Forty Mile Coulee Reservoir
Fall Walleye Index Netting, 2012

Fisheries Management
Prairies/Lethbridge and Medicine Hat

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Abstract

A Fall Walleye Index Netting (FWIN) was completed in Forty Mile Coulee Reservoir (40 Mile) from 17 to 22 September 2012. The methodology used was standard FWIN gill nets. There were 193 Walleye from 40 Mile captured, with an estimated Catch per Unit Effort (CPUE) of 18.7 fish/100 m²/24h. Other species captured included 46 Northern Pike, 95 Lake Whitefish, 517 Yellow Perch, 11 Longnose Sucker, 20 White Sucker, and 1 Spottail Shiner. Half (50%) of the Walleye catch was greater than 500 mm FL. The growth rate was characterized as moderate. Females began to reach maturity at Age 5 and all were mature by Age 7. Fish from Age 1 to Age 10, and ages 12 and 15 were present. Recruitment was poor. The CPUE from the 2004 FWIN at 40 Mile was 15.4 fish/100 m²/24h.

Introduction

Alberta Environment and Sustainable Resource Development (ESRD) implements strategies to manage sport fisheries for sustainable harvest. Monitoring is required to evaluate the effectiveness of these strategies and to recommend alternate strategies where evidence supports change. The FWIN method is used by ESRD to monitor walleye populations, and provide information on other species. The Alberta Conservation Association (ACA) conducted the FWIN field work, with assistance from ESRD, and reported on the findings in Johns (2013).

Forty Mile Coulee Reservoir was constructed in 1987 and first filled to capacity in 1989. At full supply it has a surface area of 675 ha, a maximum depth of 25.5 m, and a mean depth of 15.6 m, based on data collected in 2000. The inlet canal branches off the main St. Mary Irrigation District Canal, and can be controlled to deliver water to the reservoir or divert water around it.

Walleye may move into 40 Mile from upstream reservoirs, or be the product of within-reservoir spawning. The reservoir was stocked with 366 000 walleye fingerlings from 1990 to 1993. In 1995, the walleye fishery was designated as “collapsed/newly stocked” and the corresponding angling regulation assigned was catch and release (Berry 1995). The walleye regulations for 40 Mile were catch and release until April 1, 2004 when they changed to a harvest of one over 55 cm.

Methods

Walleye were captured using gill nets following the Fall Walleye Index Netting (FWIN) protocol described by Morgan (2000). The ACA captured fish using 61 m x 1.8 m multi-panel monofilament FWIN gill nets that were set for approximately 24 h. They randomly selected set sites for 11 nets (3 shallow, 8 deep) at 40 Mile. Catches were recorded by net location and mesh size. A net ID, date, mesh size, and count of each species of fish caught were recorded for each panel. Fork and total length (to the nearest millimetre) measurements were taken for both species, and weight (in grams), as well as sex and maturity were recorded for all large-bodied fish. Relative abundance was expressed as CPUE (fish/100 m²/24 h), and growth was described using the von Bertalanffy growth model in R.
The raw data from this FWIN survey is stored digitally in the Fish and Wildlife Management Information System (FWMIS) under Project ID # 16745. 40 Mile has Waterbody ID #6813.

**Results**

There were 193 Walleye captured from 40 Mile, with an estimated CPUE of 18.7 fish/100 m²/24 h (95%CI = 12.0-23.0, n = 10). Other species captured included 46 Northern Pike, 95 Lake Whitefish, 517 Yellow Perch, 11 Longnose Sucker, 20 White Suckers, and 1 Spottail Shiner.

The figures below are Walleye relative abundance by fork length and age.

Length distribution of walleye captured from Forty Mile Coulee Reservoir, Alberta, 2012. Mean (±SE) fork length was 495 ± 6 mm (n = 193).

Age-class distribution of walleye captured from Forty Mile Coulee Reservoir, Alberta, 2012. Mean (±SE) age of walleye was 7.5 ± 0.2 (n = 193).
Age-at-maturity of female walleye from Forty Mile Coulee Reservoir, Alberta, 2012. (n = 98)

Age-at-maturity of male walleye from Forty Mile Coulee Reservoir, Alberta, 2012. (n = 95)

von Bertalanffy growth curves for walleye captured from Forty Mile Coulee Reservoir, Alberta, 2012. von Bertalanffy growth parameters; L = 604, K = 0.20, t_0 = -2.00, n = 193.
The figure above is the von Bertalanffy growth parameters for Walleye for both sexes combined, while the figure below indicates the parameters for males and females separately.

There were 46 Northern Pike captured from 40 Mile, with an estimated CPUE of 4.4 fish/100 m²/24 h (95%CI = 1.0-2.7). The CPUE for Lake Whitefish was 9.3 fish/100 m²/24 h (95%CI = 3.0-16.0, N = 95), and the CPUE for Yellow Perch was 49.8 fish/100 m²/24 h (95%CI = 25.0-73.0, N = 517).

Table 1. The total catch from each gill net set is listed below.

<table>
<thead>
<tr>
<th>Depth stratum (m)</th>
<th>Gill net number</th>
<th>Walleye</th>
<th>Northern pike</th>
<th>Lake whitefish</th>
<th>Yellow perch</th>
<th>Non-sport fish</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 – 5</td>
<td>F13</td>
<td>5</td>
<td>9</td>
<td>2</td>
<td>44</td>
<td>1</td>
</tr>
<tr>
<td>2 – 5</td>
<td>F16</td>
<td>25</td>
<td>12</td>
<td>3</td>
<td>18</td>
<td>3</td>
</tr>
<tr>
<td>5 – 15</td>
<td>F1</td>
<td>11</td>
<td>2</td>
<td>3</td>
<td>40</td>
<td>8</td>
</tr>
<tr>
<td>5 – 15</td>
<td>F2</td>
<td>19</td>
<td>2</td>
<td>42</td>
<td>136</td>
<td>4</td>
</tr>
<tr>
<td>5 – 15</td>
<td>F4</td>
<td>18</td>
<td>2</td>
<td>13</td>
<td>109</td>
<td>3</td>
</tr>
<tr>
<td>5 – 15</td>
<td>F5</td>
<td>16</td>
<td>6</td>
<td>6</td>
<td>74</td>
<td>3</td>
</tr>
<tr>
<td>5 – 15</td>
<td>F6</td>
<td>20</td>
<td>6</td>
<td>10</td>
<td>51</td>
<td>0</td>
</tr>
<tr>
<td>5 – 15</td>
<td>F7</td>
<td>20</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>5 – 15</td>
<td>F8</td>
<td>19</td>
<td>2</td>
<td>8</td>
<td>45</td>
<td>6</td>
</tr>
<tr>
<td>5 – 15</td>
<td>F9</td>
<td>40</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>193</td>
<td>46</td>
<td>95</td>
<td>517</td>
<td>32</td>
</tr>
</tbody>
</table>
Interpretation

There has been one previous FWIN conducted on 40 Mile, in 2004. The 2004 FWIN data were collected in the same year that the regulations were changed.

Table 2 presents a comparison of 2004 and 2012 FWIN results. There hasn’t been a great deal of change in the metrics for the 40 Mile walleye fishery. The walleye catch per unit effort has only slightly increased in 2012 over 2004. Some metrics have shifted towards a more risky situation (e.g., fewer age classes supporting the fishery). In both sampling years young-of-the-year were not caught, although juveniles were better represented in the 2004 catch than in the 2012 catch. The growth rates appeared faster in 2004, although in both years Walleye reached 500 mm FL by age 7.

Table 2. Criteria for classifying status of Walleye fisheries, modified for FWIN analysis (from Sullivan 2003), and comparison of 40 Mile Walleye from 2004 to 2012.

<table>
<thead>
<tr>
<th>STATUS OF STOCK</th>
<th>TROPHY</th>
<th>STABLE</th>
<th>VULNERABLE</th>
<th>COLLAPSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age-class Distribution</td>
<td>Wide</td>
<td>Wide</td>
<td>Narrow</td>
<td>Wide or Narrow</td>
</tr>
<tr>
<td>Age-class Stability</td>
<td>8 or more age classes</td>
<td>8 or more age classes</td>
<td>1-3 age classes</td>
<td>Mean age = 6 - 10</td>
</tr>
<tr>
<td>mean age &gt;9</td>
<td>mean age = 6-9</td>
<td>mean age = 4 - 6</td>
<td>few old (&gt;10 years)</td>
<td></td>
</tr>
<tr>
<td>Age-class Stability</td>
<td>Very Stable</td>
<td>Relatively Stable</td>
<td>Unstable</td>
<td>Stable or Unstable</td>
</tr>
<tr>
<td>mean age 7.5</td>
<td>2 - 3 age classes</td>
<td>1 - 3 age classes</td>
<td>Recruitment failures</td>
<td></td>
</tr>
<tr>
<td>catch curve</td>
<td>out of smooth catch curve</td>
<td>support fishery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age-at-Maturity</td>
<td>Females 10 - 20</td>
<td>Females 8 - 10</td>
<td>Females 7 - 8</td>
<td>Females 4 - 7</td>
</tr>
<tr>
<td>Males 10 - 16</td>
<td>Males 7 - 9</td>
<td>Males 5 - 7</td>
<td>Males 3 - 6</td>
<td></td>
</tr>
<tr>
<td>Ages will vary with age class distribution</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length-at-age</td>
<td>Very slow</td>
<td>Slow</td>
<td>Moderate</td>
<td>Fast</td>
</tr>
<tr>
<td>50 cm (FL) in</td>
<td>50 cm (FL) in</td>
<td>50 cm (FL) in</td>
<td>50 cm (FL) in</td>
<td></td>
</tr>
<tr>
<td>12 - 15 years</td>
<td>9 - 12 years</td>
<td>7 - 9 years</td>
<td>4 - 7 years</td>
<td></td>
</tr>
<tr>
<td>Catch Rate</td>
<td>High &gt;30</td>
<td>Moderate 5 - 25</td>
<td>Low &lt;5</td>
<td></td>
</tr>
<tr>
<td>FWIN walleye / net</td>
<td>walleye / net</td>
<td>walleye / net</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>15.4 walleye/net</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>18.7 walleye/net</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
One of the parameters that can be compared between 2004 and 2012 is age at maturity for females, which are beginning to spawn about 2 years later in 2012 than in 2004. The figure below shows in 2004 that mature females first were collected at age 5, whereas in 2012 they were not encountered until age 7. All females were mature by age 8 in 2005, compared with age 10 in 2012. This in turn means that some female walleye are close to 550 mm, and thus vulnerable to legal harvest, when they will spawn for the first time.

Employing a harvest limit of 1 walleye over 55 cm is the most restrictive regulation that can be used, before going to a Special Harvest Licence (SHL) or catch and release.

Overall, the Walleye population in Forty Mile Coulee Reservoir is in a more risky position in 2012 than it was in 2004.

**Literature Cited**

