**

Objective	Objectives Achieved		Reason
	Yes	No	
1. Family	<input type="checkbox"/>	<input type="checkbox"/>	
2. Average	<input type="checkbox"/>	<input type="checkbox"/>	
3. Above Average	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Mean length in in gillnet was 30.7 cm with only 7.9% of the catch > 40 cm
4. Trophy	<input type="checkbox"/>	<input type="checkbox"/>	

**RECOMMENDATIONS:**

**Assessment:** Re-assess in 2007- monitor changes in length frequency of fish greater than 40 cm. Assess both Mackenzies at same time to- look for presence of marked fish in Mackenzie East to assess connectivity between lakes.

**Management:** Quality fishery regulations were applied to Mackenzie Lake east in 2004 in combination with 1) a reduction in the stocking rate 2) change to a sterile rainbow trout strain to provide a quality fishing opportunity south of Prince George.

**Comments:** Mackenzie Lake was stocked in 1997, 2000 and 2001 with extra large yearlings (up to 100 g) that were reared at the Huda Lake correctional facility as well as the Spruce City Wildlife Association hatchery. The outcome of the program is uncertain, however there have been anecdotal reports of above average quality rainbow trout caught occasionally.

**Uncertainties:** Mackenzie Lake West and East are connected by an shallow channel, and movement of rainbow trout may occur between the two lakes. Mackenzie Lake West has been stocked with diploid rainbow trout. Small numbers of maturing male trout were captured in the 2003 assessment, indicating either some natural recruitment is occurring in the outlet/inlets, or there is movement of fish between the two lakes.

**Recent Brood Request Comments:**

Annual . Reduction to 1500 for '04. Changed stock to Pennask AF3N vs. AF for 2006 in consultation with FFSBC. Aerial survey completed 01, high angler use. Assessed in 2000. Good growth. Change to quality regs for '04. Monitor effort and fish size in 2007/08

**History of Angling Regulations**

Regulations changed in 2004 to increases opportunities for trophy/quality fish. New regulations- Single barbless hook, bait-ban. 3 fish under 40 cm may be retained. Winter closure. November 1- April 30.

**Reported by:** Cory Williamson

**Date:** Jun-05

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**Table 1. Rainbow trout physical attributes for all sample years by age:**

Sample Year	Sample		Length (mm)				Weight (g)				Condition (k)				
	Age	Size	Mean	Min	Max	StdDev	Mean	Min	Max	StdDev	Mean	Min	Max	StdDev	Var
2000	1	3	119	112	126	7.0	19	15	23.7	4.4	1.14	1.07	1.18	0.1	0.00
1988	1	3	268	260	278	9.2	207	200	210	5.8	1.00	1.00	1.00	0.0	0.00
1984	1	6	168	142	183	17.7	62	35	75	16.2	1.27	1.22	1.48	0.1	0.01
2003	2	7	213	183	239	21.6	122	68	152	29.6	1.19	1.06	1.49	0.2	0.02
2000	2	15	288	231	336	34.2	288	145	475	106.6	1.16	1.06	1.30	0.1	0.00
1988	2	6	297	225	374	59.7	364								
1984	2	6	219	189	270	29.8	119	90	145	25.8	1.16	0.71	1.33	0.2	0.05
2003	3	46	318	246	395	35.4	386	180	650	120.7	1.14	0.00	1.39	0.2	0.03
2000	3	13	346	247	378	35.7	517	158	680	139.7	1.21	1.02	1.36	0.1	0.01
1988	3	1	376												
1984	3	5	354	337	365	11.1	572	500	680	76.9	1.29	1.17	1.40	0.1	0.01
2003	4	12	370	289	421	40.3	591	275	875	190.2	1.17	1.07	1.25	0.1	0.00
2000	4	3	336	280	372	49.0	482	260	625	194.7	1.22	1.18	1.25	0.0	0.00
1984	4	18	387	320	428	29.5	729	475	1025	162.9	1.24	0.92	1.45	0.1	0.01
2003	5	2	405	399	410	7.8	845	790	900	77.8	1.27	1.24	1.31	0.0	0.00
1984	5	2	429	424	433	6.4	1025	1000	1050	35.4	1.30	1.29	1.31	0.0	0.00
2003	6	1	420				800				1.08				

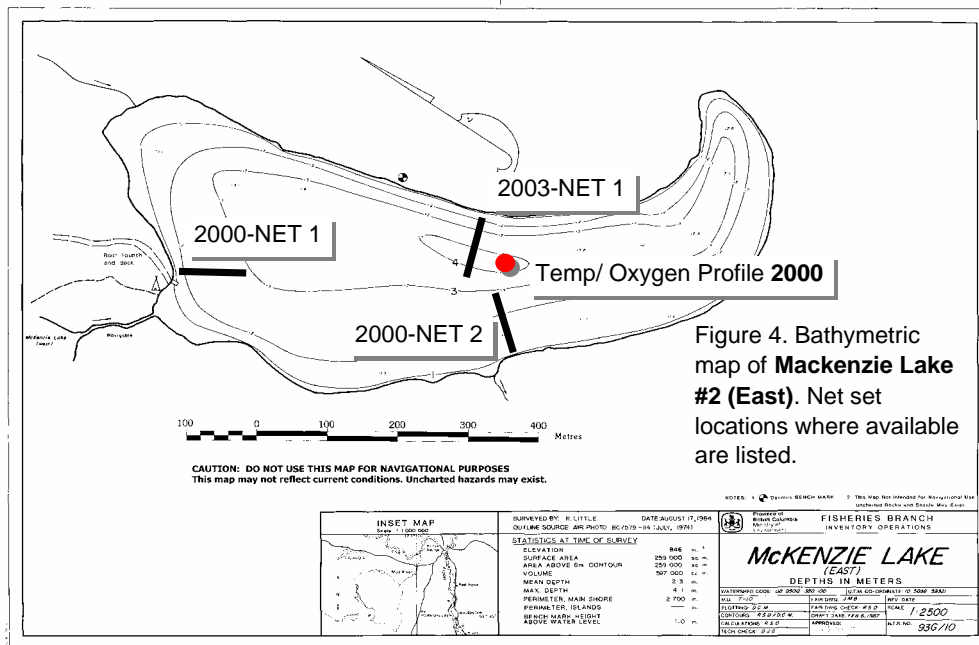
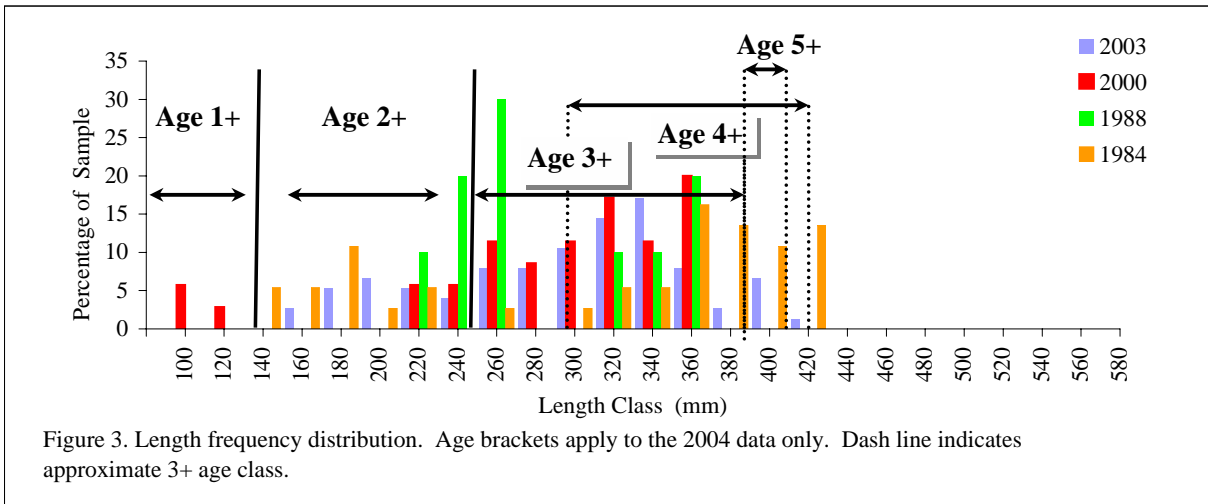
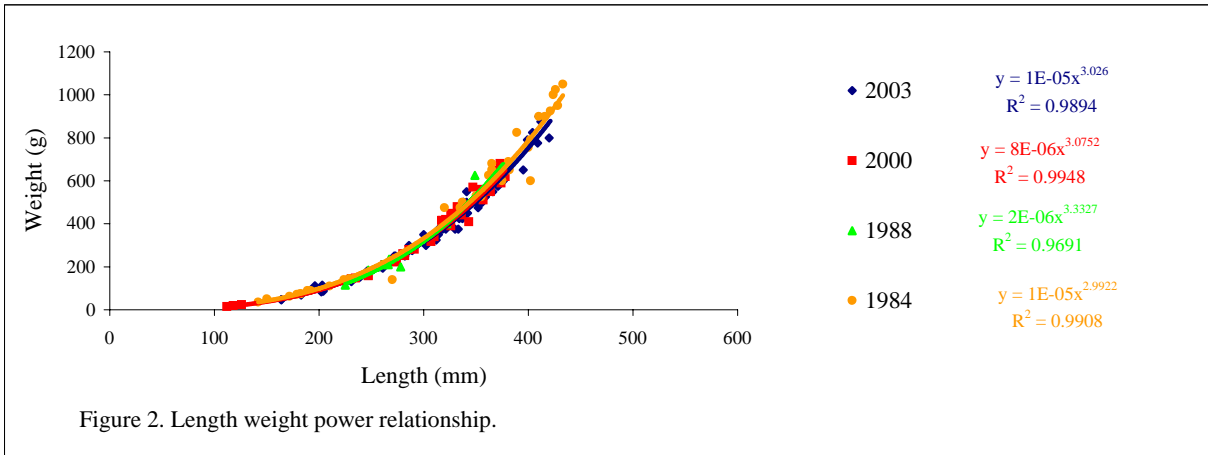
**Table 2. Catch summary for all sample years.**

Sample Year	Sample		Length (mm)				Weight (g)				Condition (k)				
	Age	Size	Mean	Min	Max	StdDev	Mean	Min	Max	StdDev	Mean	Min	Max	StdDev	Var
2003		76	307	164	421	66.3	380	46	900	211.5	1.15	0.00	1.49	0.16	0.03
2000		35	300	112	378	70.6	370	15	680	192.6	1.18	1.02	1.36	0.09	0.01
1988		10	296	225	376	54.5	346	115	650	211.1	1.80	1.00	3.00	0.63	0.40
1984		37	322	142	433	96.0	517	35	1050	333.9	1.24	0.71	1.48	0.13	0.02

**Table 3. Proportion of Catch (by survey year)**

Survey Year	2003	2000	1988	1984
Less than 250 mm	21.1 %	20.0 %	20.0 %	29.7 %
Between 250-350 mm	52.6 %	54.3 %	60.0 %	13.5 %
Between 350-400 mm	71.1 %	80.0 %	80.0 %	45.9 %
Greater than 400 mm	7.9 %	0.0 %	0.0 %	27.0 %
Greater than 500 mm	0.0 %	0.0 %	0.0 %	0.0 %

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**Table 4. Stocking History for Mackenzie Lake #2 (East) to 2005.**

Release Date	Species Name	Fish Count	Stock	Mark	Average Size (gm)	Life Cycle Stage
8-Jun-05		1500	PENNASK AF		19.59	YEARLING
3-Jun-04		1500	PENNASK AF		21.76	YEARLING
11-Jun-03		2500	PENNASK PENN AF		5.56	YEARLING
19-Jun-02		2500	PENNASK BV AF		10	YEARLING
11-Oct-01		2500	PENNASK AF		54.6	YEARLING
23-Oct-00		2300	PENNASK AF		103	YEARLING
2-Jun-99		2500	BADGER TUNKWA		13.9	YEARLING
29-May-98		2500	BADGER TUNKWA		7.75	YEARLING
24-Sep-97		1400	BLACKWATER		42.6	YEARLING
12-Jun-97		2500	BADGER TUNKWA		7.35	YEARLING
21-Sep-96		1425	BLACKWATER		73.6	YEARLING
4-Jun-96		2500	BEAVER		4.63	YEARLING
8-Jun-95		2500	TUNKWA GE		9.43	YEARLING
11-Jun-94		2500	TUNKWA		7.46	YEARLING
27-May-93		2500	TUNKWA		3.37	YEARLING
30-May-92		2500	NRT PREMIER		6.58	YEARLING
28-May-91		2500	NRT PREMIER		6.32	YEARLING
28-May-90		2500	BADGER		19.8	YEARLING
18-May-89		5000	TUNKWA		7.3	YEARLING
1-May-88		5000	TUNKWA		9.9	UNKNOWN
1-Jun-87		2500	NRT PREMIER		2.4	UNKNOWN
1-May-86		2500	NRT PREMIER		4.5	UNKNOWN
1-Jun-85		2500	NRT PREMIER		3.5	UNKNOWN
1-May-84		2500	NRT PREMIER		6.5	UNKNOWN
1-May-82		5000	BADGER DR		5.5	UNKNOWN
1-May-81		5000	NRT PREMIER		6.4	UNKNOWN
1-Jun-80		5000	NRT PREMIER		5	UNKNOWN
1-Jan-79		10000	NRT PREMIER		3.4	UNKNOWN

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**Table 5. Dissolved Oxygen/ Temperature Profile**

27-Jun-00 Station UTM n/a					
Depth (m)	DO mg/L	DO %sat	Temp. °C	pH	Cond (25°C)
0			20.5		
1	8.2		19		
2	6.1		16.5		
3	4.2		15.5		
4	0.5		14.5		
5					

**Table 6. Stock Assessment Data for 2000 (see lake files for additional survey data).**

Lake	Sample#	Site	Number	Species	Origin	Age	Length	Weight	Condition	Scale Age	Structure	Cond.	Clip	Sex	Maturity
Mackenzie	3	2		rb		1	112	15	1.06767	1+		Y			im
Mackenzie	2	2		rb		1	118	19.1	1.162485	1+		Y			im
Mackenzie	1	2		rb		1	126	23.7	1.184777	1+		Y			im
Mackenzie	11	1		rb		2	231	145	1.176338	2+		Y			im
Mackenzie	4	2		rb		2	235	148	1.140402	2+		Y			im
Mackenzie	8	2		rb		2	247	159.7	1.059776	2+		Y		f	st
Mackenzie	2	1		rb		2	263	210	1.154389	2+		Y			im
Mackenzie	5	2		rb		2	274	222.2	1.080171	2+		Y			st
Mackenzie	6	2		rb		2	274	236.3	1.156437	2+		Y		m	im
Mackenzie	1	1		rb		2	282	251	1.119248	2+		Y		M	mt
Mackenzie	13	1		rb		2	286	280	1.196906	2+		Y		F	mt
Mackenzie	7	2		rb		2	291	281.3	1.141539	2+		Y		f	mt
Mackenzie	12	1		rb		2	307	317	1.09558	2+		Y		M	mt
Mackenzie	10	2		rb		2	310	340	1.141284	2+		Y		f	r
Mackenzie	13	2		rb		2	317	415	1.302778	2+		Y		m	mt
Mackenzie	11	2		rb		2	326	390	1.125672	2+		Y		f	mt
Mackenzie	12	2		rb		2	334	475	1.3	2+		Y		m	st
Mackenzie	4	1		rb		2	336	440	1.2	2+		Y		M	mt
Mackenzie	8	1		rb		3	247	158	1.0	3+		Y			im
Mackenzie	15	2		rb		3	321	420	1.3	3+		Y		f	st
Mackenzie	9	2		rb		3	326	448	1.3	3+		Y		m	st
Mackenzie	21	2		rb		3	332	480	1.3	3+		Y		m	st
Mackenzie	3	1		rb		3	343	410	1.0	3+		Y		F	mt
Mackenzie	20	2		rb		3	347	570	1.4	3+		Y		f	r
Mackenzie	14	2		rb		3	357	511	1.1	3+		Y		f	st
Mackenzie	19	2		rb		3	364	550	1.1	3+		Y			
Mackenzie	16	2		rb		3	370	640	1.3	3+		Y		f	r
Mackenzie	14	1		rb		3	372	647	1.3	3+		Y		F	mt
Mackenzie	17	2		rb		3	373	680	1.3	3+		Y		f	mt
Mackenzie	6	1		rb		3	374	590	1.1	3+		Y		F	mt
Mackenzie	7	1		rb		3	378	620	1.1	3+		Y		F	mt
Mackenzie	10	1		rb		4	280	260	1.2	4+		Y		F	mt
Mackenzie	9	1		rb		4	355	560	1.3	4+		Y		M	mt
Mackenzie	18	2		rb		4	372	625	1.2	4+		Y		f	r
Mackenzie	5	1		rb			318	415	1.3	n/a		Y		F	mt

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**Table 7. Stock Assessment Data for 2003 (see lake files for additional survey data).**

Lake	Sample#	Site	Number	Species	Origin	Age	Length	Weight	Condition	Scale Age	Structure	Cond.	Clip	Sex	Maturity
E MacKenZ	63	1	1	Rb	h	2	239	152	1.1	2	S	1	No	F	Mt
E MacKenZ	64	1	1	Rb	h	2	226	139	1.2	2	S	1	No	M	Mt
E MacKenZ	65	1	1	Rb	h	2	195			2	S	1	No	F	Mt
E MacKenZ	68	1	1	Rb	h	2	196	112	1.5	2	S	1	No	F	Mt
E MacKenZ	69	1	1	Rb	h	2	224	131	1.2	2	S	1	No	F	Mt
E MacKenZ	70	1	1	Rb	h	2	183	68	1.1	2	S	1	No	F	Mt
E MacKenZ	71	1	1	Rb	h	2	231	131	1.1	2	S	1	No	M	Mt
E MacKenZ	4	1	1	Rb	h	3	336		0.0	3	S	1	No	F	Mt
E MacKenZ	7	1	1	Rb	h	3	307	325	1.1	3	S	1	No	M	Mt
E MacKenZ	8	1	1	Rb	h	3	328	425	1.2	3	S	1	No	Unk	Mt
E MacKenZ	9	1	1	Rb	h	3	337	425	1.1	3	S	1	No	F	Mt
E MacKenZ	10	1	1	Rb	h	3	318	375	1.2	3	S	1	No	F	Mt
E MacKenZ	12	1	1	Rb	h	3	366	550	1.1	3	S	1	No	F	Mt
E MacKenZ	13	1	1	Rb	h	3	359	525	1.1	3	S	1	No	F	Mt
E MacKenZ	14	1	1	Rb	h	3	321	375	1.1	3	S	1	No	F	Mt
E MacKenZ	15	1	1	Rb	h	3	286	300	1.3	3	S	1	No	M	Mt
E MacKenZ	16	1	1	Rb	h	3	338	500	1.3	3	S	1	No	M	Mt
E MacKenZ	18	1	1	Rb	h	3	334	425	1.1	3	S	1	No	F	Mt
E MacKenZ	19	1	1	Rb	h	3	345	500	1.2	3	S	1	No	F	Mt
E MacKenZ	20	1	1	Rb	h	3	355	500	1.1	3	S	1	No	F	Mt
E MacKenZ	21	1	1	Rb	h	3	333	475	1.3	3	S	1	No	F	Mt
E MacKenZ	24	1	1	Rb	h	3	360	550	1.2	3	S	1	No	F	Mt
E MacKenZ	26	1	1	Rb	h	3	341	450	1.1	3	S	1	No	F	Mt
E MacKenZ	27	1	1	Rb	h	3	341	550	1.4	3	S	1	No	F	Mt
E MacKenZ	28	1	1	Rb	h	3	346	500	1.2	3	S	1	No	F	Mt
E MacKenZ	30	1	1	Rb	h	3	272	250	1.2	3	S	1	No	F	Mt
E MacKenZ	31	1	1	Rb	h	3	354	525	1.2	3	S	1	No	F	Mt
E MacKenZ	33	1	1	Rb	h	3	352	475	1.1	3	S	1	No	F	Mt
E MacKenZ	34	1	1	Rb	h	3	300	350	1.3	3	S	2	No	F	Mt
E MacKenZ	35	1	1	Rb	h	3	314	350	1.1	3	S	2	No	F	Mt
E MacKenZ	36	1	1	Rb	h	3	333	375	1.0	3	S	1	No	F	Mt
E MacKenZ	37	1	1	Rb	h	3	314	375	1.2	3	S	1	No	F	Mt
E MacKenZ	38	1	1	Rb	h	3	273	250	1.2	3	S	1	No	F	Mt
E MacKenZ	39	1	1	Rb	h	3	251	184	1.2	3	S	1	No	M	Mt
E MacKenZ	40	1	1	Rb	h	3	310	350	1.2	3	S	3	No	F	Mt
E MacKenZ	41	1	1	Rb	h	3	356	500	1.1	3	S	1	No	F	Mt
E MacKenZ	42	1	1	Rb	h	3	261	194	1.1	3	S	1	No	F	Mt
E MacKenZ	45	1	1	Rb	h	3	395	650	1.1	3	S	1	No	F	Mt
E MacKenZ	46	1	1	Rb	h	3	286	275	1.2	3	S	1	No	F	Mt
E MacKenZ	47	1	1	Rb	h	3	302	300	1.1	3	S	1	No	F	Mt
E MacKenZ	48	1	1	Rb	h	3	341	500	1.3	3	S	1	No	F	Mt
E MacKenZ	50	1	1	Rb	h	3	340	450	1.1	3	S	3	No	F	Mt
E MacKenZ	51	1	1	Rb	h	3	328	425	1.2	3	S	1	No	F	Mt
E MacKenZ	52	1	1	Rb	h	3	350	500	1.2	3	S	1	No	F	Mt
E MacKenZ	53	1	1	Rb	h	3	315	375	1.2	3	S	1	No	F	Mt
E MacKenZ	54	1	1	Rb	h	3	330	375	1.0	3	S	1	No	F	Mt
E MacKenZ	55	1	1	Rb	h	3	293	300	1.2	3	S	1	No	F	Mt
E MacKenZ	56	1	1	Rb	h	3	270	225	1.1	3	S	1	No	F	Mt
E MacKenZ	57	1	1	Rb	h	3	268	225	1.2	3	S	1	No	F	Mt
E MacKenZ	58	1	1	Rb	h	3	246	180	1.2	3	S	1	No	F	Mt
E MacKenZ	59	1	1	Rb	h	3	270	225	1.1	3	S	1	No	F	Mt
E MacKenZ	61	1	1	Rb	h	3	282	250	1.1	3	S	2	No	F	Mt
E MacKenZ	62	1	1	Rb	h	3	258	200	1.2	3	S	2	No	M	Mt
E MacKenZ	1	1	1	Rb	h	4	371	575	1.1	4	S	1	No	F	Mt
E MacKenZ	2	1	1	Rb	h	4	421			4	S	1	No	F	Mt
E MacKenZ	5	1	1	Rb	h	4	404	825	1.3	4	S	1	No	F	Mt
E MacKenZ	6	1	1	Rb	h	4	412	875	1.3	4	S	1	No	F	Mt
E MacKenZ	11	1	1	Rb	h	4	409	775	1.1	4	S	1	No	Unk	Mt
E MacKenZ	17	1	1	Rb	h	4	342	450	1.1	4	S	1	No	F	Mt
E MacKenZ	22	1	1	Rb	h	4	376	600	1.1	4	S	1	No	F	Mt
E MacKenZ	23	1	1	Rb	h	4	361	575	1.2	4	S	3	No	M	Mt
E MacKenZ	29	1	1	Rb	h	4	312	325	1.1	4	S	1	No	F	Mt
E MacKenZ	32	1	1	Rb	h	4	372	625	1.2	4	S	1	No	F	Mt
E MacKenZ	49	1	1	Rb	h	4	366	600	1.2	4	S	1	No	F	Mt
E MacKenZ	60	1	1	Rb	h	4	289	275	1.1	4	S	1	No	F	Mt
E MacKenZ	3	1	1	Rb	h	5	399	790	1.2	5	S	1	No	F	Mt
E MacKenZ	43	1	1	Rb	h	5	410	900	1.3	5	S	1	No	F	Mt
E MacKenZ	25	1	1	Rb	h	6	420	800	1.1	6	S	1	No	F	Mt