

Executive Summary

Crystal Lake 2004

A stocking assessment was conducted on Crystal Lake during the fall of 2004. Both a sinking and a floating gillnet (90 m, standard mesh) were set on September 14, 2004. The total sampling effort was 64 hours resulting in a gillnet catch per unit effort (CPUE) of 0.38 fish per hour for rainbow trout, and 0.30 fish per hour for eastern brook trout. The objectives of this assessment were to document the status of the fishery and attempt to determine the level of natural recruitment resulting from brook trout stocked prior to 1997. The management objectives for Crystal Lake are stated as maintaining a high-use fishery for rainbow trout. Brook trout were stocked in Crystal Lake beginning in 1990 in place of the Huble Lake fishery. The results of the assessment indicate that both brook trout and rainbow trout are growing well and reaching a size suitable to provide an above average angling experience for the Omineca Region. The mean length of rainbow trout was 342 mm with a maximum length of 477 mm; while, the mean length of eastern brook trout was 313 mm with a maximum length of 574 mm. There does not appear to be any evidence that suggests a high level of natural recruitment is occurring at Crystal Lake, however a small number (15% of sample) of maturing brook trout was captured. It is recommended that two cohorts of marked sterile brook trout be stocked prior to the next assessment in 2009 to assess the level of natural recruitment. The overall gillnet CPUE was low for both rainbow and eastern brook trout. It is uncertain if this reflects a low number of fish in the lake or if the nets were not set in adequate areas for efficient fish capture. The combined number of eastern brook trout and rainbow trout stocked in the lake should be at a sufficient density to provide for a good sport fishery. It is recommended that angler creel/satisfaction surveys be completed on Crystal lake during the summer and winter fishing period to determine angler success rates as well as the importance of the winter brook trout fishery. Crystal is an important recreational lake in the Omineca Region and has the potential to provide an above average angling experience; therefore, we need the additional census information to ensure that this lake is being managed effectively.



Figure 1. Rainbow trout captured in Crystal lake during the 2004 lake assessment.

Omineca Region Stocked Lake Assessment Report

**OMINECA REGION
LAKE STOCK ASSESSMENT REPORT**

LAKE NAME: Crystal **BC WBID:** 01107CRKD

LAKE LOCATION: *Nearest center:* 70 km N of Prince George *Drainage:* FRASER
UTM: 10.524861.6029722

LAKE ATTRIBUTES: *Surface Area:* 37 Ha *Elevation:* 721 m
Littoral Area: na Ha *T.D.S.:* 63 ppm
Max Depth: 28 m *Mean depth:* 11.2 m

MANAGEMENT OBJECTIVE:

| | | RB | EB |
|-------------|--|-------------------------------------|-------------------------------------|
| Objective 1 | Family Fishery (High CPUE <30 cm) | <input type="checkbox"/> | <input type="checkbox"/> |
| Objective 2 | Average Quality (30-40 cm) | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Objective 3 | Above Average (40-50 cm) | <input type="checkbox"/> | <input type="checkbox"/> |
| Objective 4 | Trophy (20% > 50 cm for RB, 20% > 40 cm for EB) | <input type="checkbox"/> | <input type="checkbox"/> |

MANAGEMENT/SURVEY HISTORY:

Previous gill net assessment(s): no yes MOE 1968; MOE 1984
 Year(s) Surveyed: 1968; 1984

STOCKING DATA:

| | | |
|-------------------------------|---------------------|------------------------|
| | Rainbow Trout | Eastern Brook Trout |
| <i>Current Stocking Rate</i> | 41 Fish/Ha Annually | 135.1 Fish/Ha Annually |
| <i>Stock Type</i> | PENNASK AF | AYLMER AF3N |
| <i>Species</i> | RB, EB | |
| <i>Previous Stocking Rate</i> | 41 | 40.5 |

SURVEY METHODS:

| Method | Date (yy.mm.dd) | Survey Agency | Crew |
|----------|-----------------|---------------|---------------------------------|
| Fish | SGN 2004-09-13 | BCCF | Chad Robertson, Kevin Mernickle |
| Chem. | na | | |
| Physical | na | | |
| Temp. | na | | |

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

SURVEY RESULTS:

Catch

| | RB | EB | RSC | LKC | LSU | CSU | NSC | CAS | BT | LT |
|-------------|----|----|-----|-----|-----|-----|-----|-----|----|----|
| 2004 | 24 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1984 | 35 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1968 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1900 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Survey Year | 2004 | 1984 | 1968 |
|--------------|------|-------|------|
| Effort Hours | 64 | 21.75 | 20 |
| RB CPUE: | 0.38 | 1.61 | 1.05 |
| EB CPUE: | 0.30 | 0.00 | 0.00 |
| # of Sets: | 3 | 1 | 1 |

Next Assessment **2009**

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SURVEY CONCLUSIONS:

| Objective | Rainbow Objectives Achieved | | | Brook Trout Objectiv | | |
|------------------|-------------------------------------|--------------------------|--------|-------------------------------------|--------------------------|--------|
| | Yes | No | Reason | Yes | No | Reason |
| 1. Family | <input type="checkbox"/> | <input type="checkbox"/> | | <input type="checkbox"/> | <input type="checkbox"/> | |
| 2. Average | <input checked="" type="checkbox"/> | <input type="checkbox"/> | | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 3. Above Average | <input type="checkbox"/> | <input type="checkbox"/> | | <input type="checkbox"/> | <input type="checkbox"/> | |
| 4. Trophy | <input type="checkbox"/> | <input type="checkbox"/> | | <input type="checkbox"/> | <input type="checkbox"/> | |

RECOMMENDATIONS:

Assessment: The next stock assessment should be scheduled for 2009, however a creel survey conducted in 2005 or 2006 is recommended. It is also recommended that two cohorts of marked EB be stocked in 2007 and 2008 prior to the next stocking assesment in 2009.

Management: The mean and maximum size of rainbow trout is higher than in the surveys conducted in 1968 and 1984. Overall gillnet CPUE is down from the previous surveys, and low compared to other lakes in the region. A creel survey during the summer of 2005 or 2006 is reccomended for a determination of angler success rates.

Comments: Fifteen percent of the brook trout sample in 2004 was comprised of maturing fish, indicating that there is limited ongoing natural recruitment.
Release records only date back to 1976; lakes file indicates stocking prior to 1976.

Anecdotal reports in 2004 of brook trout in small lakes immediately adjacent to Crystal Lake.

Uncertainties: Gillnet CPUE is fairly low for Crystal Lake. It is uncertain if this reflects a low number of fish in the lake or if the nets were not set in adequate areas for efficient fish capture. The combined number of EB and RB stocked in the lake should be at a sufficient density to provide for a good sport fishery.

Recent Brood Request Comments:

2005 EB Annual. Assessed '04 . Excellent growth. Limited natural recruitment.

2005 RB Annual release. Changed stock to Penask AF3N vs AF for 2006 in consultation with FFSBC. Assessed in '04. Prelim results- Excellent growth to 45+ cm. No changes until data review complete.

History of Angling Regulations

No special angling regulations for Crystal Lake

Reported by: Adrian Clarke

Date: Mar-05

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Table 1. Rainbow and brook trout physical attributes for 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 |
| Rainbow Trout | | | | | | | | | | | | | | | |
| 2004 | 1 | 8 | 213.125 | 190 | 248 | 20.8 | 107 | 71 | 169 | 35.4 | 1.07 | 0.98 | 1.16 | 0.1 | 0.00 |
| 2004 | 2 | 1 | 326 | | | | 380 | | | | 1.10 | | | | |
| 1984 | 2 | 8 | 249.75 | 195 | 297 | 28.9 | 193 | 85 | 300 | 61.5 | 1.20 | 1.15 | 1.34 | 0.1 | 0.00 |
| 2004 | 3 | 15 | 411.933 | 372 | 477 | 23.9 | 771 | 540 | 1100 | 136.6 | 1.09 | 0.97 | 1.21 | 0.1 | 0.00 |
| 1984 | 3 | 13 | 312.385 | 238 | 380 | 50.4 | 365 | 163 | 575 | 152.7 | 1.13 | 1.05 | 1.22 | 0.1 | 0.00 |
| 1984 | 4 | 5 | 358.8 | 318 | 426 | 41.2 | 515 | 350 | 750 | 161.6 | 1.09 | 0.97 | 1.22 | 0.1 | 0.01 |
| 1984 | 5 | 1 | 427 | | | | 780 | | | | 1.00 | | | | |
| Eastern Brook Trout | | | | | | | | | | | | | | | |
| 2004 | 1 | 7 | 157 | 138 | 180 | 13.9 | 36 | 28 | 56 | 10.4 | 0.92 | 0.61 | 1.07 | 0.2 | 0.02 |
| 2004 | 2 | 6 | 332.667 | 311 | 354 | 16.8 | 440 | 370 | 490 | 43.8 | 1.20 | 1.06 | 1.27 | 0.1 | 0.01 |
| 2004 | 3 | 2 | 389.5 | 354 | 425 | 50.2 | 895 | 730 | 1060 | 233.3 | 1.51 | 1.38 | 1.65 | 0.2 | 0.04 |
| 2004 | 4 | 2 | 483 | 464 | 502 | 26.9 | 1405 | 1400 | 1410 | 7.1 | 1.26 | 1.11 | 1.40 | 0.2 | 0.04 |
| 2004 | 5 | 2 | 553 | 532 | 574 | 29.7 | 2088 | 1800 | 2375 | 406.6 | 1.23 | 1.20 | 1.26 | 0.0 | 0.00 |

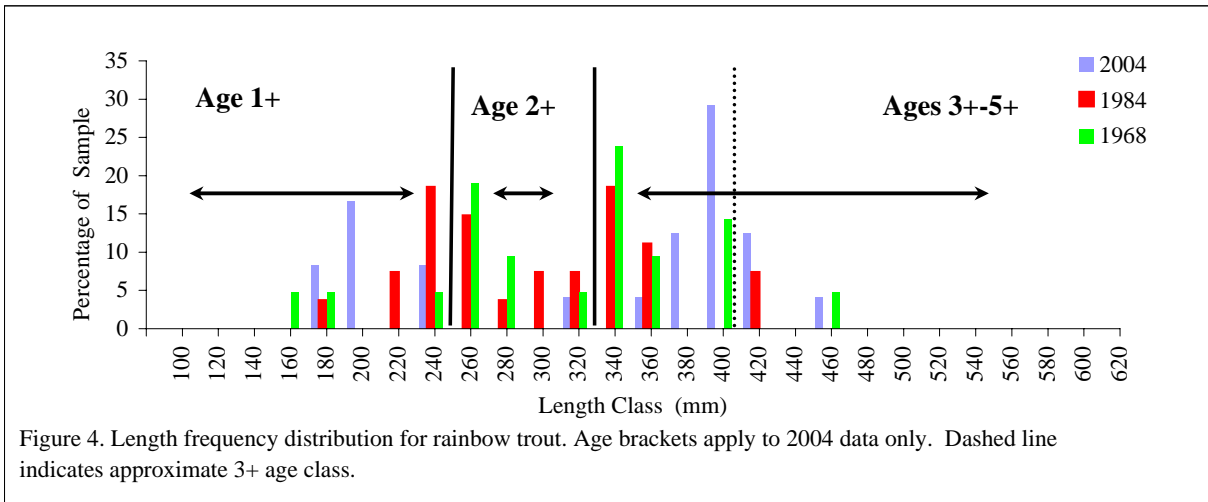
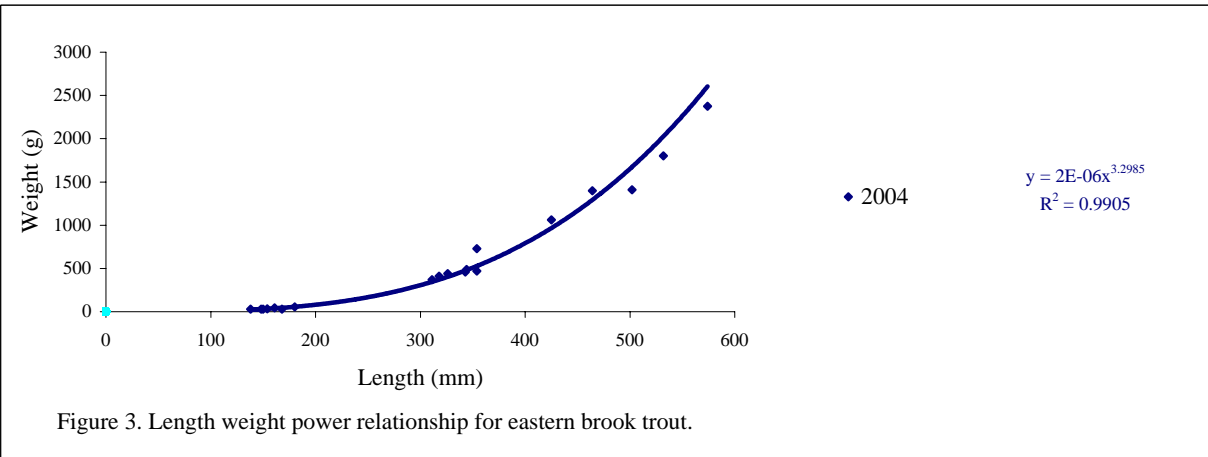
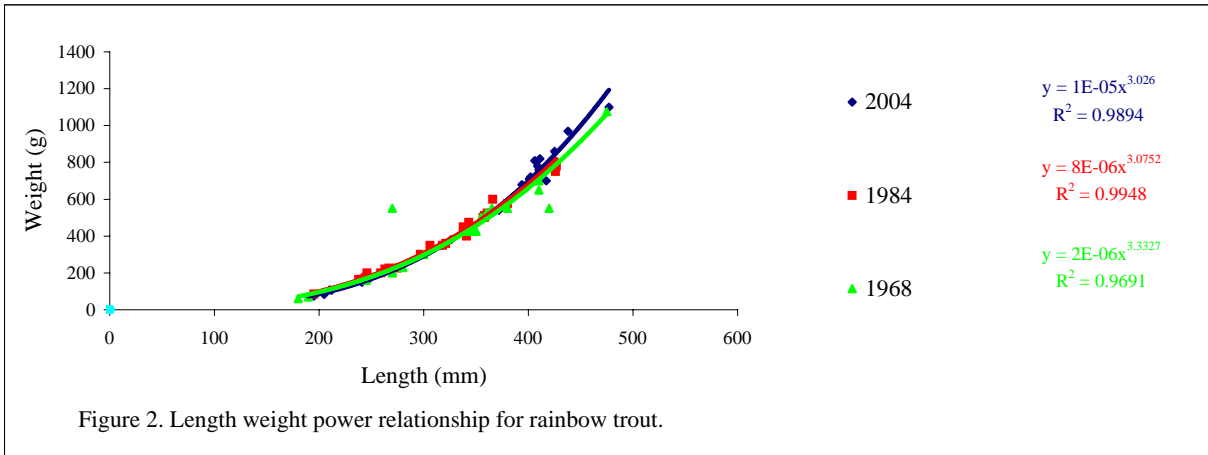
Table 2. Catch summary for all sample years.

| Sample Year | Sample Size | Length (mm) | | | | Weight (g) | | | | Condition (k) | | | | |
|----------------------|-------------|-------------|-----|-----|--------|------------|-----|------|--------|---------------|------|------|--------|------|
| | | Mean | Min | Max | StdDev | Mean | Min | Max | StdDev | Mean | Min | Max | StdDev | Var |
| Rainbow Trout | | | | | | | | | | | | | | |
| 2004 | 24 | 342 | 190 | 477 | 97.2 | 534 | 71 | 1100 | 336.1 | 1.09 | 0.97 | 1.21 | 0.06 | 0.00 |
| 1984 | 27 | 307 | 195 | 427 | 97.2 | 357 | 85 | 780 | 189.3 | 1.14 | 0.97 | 1.34 | 0.08 | 0.01 |
| 1968 | 21 | 327 | 180 | 475 | 75.1 | 426 | 60 | 1075 | 237.5 | 1.12 | 0.74 | 2.79 | 0.39 | 0.15 |
| Brook Trout | | | | | | | | | | | | | | |
| 2004 | 19 | 313 | 138 | 574 | 142.2 | 614 | 28 | 2375 | 687.4 | 1.14 | 0.61 | 1.65 | 0.23 | 0.05 |

Table 3. Proportion of Catch (by survey year)

| Survey Year | 2004 | 1984 | 1968 |
|----------------------------|--------|--------|--------|
| Rainbow Trout | | | |
| Less than 250 mm | 33.3 % | 25.9 % | 14.3 % |
| Between 250-350 mm | 4.2 % | 44.4 % | 42.9 % |
| Between 250-400 mm | 20.8 % | 66.7 % | 66.7 % |
| Greater than 400 mm | 45.8 % | 7.4 % | 19.0 % |
| Greater than 500 mm | 0.0 % | 0.0 % | 0.0 % |
| Eastern Brook Trout | | | |
| Less than 250 mm | 36.8 % | | |
| Between 250-350 mm | 26.3 % | | |
| Between 250-400 mm | 36.8 % | | |
| Greater than 400 mm | 26.3 % | | |
| Greater than 500 mm | 15.8 % | | |

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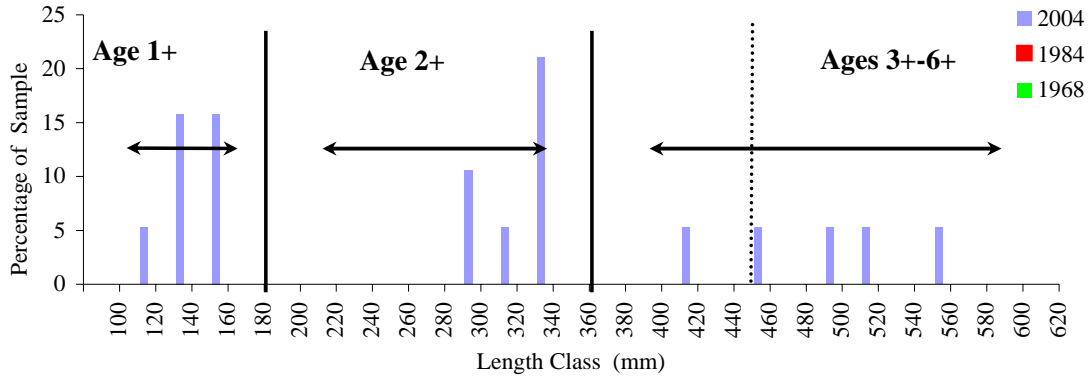


Figure 5. Length frequency distribution for brook trout. Age brackets apply to 2004 data only. Dashed line indicates approximate 3+ age class.

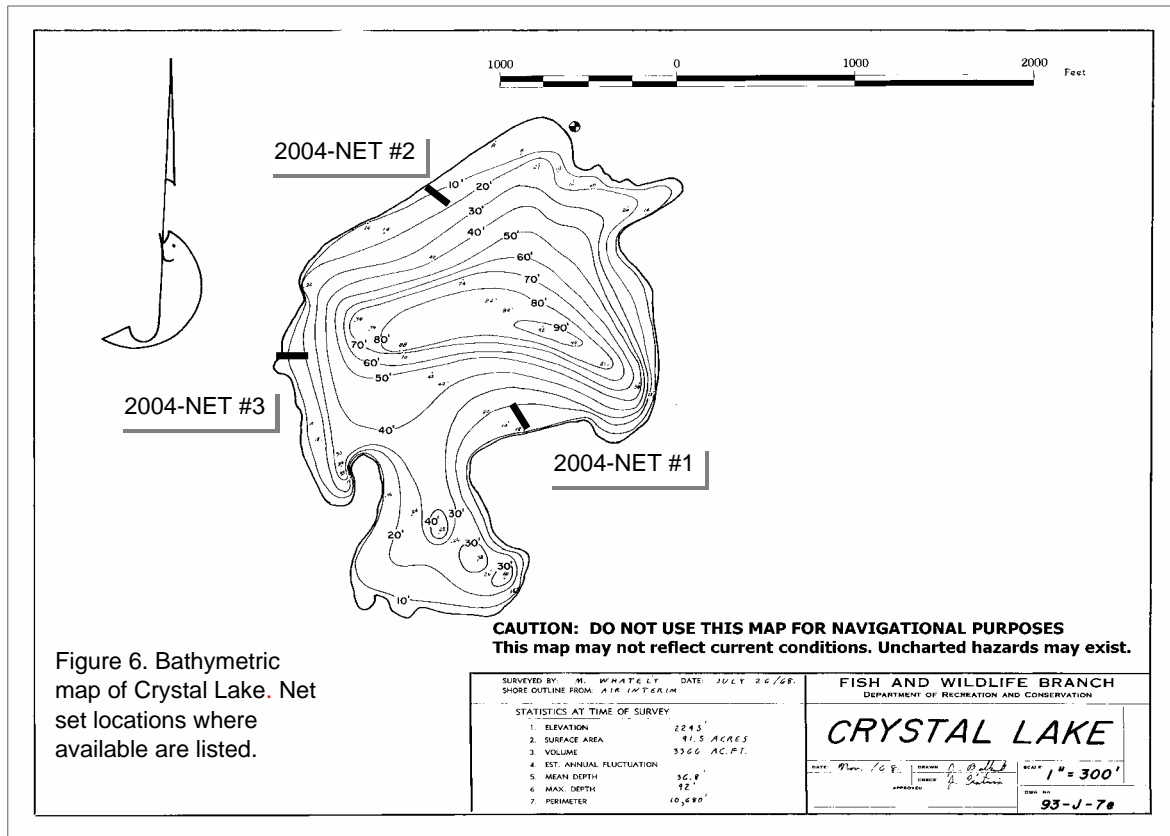


Figure 6. Bathymetric map of Crystal Lake. Net set locations where available are listed.

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Table 5. Stocking History for Crystal lake to 2004.

| Rainbow Trout | | | | | | |
|----------------------|----------------|-------------------|-----------------|-------------|----------------|-------------------|
| Release Date | Species | Fish Count | Stock | Mark | Average | Life Cycle |
| 3-Jun-04 | RB | 1500 | PENNASK AF | | 21.76 | YEARLING |
| 11-Jun-03 | RB | 1500 | PENNASK PENN AF | | 5.56 | YEARLING |
| 3-Jun-02 | RB | 1500 | PENNASK AF | | 6.41 | YEARLING |
| 3-Jul-01 | RB | 1500 | PENNASK BV AF | | 12.72 | YEARLING |
| 4-Jun-00 | RB | 1500 | PENNASK PENN AF | | 4.78 | YEARLING |
| 3-Jun-99 | RB | 1500 | PENNASK BEAV AF | | 15.15 | YEARLING |
| 31-May-98 | RB | 1500 | PENNASK AF | | 12.66 | YEARLING |
| 28-May-97 | RB | 1500 | PENNASK HATH AF | | 17.1 | YEARLING |
| 4-Jun-96 | RB | 1500 | PENNASK HATH AF | | 17.24 | YEARLING |
| 25-May-95 | RB | 1500 | PENNASK AF | | 18.52 | YEARLING |
| 12-Jun-94 | RB | 2500 | TUNKWA | | 7.46 | YEARLING |
| 31-May-93 | RB | 2500 | TUNKWA | | 2.94 | YEARLING |
| 29-May-92 | RB | 2500 | NRT PREMIER | | 6.58 | YEARLING |
| 3-Sep-91 | RB | 5000 | DRAGON | | 0.68 | FALL FRY |
| 28-Aug-90 | RB | 10000 | DRAGON | | 0.6 | FALL FRY |
| 2-Jun-89 | RB | 2500 | PENNASK HATH AF | | 11.4 | YEARLING |
| 1-May-88 | RB | 2500 | TUNKWA | | 11 | UNKNOWN |
| 1-May-87 | RB | 2500 | TUNKWA | | 14.2 | UNKNOWN |
| 1-May-86 | RB | 2500 | NRT PREMIER | | 4.5 | UNKNOWN |
| 1-Aug-85 | RB | 5000 | NRT PREMIER | | 0.8 | UNKNOWN |
| 1-May-83 | RB | 5000 | NRT PREMIER | | 4 | UNKNOWN |
| 1-Jun-82 | RB | 5000 | NRT PREMIER | | 4 | UNKNOWN |
| 1-Jun-81 | RB | 5000 | NRT PREMIER | | 5.7 | UNKNOWN |
| 1-Jan-79 | RB | 5000 | NRT PREMIER | | 3.4 | UNKNOWN |
| 1-Jan-78 | RB | 5000 | NRT PREMIER | | 4 | UNKNOWN |
| 1-Jan-76 | RB | 10000 | PENNASK | | 1.4 | UNKNOWN |

| Eastern Brook Trout | | | | | | |
|----------------------------|----------------|-------------------|--------------|-------------|----------------|-------------------|
| Release Date | Species | Fish Count | Stock | Mark | Average | Life Cycle |
| 3-Jun-04 | Brook Trout | 5000 | AYLMER AF3N | | 7 | FINGERLING |
| 11-Jun-03 | Brook Trout | 5000 | AYLMER AF3N | | 6.59 | FINGERLING |
| 21-Jun-02 | Brook Trout | 5000 | AYLMER AF3N | | 11.04 | FINGERLING |
| 13-Jun-01 | Brook Trout | 1000 | AYLMER AF3N | | 7.6 | FINGERLING |
| 3-Jun-01 | Brook Trout | 4000 | AYLMER AF3N | | 6.91 | FINGERLING |
| 3-Jun-00 | Brook Trout | 5000 | AYLMER AF3N | | 4.78 | FINGERLING |
| 31-May-98 | Brook Trout | 5000 | AYLMER 3N | | 4.26 | FINGERLING |
| 13-Jun-97 | Brook Trout | 3000 | AYLMER | | 3.33 | FINGERLING |
| 4-Jun-96 | Brook Trout | 5000 | AYLMER | | 3.85 | FINGERLING |
| 27-May-95 | Brook Trout | 5000 | AYLMER | | 3.79 | FINGERLING |
| 12-Jun-94 | Brook Trout | 5000 | AYLMER | | 3.81 | FINGERLING |
| 10-Jun-93 | Brook Trout | 5000 | AYLMER | | 4.37 | FINGERLING |
| 29-May-92 | Brook Trout | 5000 | AYLMER | | 2.38 | FINGERLING |
| 23-May-91 | Brook Trout | 5000 | AYLMER | | 2.26 | FINGERLING |
| 10-Jun-90 | Brook Trout | 5000 | AYLMER | | 4.2 | FINGERLING |

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Table 5. Stock assessment data for 2004 (see lakes files for additional survey data).

| Lake | Sample# | Site | Species Caught | Age | Length (mm) | Weight (grams) | Condition (k) | Scale Age | Structure | Clip | Sex | Maturity | Ageing Comments |
|---------|---------|------|----------------|-----|-------------|----------------|---------------|-----------|-----------|------|------|----------|----------------------------------|
| Crystal | 1 | 1 | RB | 3 | 406 | 810 | 1.2 | 3+ | OT | UN | f | mt | translucent; vague 1st annulus |
| Crystal | 2 | 1 | RB | 3 | 409 | 780 | 1.1 | 3+ | OT | UN | f | mt | tip broken |
| Crystal | 3 | 1 | EB | 2 | 343 | 460 | 1.1 | 2++ | OT | UN | af3n | | |
| Crystal | 4 | 1 | EB | 1 | 168 | 29 | 0.6 | 1+ | OT | UN | af3n | | |
| Crystal | 5 | 1 | EB | 1 | 150 | 30 | 0.9 | 1+ | OT | UN | af3n | | |
| Crystal | 6 | 3 | EB | 5 | 574 | 2375 | 1.3 | 5+ | OT | UN | af3n | | outer edge translucent |
| Crystal | 7 | 3 | EB | 5 | 532 | 1800 | 1.2 | 5+ | OT | UN | f | st | |
| Crystal | 8 | 3 | EB | 4 | 502 | 1410 | 1.1 | 4+ | OT | UN | m | mt | opaque center; vague 1st annulus |
| Crystal | 9 | 3 | EB | 4 | 464 | 1400 | 1.4 | 4+ | OT | UN | af3n | | |
| Crystal | 10 | 3 | EB | 2 | 311 | 370 | 1.2 | 2+ | OT | UN | af3n | | |
| Crystal | 11 | 3 | EB | 3 | 354 | 730 | 1.6 | 3+ | OT | UN | f | m | opaque center; vague 1st annulus |
| Crystal | 12 | 3 | EB | 2 | 318 | 410 | 1.3 | 2+ | OT | UN | af3n | | |
| Crystal | 13 | 3 | EB | 3 | 425 | 1060 | 1.4 | 3+ | OT | UN | af3n | | |
| Crystal | 14 | 3 | EB | 1 | 161 | 44 | 1.1 | 1+ | OT | UN | af3n | | |
| Crystal | 15 | 3 | EB | 2 | 344 | 490 | 1.2 | 2+ | OT | UN | af3n | | tip broken |
| Crystal | 16 | 3 | EB | 2 | 354 | 470 | 1.1 | 2++ | OT | UN | af3n | | |
| Crystal | 17 | 3 | RB | 3 | 477 | 1100 | 1.0 | 3++ | OT | UN | m | mt | opaque center; vague 1st annulus |
| Crystal | 18 | 3 | RB | 3 | 438 | 970 | 1.2 | 3+ | OT | UN | f | mt | translucent |
| Crystal | 19 | 3 | RB | 3 | 411 | 820 | 1.2 | 3++ | OT | UN | f | im | translucent |
| Crystal | 20 | 3 | RB | 3 | 425 | 860 | 1.1 | 3++ | OT | UN | f | mt | |
| Crystal | 21 | 3 | RB | 3 | 410 | 760 | 1.1 | 3+ | OT | UN | f | mt | tip broken |
| Crystal | 22 | 3 | RB | 3 | 394 | 680 | 1.1 | 3+ | OT | UN | f | mt | translucent |
| Crystal | 23 | 3 | RB | 3 | 395 | 650 | 1.1 | 3+ | OT | UN | f | mt | translucent; vague 1st annulus |
| Crystal | 24 | 3 | RB | 3 | 372 | 540 | 1.0 | 3++ | OT | UN | f | mt | |
| Crystal | 25 | 3 | RB | 2 | 326 | 380 | 1.1 | 2++ | OT | UN | f | im | translucent; tip broken |
| Crystal | 26 | 3 | RB | 1 | 241 | 150 | 1.1 | 1+ | OT | UN | f | im | |
| Crystal | 27 | 3 | RB | 1 | 212 | 106 | 1.1 | 1+ | OT | UN | f | im | |
| Crystal | 28 | 3 | RB | 1 | 210 | 107 | 1.2 | 1++ | OT | UN | f | im | |
| Crystal | 29 | 3 | RB | 1 | 205 | 84 | 1.0 | 1++ | OT | UN | f | jm | tip broken |
| Crystal | 30 | 3 | RB | 1 | 204 | 94 | 1.1 | 1+ | OT | UN | f | im | |
| Crystal | 31 | 3 | RB | 1 | 195 | 74 | 1.0 | 1+ | OT | UN | f | im | |
| Crystal | 32 | 2 | RB | 1 | 190 | 71 | 1.0 | 1+ | OT | UN | f | im | |
| Crystal | 33 | 2 | RB | 3 | 425 | 810 | 1.1 | 3+ | OT | UN | f | mt | translucent; vague 1st annulus |
| Crystal | 34 | 2 | RB | 3 | 402 | 720 | 1.1 | 3+ | OT | UN | f | mt | translucent |
| Crystal | 35 | 2 | RB | 3 | 401 | 710 | 1.1 | 3+ | OT | UN | f | st | translucent |
| Crystal | 36 | 2 | RB | 3 | 397 | 660 | 1.1 | 3+ | OT | UN | f | mt | translucent; broken |
| Crystal | 37 | 2 | RB | 3 | 417 | 700 | 1.0 | 3++ | OT | UN | f | st | broken |
| Crystal | 38 | 2 | RB | 1 | 248 | 169 | 1.1 | 1+ | OT | UN | f | im | |
| Crystal | 39 | 2 | EB | 2 | 326 | 440 | 1.3 | 2+ | OT | UN | af3n | | |
| Crystal | 40 | 2 | EB | 1 | 180 | 56 | 1.0 | 1+ | OT | UN | af3n | | |
| Crystal | 41 | 2 | EB | 1 | 148 | 31 | 1.0 | 1+ | OT | UN | af3n | | |
| Crystal | 42 | 2 | EB | 1 | 154 | 32 | 0.9 | 1+ | OT | UN | af3n | | |
| Crystal | 43 | 2 | EB | 1 | 138 | 28 | 1.1 | 1+ | OT | UN | af3n | | |