
# Wadlin Lake Fall Walleye Index Netting (FWIN) Survey 2012

*Fisheries Management*

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# Walleye Stock Assessment of Wadlin Lake, Alberta 2012.

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Alberta
Environment and Sustainable Resource Development

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# 1.0 ABSTRACT

Fisheries Management staff from the Peace/Upper Hay Area completed a Fall Walleye Index Netting (FWIN) survey on Wadlin Lake in 2012. Fall Walleye Index Netting (FWIN) is a standardized assessment tool used to approximate walleye density and population status, as well as providing relative abundance for other captured species. Walleye (*Sander vitreus*) were stocked into Wadlin Lake in 1990, 1991 and 1996 with previous FWIN surveys conducted in 2005 and 2008. Results from this survey indicate a mean catch rate of 28.8 fish/100m²/24hr (95% CI = 18.0 – 42.0). Good recruitment is evident but large walleye over 500mm fork length were scarce (only 15% of the walleye catch). Walleye ages ranged from 0 to 22 years with a mean age of 5.3 years. The age-class structure illustrates two distinct groups of walleye; 1) stocked and 2) natural recruitment. Walleye recruitment is represented by the 0 to 6 year olds and the stocked walleye by the 16, 21 and 22 year olds. The 2 to 5 year-olds dominated the sample with a CUE of 21.5 fish/100m²/24hr and comprised 75% of the total catch. Year class failures are evident in the 7 to 15 year olds. Male walleye were sexually mature at age 4. Female walleye maturity was uncertain due to lack of females represented in the catch from 7 to 15 years of age. The walleye population was assessed to be of a vulnerable status. The catch per unit effort (CUE) for yellow perch (*Perca flavescens*) was 58.0 perch/100m²/24hr (95% CI= 37.7–80.3). Northern pike (*Esox lucius*) and lake whitefish (*Coregonus clupeaformis*) were the other sport fish species captured in the index netting assessment.

# 2.0 INTRODUCTION

Wadlin Lake is an important domestic and recreational fishery for the local residents of Fort Vermilion and La Crete areas. Wadlin Lake supports native fish populations of northern pike, yellow perch, lake whitefish, longnose sucker (*Catostomus catostomus*) and burbot (*Lota lota*). Walleye (*Sander vitreus*) were introduced into Wadlin Lake in 1990, 1991 and 1996. In Alberta, walleye have been subjected to high angling pressure for many years. In 1995, Alberta Sustainable Resource Development (ASRD) developed and implemented *Alberta's Walleye Management and Recovery Plan*[1] to aid in the recovery of walleye populations (Berry, 1995). Subsequently, Wadlin Lake was classified as having a "stocked - collapsed" walleye population due to the recent stockings. The sportfishing regulation for that "stocked - collapsed" category prohibited the harvest of walleye (zero limit, catch and release only) in order to encourage a natural self-sustaining population.

In 2001, a testnetting survey on Wadlin Lake indicated very high numbers of walleye, one of the highest density walleye lakes in the Northwest Region (Schroeder, 2001). In 2003, regulation changes to numerous walleye lakes within the Northwest Region allowed the opportunity for anglers to harvest walleye. Wadlin Lake was chosen based on a high walleye population that was noted in the 2001 monitoring results. The new regulation allowed a harvest of 2 walleye over 50cm.

To monitor the increased level of effort and harvest of walleye on Wadlin Lake, a creel survey was conducted during the summer of 2003 (England 2003). As part of the Region's Lake Monitoring Program, a test netting survey was conducted in 2004 to evaluate the response of the walleye population to the new harvest regulation (England 2004). To further evaluate the sportfish population dynamics in Wadlin Lake, Fall Walleye Index Netting (FWIN) studies were conducted in 2005 by ASRD (unpublished data) and in 2008 by the Alberta Conservation Association (Wood 2008).

Current sport fishery harvest regulations for Wadlin Lake are: Walleye – one (1) ≥ 50cm total length (TL) per day, Northern Pike limit– zero (0), Yellow Perch limit – zero (0), Lake Whitefish limit – ten (10) , Burbot limit – three (3). Wadlin Lake is open for angling from June 1 to March 31 and closed from April 1 to May 31.

[1] *Alberta's Walleye Management and Recovery Plan was designed to manage each individual walleye population, and to classify and evaluate each population's state of exploitation. The strategy involves designating each walleye population into one of four management categories and taking action to recover and maintain these populations.*

The walleye population in Wadlin Lake was assessed by conducting a Fall Walleye Index Netting (FWIN) study in 2012. The objectives of this study are as follows:

1. Assess current walleye density and population parameters in order to review current status and regulations.
2. Assess northern pike and yellow perch relative abundance and population parameters in order to review current status and regulations.
3. Report catch summaries of other fish species captured.

## 3.0 STUDY AREA

Wadlin Lake (57° 44′ N, 111° 36′ W) is located approximately 80 km south of Fort Vermilion, Alberta (Figure 1). It is situated within the Buffalo Head Hills, (Municipal District of Mackenzie No. 23). Wadlin Lake, and its watershed, is part of the Wabasca River drainage which eventually flows into the Peace River. Wadlin Lake has a surface area of 1,926 hectares, a mean depth of 6.5m and maximum depth of 11.9m (Government of Alberta 2012). Shoreline development includes a municipal campground and boat launch located in the northeast corner of the lake. Access to Wadlin Lake is via Highway 88.

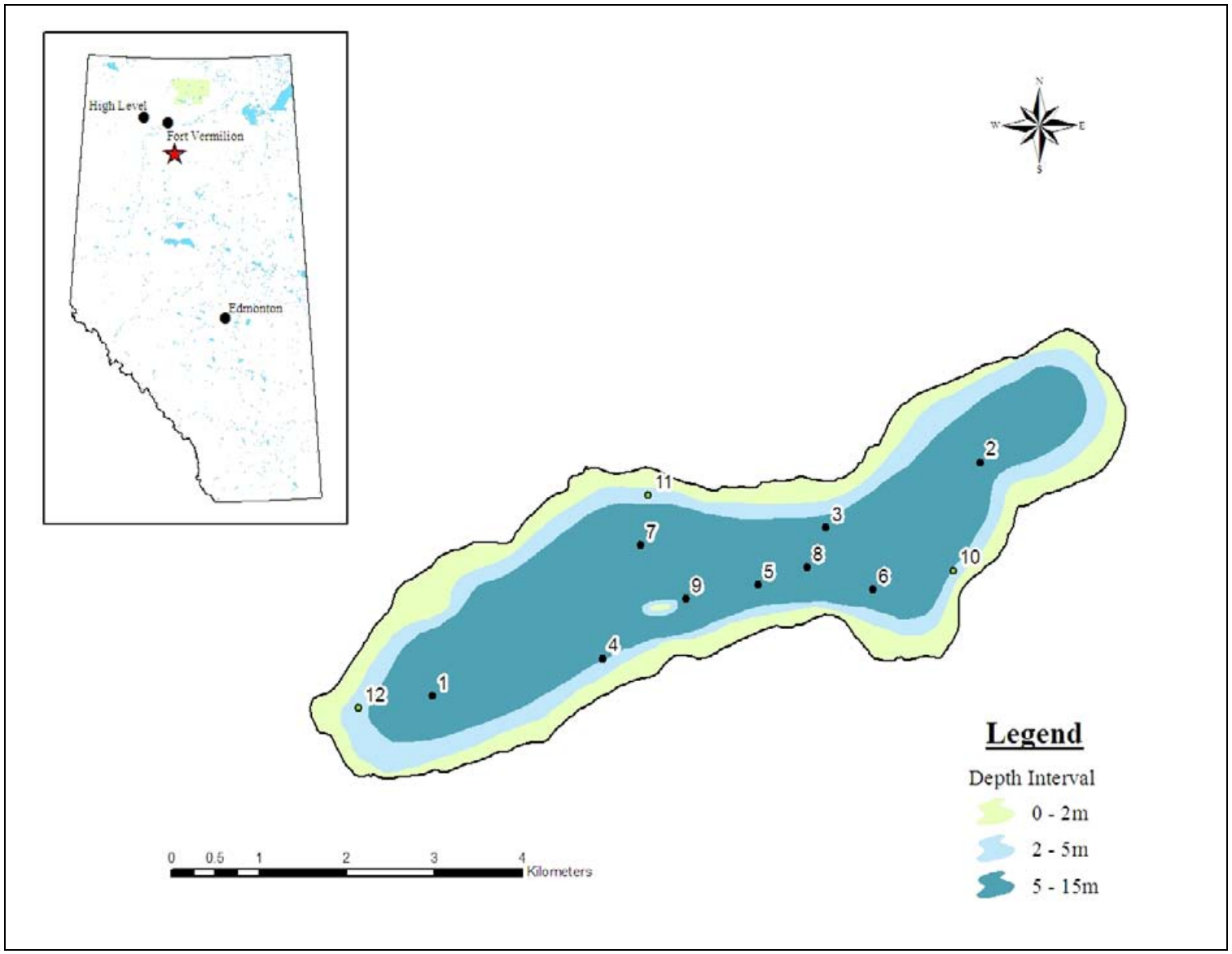


Figure 1. Map showing location of Wadlin Lake and Fall Walleye Index net site locations sampled in 2012.

# 4.0 MATERIALS AND METHODS

## *4.1 Materials*

Multi-mesh benthic gill nets (FWIN nets) were used to capture fish. Each standard gillnet is made up of 8 different size mesh panels of 25, 38, 51, 63, 76, 102, 127, and 157 mm (stretch measure). To reduce overall fish mortality during this survey, a combination of 6 full FWIN nets and 6 half FWIN nets were used. Full FWIN net dimensions of each panel were 7.6 m long by 1.8 m high. Half FWIN net dimensions are 3.8 m long and 1.8 m high. The panels were sewn together in ascending order of size (no space between the panels). Modified nets consisted of all the above mesh sizes and also included 12 and 19mm mesh panels of the same dimensions that were attached to a standard gillnet by a 15 meter bridal.

## *4.2 Methods*

### *Sampling Design*

In general the sampling design followed the Fall Walleye Index Netting (FWIN) protocol (Morgan 2002). A stratified random sampling design was employed. The lake was stratified by depth and sampling effort was allocated proportionately to surface area of the depth stratum. Table 1 shows the stratification and the proportion of the lakes surface area represented by each stratum. Vertical and horizontal error may exist in bathymetric data. Depth information was captured using depth maps created in the 1970's and on-screen digitized in a Geographic Information System (GIS). Depths were confirmed in the field and nets were set following the FWIN depth stratum protocol.

The FWIN protocol excludes sampling in depths < 2m and >15m as they are not included in the stratification. The 2-5m depth strata represents approximately 20% of the lakes area and the 5-15m depth strata represents approximately 56 % of the lakes area. (Table 1). The remainder of the area, approximately 24%, falls within the 0-2m depth strata. As stated previously, the total lake surface area is 1,926 ha. The area of the lake that falls within the FWIN protocol stratification is approximately 1,465 ha.

The FWIN methodology is a tool that has been developed for assessing walleye populations. Catch and biological information for yellow perch and northern pike is reported here as well. FWIN catch rates reported for perch, pike, and other species have not yet been related to their density and as such are measures of relative abundance, however, age, weight, and size information is used for stock assessment purposes.

Sample sites were randomly generated and selected using Hawth's Analysis Tools v3.27. A minimum distance of 500 m between all sites was one of the criteria selected. Nets were set over night for approximately 24 hours (FWIN protocol allows for +/- 3hrs) and at a minimum depth of two meters. Nets were set perpendicular to the shoreline where possible, without crossing

depth intervals. Modified nets were used to assess forage species of fish. The orientation of the largest or smallest mesh in relation to the shore was random. The modified nets were used for experimental purposes only. Half of the sets contained these small mesh panels. These panels were attached to the standard FWIN gang and half FWIN gangs, leaving approximately 15 meters between the standard mesh panels and the small mesh panels in order to avoid any potential leading effects of the small mesh. Net locations were recorded in Universal Transverse Mercator (UTM) projection coordinates using handheld GPS units. Surface water temperature was also recorded at most net locations. The FWIN protocol requires that sampling occur when surface water temperature is between 10 and 15°C.

Biological data were analyzed and written using Microsoft Office 2003. A complete data set from the 2012 study is stored in the Alberta Sustainable Resource Development (ASRD) *Fisheries and Wildlife Management Information System*[2] database (FWMIS).

### *Sample Size*

A total of 15 random locations were predetermined (5 sites in the 2-5m stratum, and 10 in the 5-15m depth stratum). The number of nets actually set was determined in the field by conducting power analyses of net catches to achieve a predetermined level of precision measured by a coefficient of variation of less than 0.2 (Haddon 2001, Morgan 2002). Overall mean catch rate of walleye and differences in walleye catch rate between depth stratums were also calculated. The total number of sampled sites and area of each stratum is shown in Table 1. UTM co-ordinates of all sample locations can be found in Appendix A.

Table 1. Stratified sampling and stratum surface area for index netting of Wadlin Lake, Alberta 2012.

| Depth Interval | # sites | Area (ha) | Percent (%) |
|---|---|---|---|
| 0-2 m | 0 | 460.11 | 23.89 |
| 2-5 m | 3 | 385.02 | 19.99 |
| 5-15 m | 9 | 1080.97 | 56.12 |
| >15 m | 0 | 0 | 0 |
| **Total** | **12** | **1926.10** | **100** |

[2] FWMIS is a provincial database containing comprehensive information on fish and fish habitat data. It was developed by Alberta Sustainable Resource Development (ASRD) to meet the data storage and data requirements of fisheries managers. As a requirement of a fisheries research license fish information collected must be sent to SRD for inclusion in the database.

### *Data Collection*

All fish species were kept for biological sampling. Catch was recorded by net location and mesh size. Biological data collected from walleye, northern pike, lake whitefish and most yellow perch included: fork length (FL), total length (TL), weight, sex, maturity, and stomach contents. Gonad weight was also collected from mature female walleye. Ageing structures (pelvic fin and otolith for walleyes, cleithrum for pike, otoliths for perch and otoliths from lake whitefish) were removed and stored in individual envelopes. Species and numbers of fish captured in the 12mm and 19mm meshes can be found in Appendix B. Specific information on non-sport fish species collected can be found in FWMIS.

Otoliths were collected and prepared following Watkins and Spencer (2009). Aging structures for the remaining species were collected and prepared following Mackay et al (1990).

Field data were recorded on field data forms and then entered into Microsoft Excel. Prior to analysis, frequency distributions of each FWIN parameter were calculated and the original data sheets were used to investigate and verify the data. In addition, scatter plots of weight-length and length-at-age were generated to identify outliers. Outliers were identified visually and were omitted if measurement or recording error were the suspected cause.

### *Data Analyses*

To ensure consistent data analysis, the number of fish caught in each half FWIN net panel was converted to full FWIN net mesh panels (2X). This conversion was strictly used for calculating mean catch per unit (CUE) parameters. The number of biological fish samples was not extrapolated. Mean catch per unit effort (CUE) was calculated by multiplying the catch by the net area by set duration. Standardized calculations for net area and time were employed. Catch per unit effort was calculated for individual set locations and the mean CUE was determined from all sets.

Mean CUE = (Catch x (100/109.8) x (24/Set Time))

Where,
Catch = Number of fish caught
100 = standardized number to $100m^2$
109.8 = Standard FWIN (8 panels) total mesh area
24 = Standardized number to 24 hrs
Set Time = The duration nets were employed

Estimates and 95% upper and lower confidence intervals of mean CUE were stratum weighted and calculated using bootstrap methods (Haddon 2001). Calculated empirical confidence intervals (95% CI) were completed according to Haddon (2001).

Size and age distributions, growth equation (Von Bertalanffy), and maturity rates were calculated to assess the stock status according to modified guidelines of the Walleye Management and Recovery Plan (Berry 1995). To portray fish population growth as a function of time (i.e., length-at-age), the Von Bertalanffy growth equation was calculated using the Fishery Analysis and Simulation Tools software ver. 2.1 (Slipke and Maceina, 2001). Length-at-age data were fitted to the population growth model by applying the equation to the average total length at age.

# 5.0 RESULTS

## *5.1 Total Catch*

Fall Walleye Index Netting occurred between September 10 – 13, 2012. Water temperatures ranged between 11.4 – 13.0°C. Nets were set for mean time of 23 hours, ranging from 22.4 to 25.3 hours. A desired precision level (less than 20% relative standard error in walleye catch rates between net sets) was not achieved, however, adequate walleye biological samples were found after sampling 12 sites. A total of 2,021 fish representing 5 different species were captured during the 4 days of sampling (Appendix B). Excluding modified nets; a total of 1681 fish were captured. Fish caught in the modified nets were not included in the analysis. Only 10 northern pike were caught during this survey (CUE = <1 pike/100m²/24hr), therefore no further analysis was conducted or reported for this species. No minnow species were captured.

## *5.2 Walleye Catch per Unit Effort (CUE)*

Walleye were caught at all locations (Appendix C). The highest catches appeared in the 63 mm panels (7.8 walleye/net), followed by the 76 mm mesh (6.3 walleye/net). Modified nets were set in 6 locations (Appendix A). Modified mesh sizes captured a total of 6 walleye (19mm mesh). The catch per unit effort (CUE) for walleye was 28.8 walleye/100m²/24hr (95% CI= 18.0–42.0), (Figure 2). There was a high variance in catch rates between sample sites as indicated by the wide confidence intervals (RSE = 21.8).

Previous FWIN surveys in 2005 (8.5 walleye/100m²/24hr (CI=6.0-10.9) and 2008 (10.5 walleye/100m²/24hr (CI=7.6-13.5), had lower catch rates than this survey. Compared to other FWIN surveys conducted across the province since 2005, Wadlin Lake's 2012 catch rate is much higher than the provincial average of 17.1 walleye/100m²/24hr (Fisheries Management, unpublished data, Appendix F). A catch rate of 28.8 walleye/100m²/24hr in Wadlin Lake is considered high, according to Alberta's Walleye Management Recovery Plan criteria for classifying the status of walleye fisheries (Table 2).

A total of 123 mature walleye were sampled, with a ratio of 0.2 females (n = 22) to every 1.0 males (n = 127). Sex was determined from a total of 264 walleye. The overall ratio of female walleye (n = 134) to male walleyes (n = 130) was 1.0:1.0. Walleye with "unknown" sex determination were not included in this analysis.

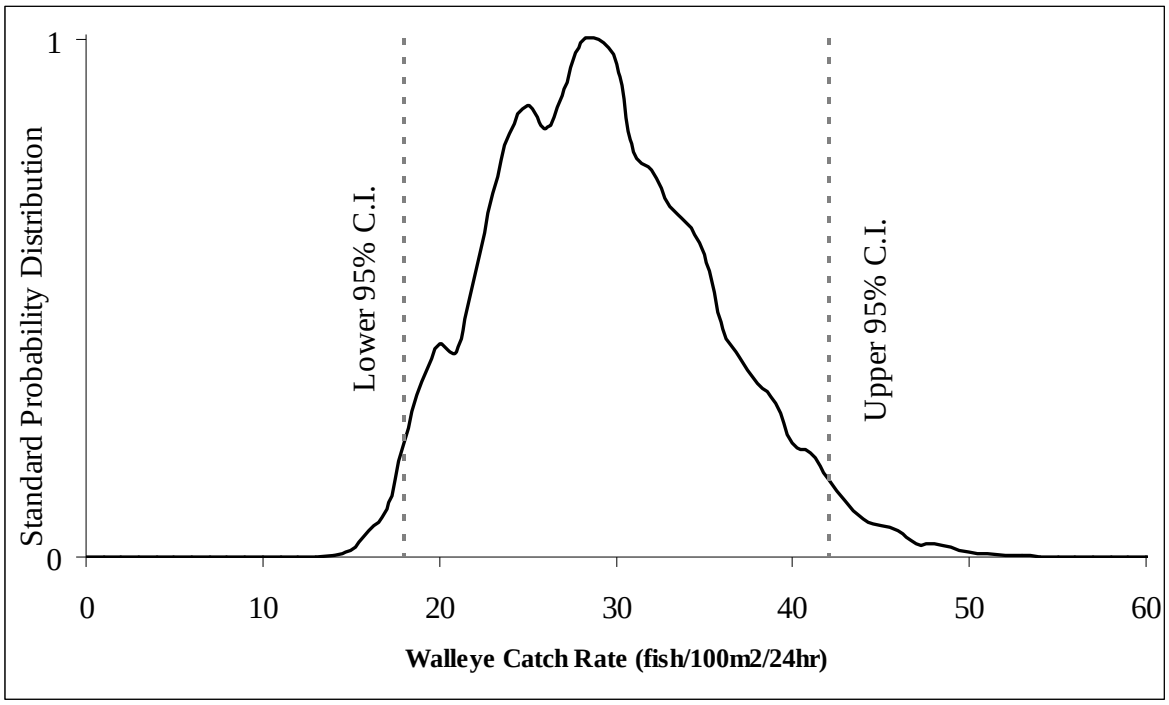


Figure 2. Walleye catch frequency distribution, Wadlin Lake, 2012. A standardized probability function of the number of walleye caught (CUE = 28.8 fish/100m²/24hr; 95% CI = 18.0 – 42.0). Excluding 12 and 19mm mesh sizes, respectively.

### *5.3 Walleye Fork-Length Distribution*

The fork length distribution ranged from 104 - 710mm (n = 280) (Figure 3). No walleye were captured between 130 – 190mm. Only one walleye was caught over 700mm FL. Sixteen (16) young-of-the-year walleye (FL ranging from 104 to 128mm) were captured indicating that recruitment is evident. Walleye over 500 mm FL represented only 15% of the catch. Walleye densities decreased significantly over 500 mm FL.

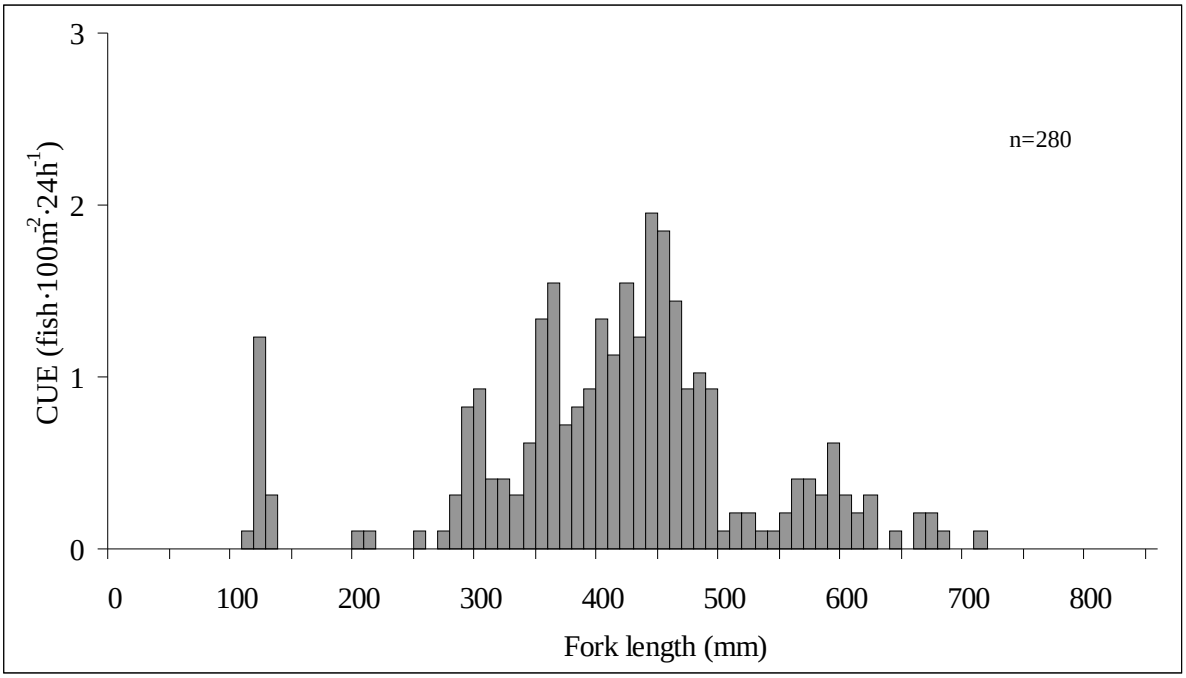


Figure 3. Fork length distributions of walleye from Fall Walleye Index netting at Wadlin Lake, Alberta, 2012 (n=280).

### *5.3.1 Female Walleye*

Female walleye fork lengths ranged from 245 mm to 710 mm (Figure 4). Female walleye were 100 percent mature by 530 mm FL (556 mm TL), which indicates that the current regulation of 1 over 500 mm TL limit may not provide sufficient protection of the spawning female walleye cohort.

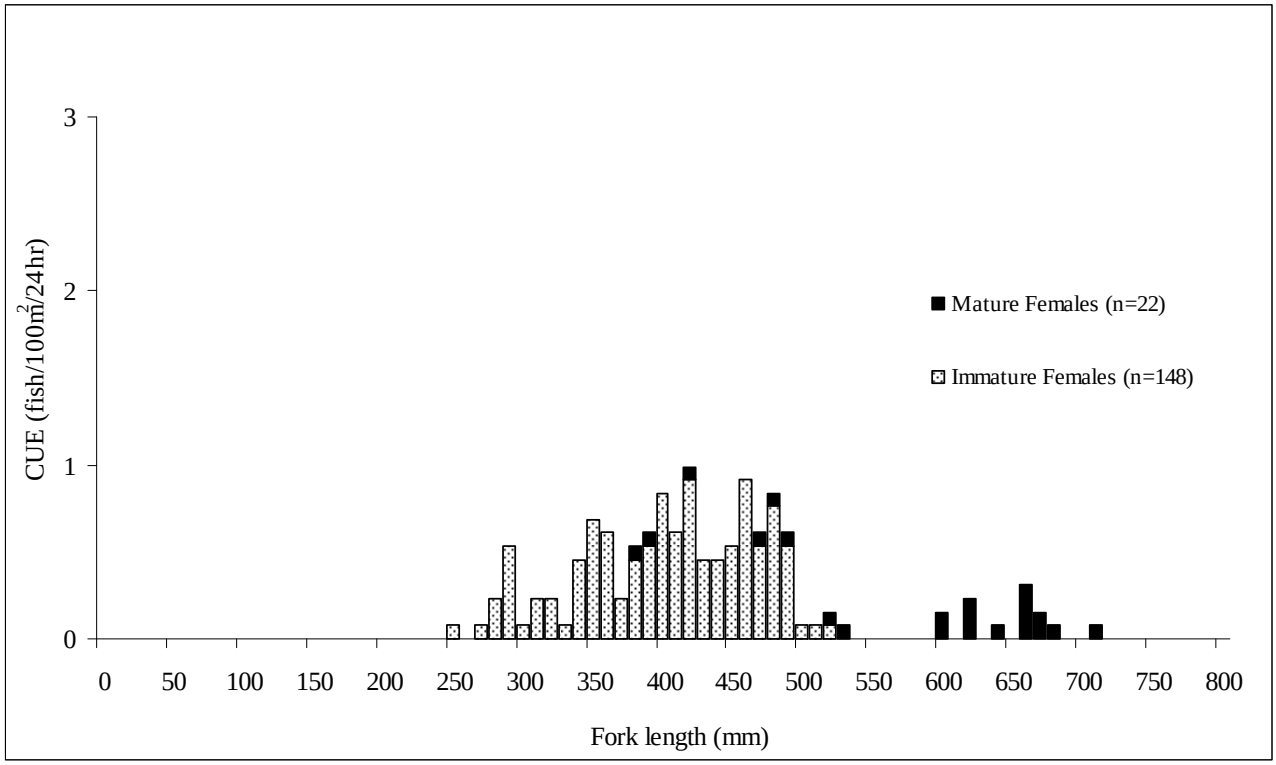


Figure 4. Proportion of mature and immature female walleye by size class sampled from Fall Walleye Index Netting on Wadlin Lake, 2012 (n = 170).

### *5.3.2 Male Walleye*

The fork lengths of male walleye ranged from 196 mm to 607 mm (Figure 5). Male walleye were 100 percent mature by 390 mm FL (413 mm TL), which indicates that the current regulation of 1 over 500 mm TL provides protection to the spawning male walleye cohort.

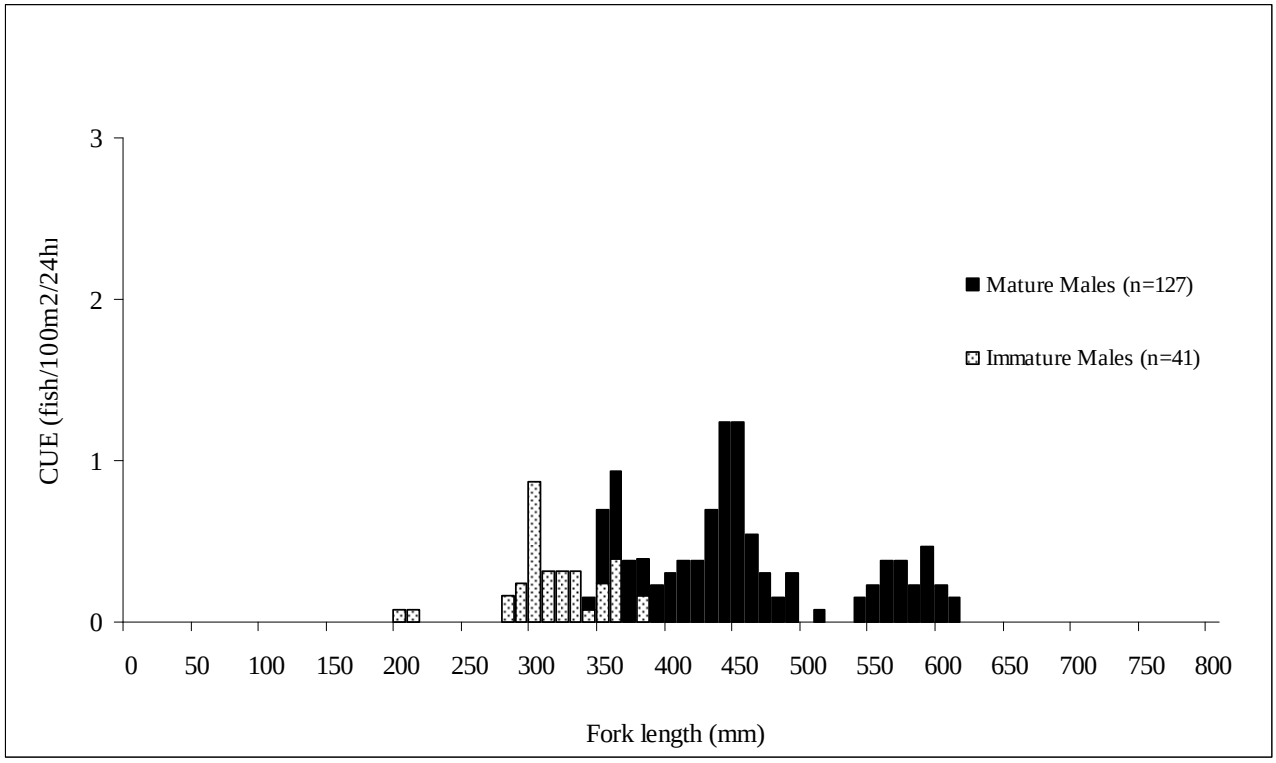


Figure 5. Proportion of mature and immature male walleye by size class sampled from Fall Walleye Index Netting on Wadlin Lake, 2012 (n = 168).

## *5.4 Walleye Age-Class Frequency Distribution*

The walleye sampled in 2012 ranged in age from 0 to 22 years (Figure 6). The mean age was 5.3 years Walleye stocked in 1990, 1991 and 1996 were evident in this survey, comprising 12% of the total catch and were represented by the sixteen (16), twenty-one (21) and twenty-two (22) year-olds. The two, three, four and five year-olds dominated the sample with a CUE of 21.5 fish/100m²/24hr, comprising 75% of the total catch. Age classes seven (7) to fifteen (15) were absent.

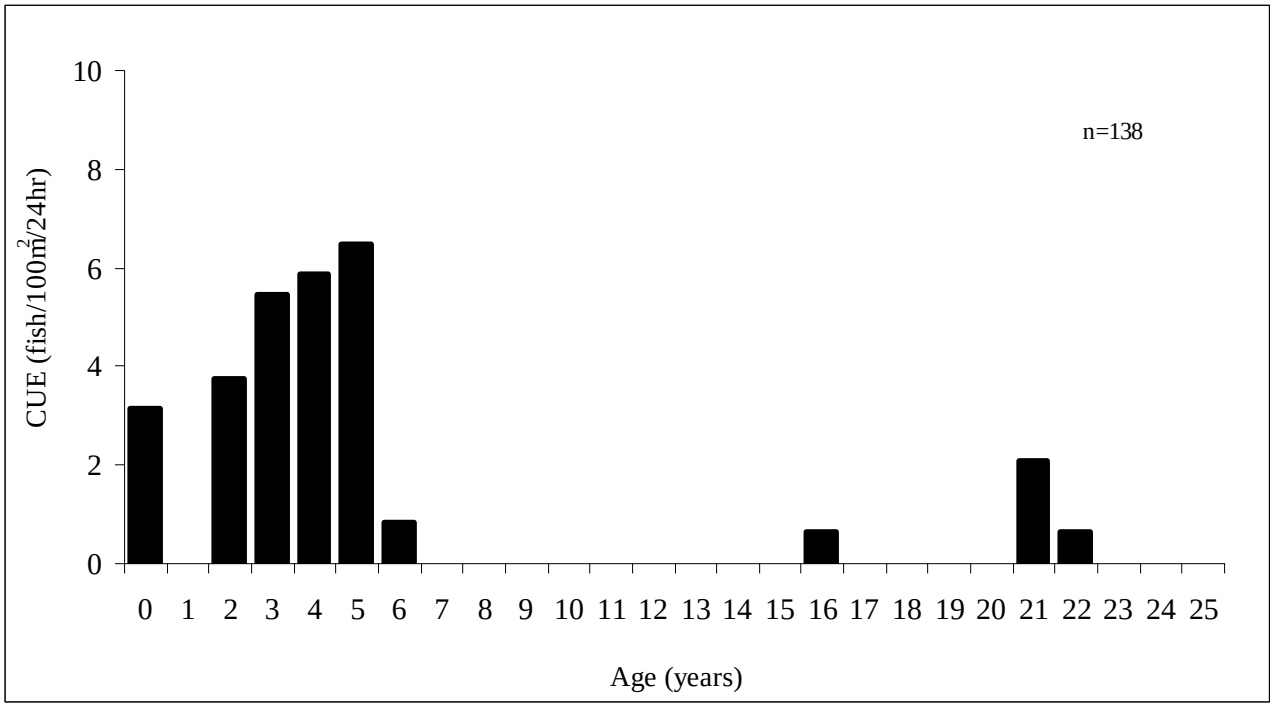


Figure 6. Age distribution of walleye as determined from fish sampled from index netting at Wadlin Lake, Alberta 2012 (n=138).

### *5.5 Walleye Age-Class Stability*

The age-class structure of the Wadlin Lake walleye population illustrates two distinct groups of age-classes, the stocked walleye and the natural recruited walleye. Walleye recruitment is represented by 6 age classes, zero to six year-olds (one year-old age class was absent). Most age classes in the recruited walleye were above 3.0 fish/100m²/24hr. There appears to be a number of complete year class failures from age 7 to age 15. The stocked walleye population is represented by 3 age-classes with low CUE's. This stock assessment illustrates good recruitment in the last 6 years, with support primarily from low density, old, stocked walleye individuals. This age class is indicative of a vulnerable population.

### *5.6 Walleye Age-At-Maturity*

Mature walleye accounted for 53% of the total walleye catch. There were 16 young-of-the-year (age-class 0) walleye with unknown sex determination that were not included in the analysis. A total of 64 female walleye were aged with strong age classes present in the two to five year-olds (Figure 7). These age classes represent 88% of all the females aged. Age-at-maturity for female walleye was difficult to determine primarily due to the age class gap and hence an assignment of stock status with this metric is not reported. Only 12.5% of the female walleye sampled were mature. Age classes were absent from the seven to twenty year olds.

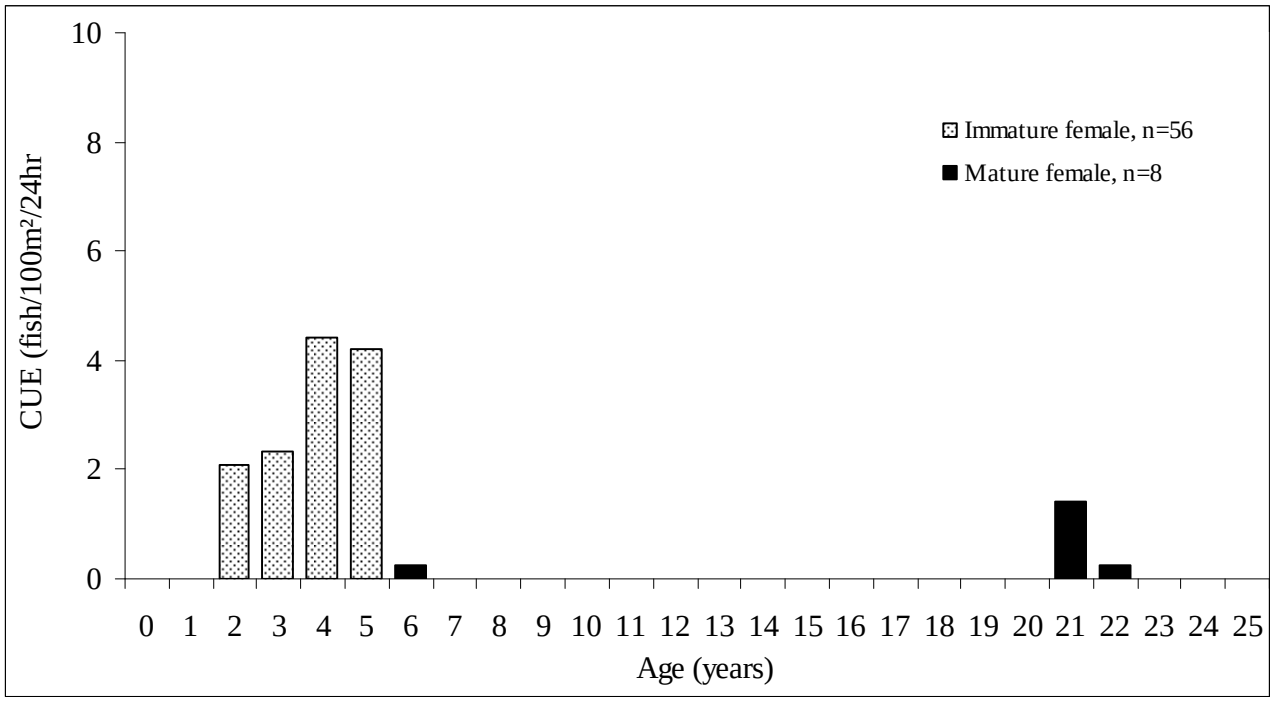


Figure 7. Catch rate of mature and immature female walleye by age class sampled from Fall Walleye Index Netting on Wadlin Lake, 2012 (n = 64).

There were a total of 60 male walleye aged with strong age classes present in the two to five year-olds (CUE of 12.0 fish/100m²/24hr (Figure 8). These age classes represent 80% of all the males aged. Evidence of mature male walleye were found as early as 3 years-old. Male walleye were 100% mature by age four. Age classes were absent from age seven to age fifteen. Age at maturity of male walleye is indicative of a collapsed population.

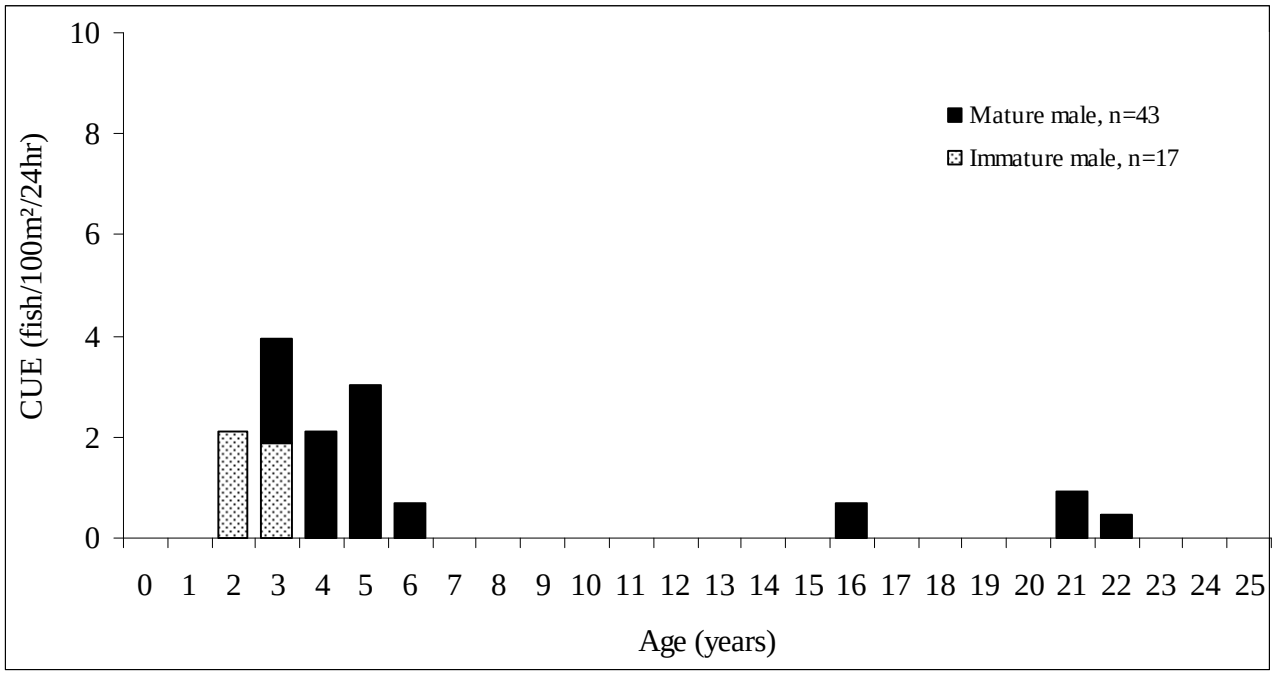


Figure 8. Catch rate of mature and immature male walleye by age class sampled from Fall Walleye Index Netting on Wadlin Lake, 2012 (n = 60).

## *5.7 Walleye Length-At-Age*

Walleye reached 500mm total length (475mm fork length) by age 6 (Figure 9). Due to the large age-class gaps from age seven to age fifteen, total lengths were predicted for the analysis using =Linf*(1-EXP(-K*(age-to)) (Dwayne Latty, unpublished data, ASRD). Walleye growth was much slower past age 8. The growth rate is considered fast and would be indicative of a collapsed or newly stocked population (Table 2).

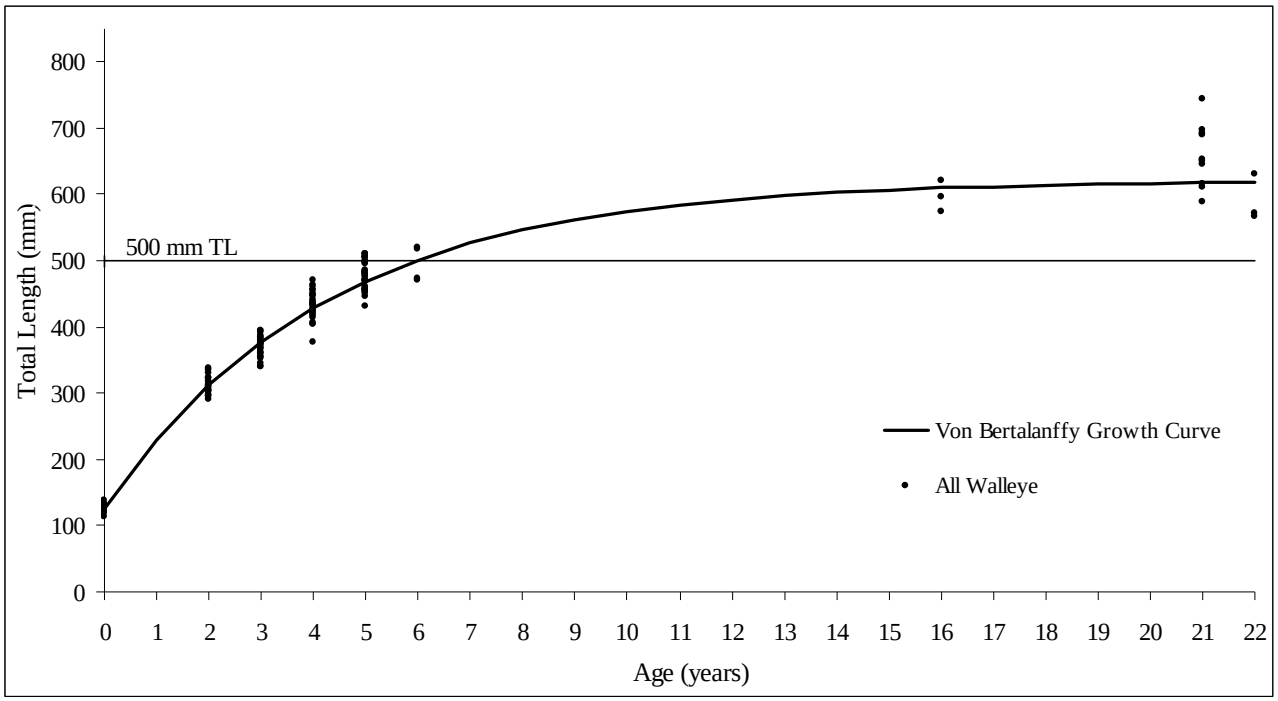


Figure 9. Length-at-age for walleye from Wadlin Lake, FWIN 2012. Von Bertalanffy growth equation, (n = 138; K = 0.236, $L\infty$ = 621.2mm TL, $t_0$ = -0.953).

Table 2. Criteria for classifying status of walleye fisheries*, modified for FWIN analysis (from Sullivan 2003).

| STATUS OF STOCK | STABLE | VULNERABLE | COLLAPSED |
|---|---|---|---|
| Age-class Distribution | Wide<br>9 or more age classes<br>mean age = 6-9 | Narrow<br>1-3 age classes<br>mean age = 4-6<br>few old (>10 years) fish | Wide or Narrow<br>Mean age = 6-10 |
| **Wadlin Lake 2012** | | | **6 age classes<br>Mean age of 5<br>few older stocked fish** |
| Age-class Stability | Relatively Stable<br>2-3 age classes out of smooth catch curve<br>CUE>3 fish/100m²/24hr | Unstable<br>1-2 age classes support fishery<br>CUE>3 fish/100m²/24hr | Stable or Unstable<br>recruitment failures |
| **Wadlin Lake 2012** | | **1 age class supports fishery (stocked cohort) good recruitment, year class failures** | |
| Age-at-Maturity (50% Maturity)<br>Age-at-Maturity (100% Maturity) | Females 8-10<br>Males 7-9 | Females 7-8<br>Males 5-7 | Females 4-7<br>Males 3-6<br>Ages will vary with age class distribution |
| **Wadlin Lake 2012** | | | **Males – 4<br>Females - uncertain** |
| Growth (Length-at-Age) | Slow<br>50cm (TL) in 9-12 years | Moderate<br>50cm (TL) in 7-9 years | Fast<br>50cm (TL) in 4-7 years |
| **Wadlin Lake 2012** | | | **50cm (TL) in 6 years** |
| Catch Rate FWIN | High >20 walleyes/net | Moderate 10-20 walleyes/net | Low <10 walleyes/net |
| **Wadlin Lake 2012** | **28.8 walleye/net** | | |

*Adopted from Alberta's Walleye Management Recovery Plan, 1995.

### *5.8 Yellow Perch Catch per Unit Effort*

Yellow perch were caught at all locations (Appendix D). The highest catches appeared in the 38 mm panels (34.4 perch/net) followed by the 25 mm mesh (13.5 perch/net). Modified nets were set in 6 locations (Appendix A). Modified mesh sizes captured a total of 334 perch (297 in the 12mm mesh and 37 in the 19mm mesh), which are not included in the analysis.

The catch per unit effort (CUE) for yellow perch was 58.0 perch/100m²/24hr (95% CI= 37.7–80.3), (Figure 10). There was a high variance in catch rates between sample sites as indicated by the wide confidence intervals (RSE = 18.9).

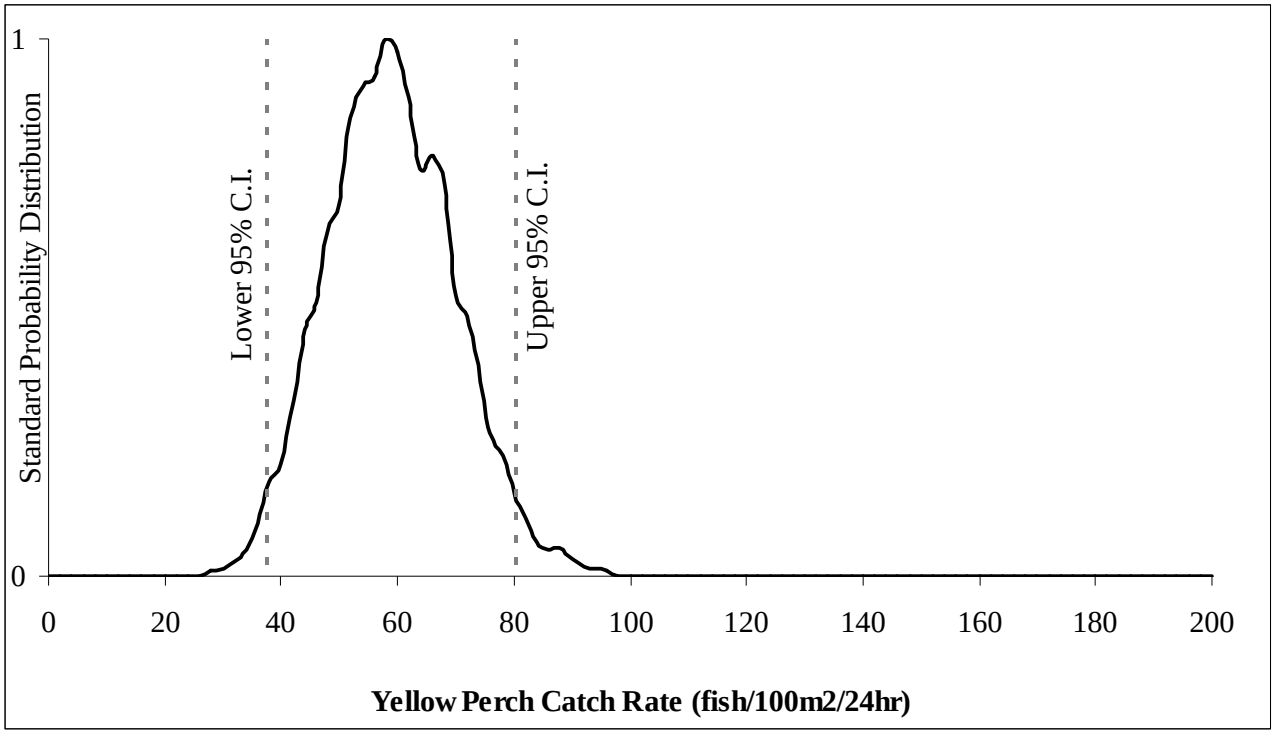


Figure 10. Yellow perch catch frequency distribution, Wadlin Lake, 2012. A standardized probability function of the number of yellow perch caught (CUE = 58.0 fish/100m²/24hr; 95% CI = 37.7 – 80.3). Excluding 12 and 19mm mesh sizes, respectively.

### *5.9 Yellow Perch Fork Length Distribution*

Fork length distribution ranged from 104 mm to 270 mm (Figure 11). The majority (96%) of the perch caught were between 110 mm and 210 mm FL.

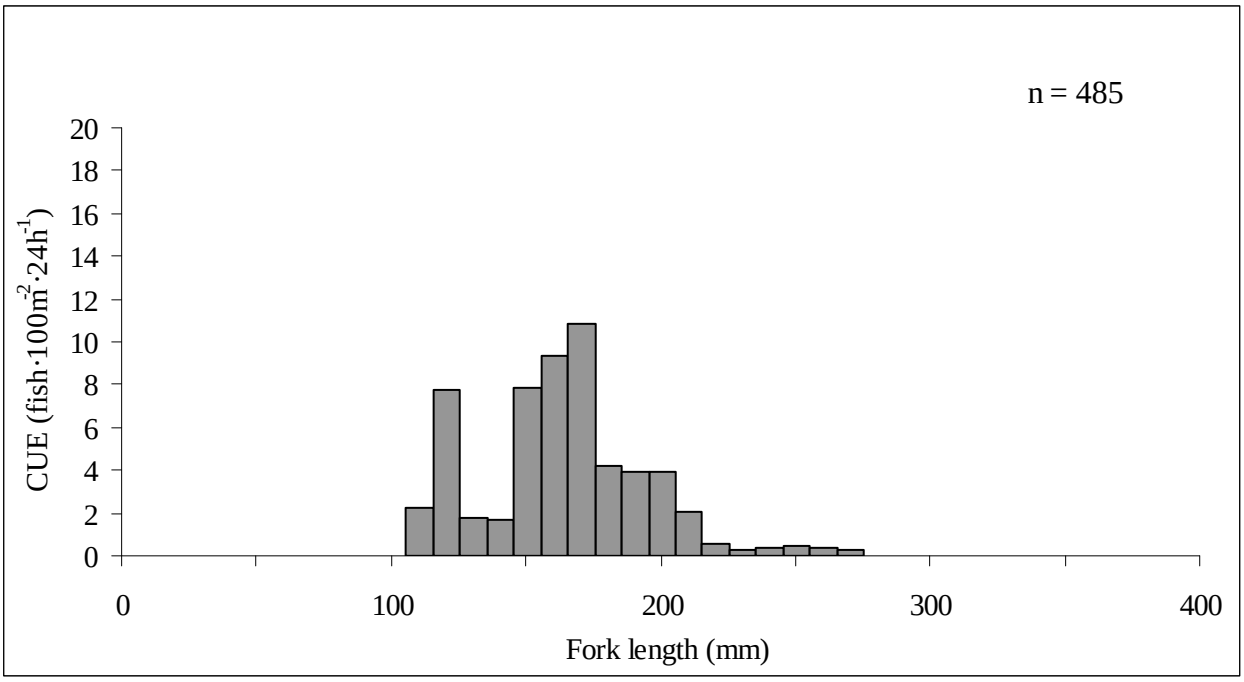


Figure 11. Fork length distributions of yellow perch from Fall Walleye Index netting at Wadlin Lake, Alberta, 2012 (n=485).

### *5.10 Yellow Perch Age-Class Frequency Distribution*

A total of 87 yellow perch were aged during this FWIN survey. Ages ranged from 2 to 8 years (Figure 12). The 2 to 5 year-olds dominated the sample with a CUE of 56.0 fish/100m²/24hr comprising 97% of the total aged sample. Yellow perch 6 years of age and older were present but in low densities.

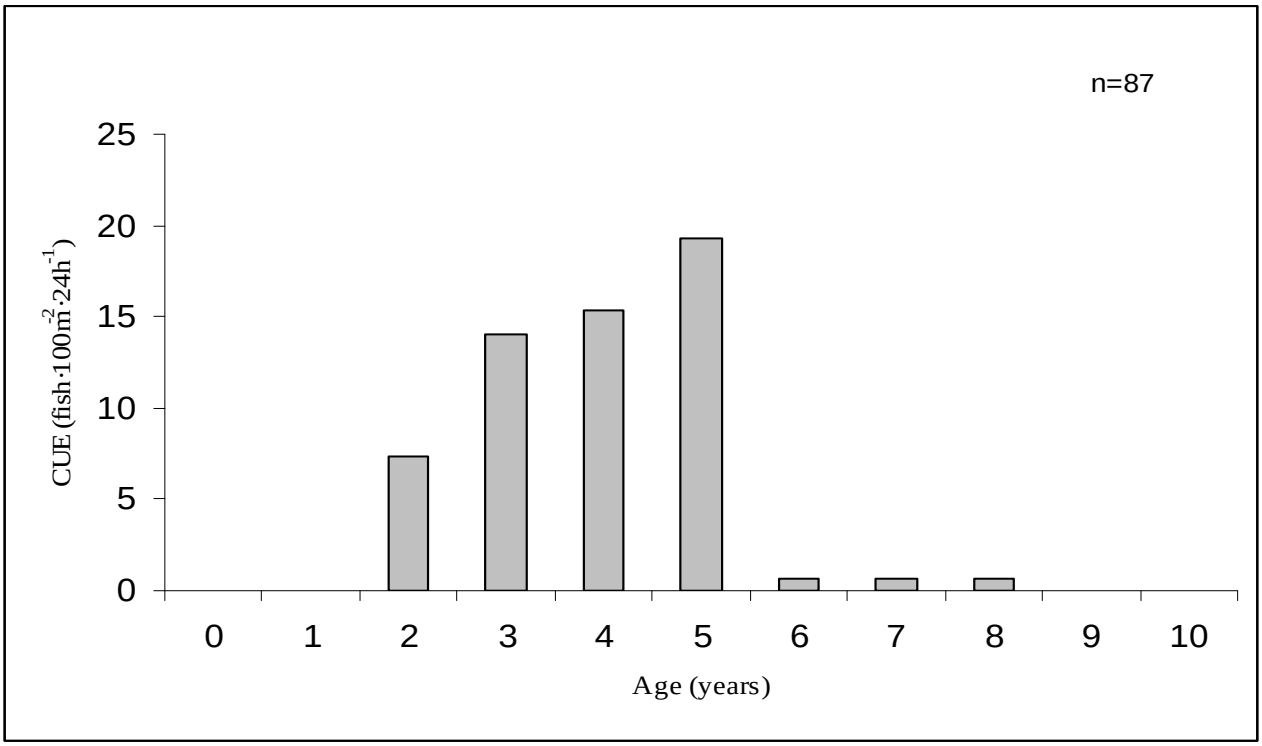


Figure 12. Age distribution of yellow perch as determined from fish sampled from index netting at Wadlin Lake, Alberta 2012 (n=87).

## *5.11 Yellow Perch Length-At-Age*

Length-at-age data for yellow perch is shown in Figure 13. No perch older than 8 years old were sampled, therefore total lengths were predicted for the analysis using =Linf*(1-EXP(-K*(age-to)) (Dwayne Latty, unpublished data, ASRD).

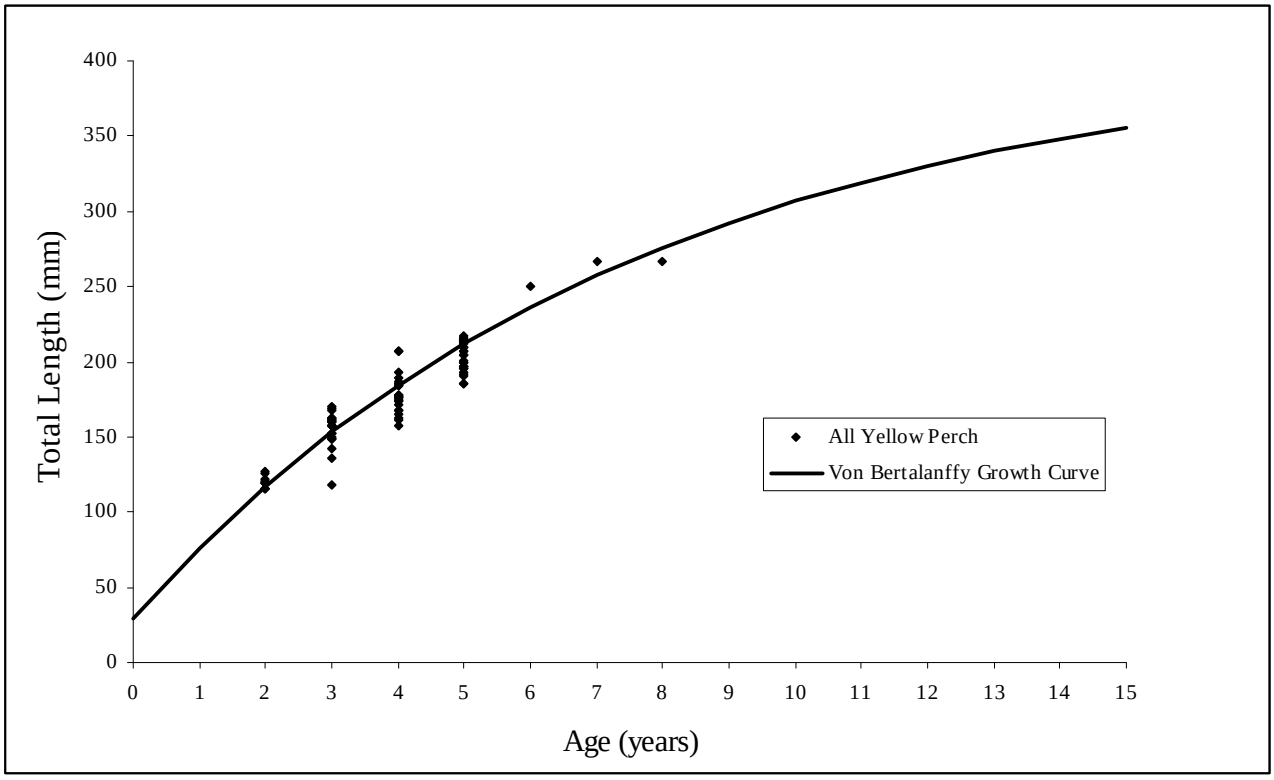


Figure 13. Length-at-age for yellow perch from Wadlin Lake FWIN 2012. Von Bertalanffy growth equation, (n = 87; K = 0.132, $L\infty$ = 407.83mm TL, $t_0$ = -0.565).

## 6.0 DISCUSSION

The walleye catch rate of 28.8 fish/100m²/24hrs for Wadlin Lake is one of the highest catch rates among walleye lakes in the province (provincial average of 17.1 fish/100m²/24hrs in FWIN surveys since 2001). The age class structure is composed of mostly younger fish (mean age 5) that have just started to mature. A few older female walleye from the 1990, 1991 and 1996 stocking are the main spawning cohort in Wadlin Lake. Good recruitment is evident, however there are major year–class failures in the 7 to 15 year olds. The reason for the absent year classes is currently unknown and requires further investigation, however, some of these year class 'failures' are likely a result of stocked female walleye not reaching maturity for 6 to 10 years after stocking. The fork length distribution for walleye appears to be truncated after 500 mm. With the sportfishing regulation for walleye on Wadlin Lake being 1 over 50 cm (total length), it is possible that angling may be impacting the walleye population and responsible for this truncation. There is no commercial fishery and an average of only 1 domestic licence issued per year from 1999 – 2009 for Wadlin Lake. Based upon Sullivan's (2003) criteria, the walleye population is considered vulnerable - collapsed. Based on this stocked walleye population only recently displaying evidence of self sustainability, a more suitable description of the population might be 'vulnerable with establishment of a naturalized population'.

The current regulation of 1 walleye over 500 mm TL limit is currently fully protecting mature male walleye but not fully protecting spawning female walleye. As per the Alberta Walleye Management and Recovery Plan, it is critical that when considering regulations, that mature walleye are given at least one to two years to spawn before being harvested. Current recruitment success is attributed to low angler effort and harvest in the past 6 years, which if changed could result in increased mature female mortality and negative impacts to recruitment.

The results of this study indicate that walleye recruitment has been good the last 5 years at Wadlin Lake. The study also reveals that male walleye were mature at age 4 while female maturity was uncertain due to low numbers (8) caught and the significant age class gap prior to 2005. It is critical that mature female walleye are not over exploited, to ensure that an adequate number are available for spawning each year.

The mean number of yellow perch caught per set was 58.0 fish/100m²/24hrs. A large majority (96%) of the perch caught were small (less than 210mm FL). They provide a good forage base for the walleye and pike populations. If there is an increase in the size of the perch, angler effort and harvest will likely increase. Currently there is a zero bag limit on the perch fishery.

Very low numbers of northern pike (10) were captured during this survey. This is indicative of a collapsed pike population in the lake; however, it is acknowledged that areas that were shallower than 2 meters were not sampled. The catch rate of less than 1 pike/24hrs/100m² makes it one of the lowest pike catch rates in Alberta. Currently there is a zero bag limit on the pike fishery.

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# 8.0 APPENDICES

Appendix A. Set locations (n = 12) at Wadlin Lake, 2012 Fall Walleye Index Netting. Coordinates in Universal Transverse Mercator (UTM) Zone 11.

| Set Number | FWIN Net Type | Depth Stratum (m) | UTM_X | UTM_Y |
|---|---|---|---|---|
| **1** | Full | 5-15 | 579927.74 | 6398616.37 |
| **2** | Full | 5-15 | 586188.64 | 6401291.76 |
| **3** | Full | 5-15 | 584428.08 | 6400545.33 |
| **4*** | Full | 5-15 | 581872.28 | 6399047.10 |
| **5*** | Half | 5-15 | 583647.96 | 6399886.19 |
| **6** | Half | 5-15 | 584964.55 | 6399838.61 |
| **7*** | Half | 5-15 | 582303.58 | 6400341.63 |
| **8** | Half | 5-15 | 584208.95 | 6400089.74 |
| **9*** | Half | 5-15 | 582823.61 | 6399727.76 |
| **10*** | Full | 2-5 | 585882.38 | 6400053.42 |
| **11** | Half | 2-5 | 582386.71 | 6400918.24 |
| **12*** | Full | 2-5 | 597076.94 | 6398477.60 |

* Modified net gangs (12 and 19mm mesh panels added)

Appendix B. Catch composition and number of fish species caught at Wadlin Lake, 2012 Fall Walleye Index Netting.

| | Species | | | | |
|---|---|---|---|---|---|
| **Mesh (mm)** | Walleye | Northern Pike | Lake Whitefish | Yellow Perch | Longnose Sucker |
| **12*** | - | - | - | 297 | - |
| **19*** | 6 | - | - | 37 | - |
| **25** | 35 | - | 7 | 162 | - |
| **38** | 11 | 3 | 27 | 413 | - |
| **51** | 55 | 1 | 44 | 137 | 1 |
| **63** | 94 | 2 | 94 | 25 | 1 |
| **76** | 76 | 4 | 138 | 2 | 2 |
| **102** | 49 | - | 160 | - | 3 |
| **127** | 28 | - | 75 | - | - |
| **152** | 24 | - | 14 | - | - |
| **Total**** | **372** | **10** | **559** | **1073** | **7** |

* Modified mesh panels

** Totals include all half FWIN counts converted to full FWIN counts

Appendix C. Catch Summary of Walleye at Wadlin Lake, 2012 Fall Walleye Index Netting.

| Set Number | Set Time | 25 | 38 | 51 | 63 | 76 | 102 | 127 | 152 | Total Catch | CUE/Net |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 25.33 | 2 | 7 | 11 | 25 | 19 | 7 | 5 | 5 | 81 | 69.9 |
| **2** | 22.58 | 1 | 1 | 3 | 4 | 8 | 7 | 3 | 2 | 29 | 28.1 |
| **3** | 22.42 | 2 | - | 1 | 4 | 4 | 1 | 1 | - | 13 | 12.7 |
| **4** | 25.33 | 2 | - | 1 | 5 | 6 | 3 | 2 | 1 | 20 | 17.3 |
| **5** | 22.67 | - | - | 4 | 12 | 2 | 2 | 2 | - | 22 | 21.2 |
| **6** | 23.08 | - | - | - | 2 | 2 | 4 | - | - | 8 | 7.6 |
| **7** | 22.42 | 2 | - | 4 | 8 | 10 | 2 | - | 2 | 28 | 27.3 |
| **8** | 22.58 | 2 | - | 6 | 2 | - | 4 | - | - | 14 | 13.6 |
| **9** | 22.58 | 24 | - | 10 | 18 | 10 | 12 | 6 | 4 | 84 | 81.3 |
| **10** | 22.58 | - | - | 4 | 1 | 5 | 3 | 4 | 4 | 21 | 20.3 |
| **11** | 22.50 | - | - | 6 | 6 | - | 2 | 2 | 2 | 18 | 17.5 |
| **12** | 25.00 | - | 3 | 5 | 7 | 10 | 2 | 3 | 4 | 34 | 29.7 |
| **Mean Catch/Net*** | - | 2.9 | 0.9 | 4.6 | 7.8 | 6.3 | 4.1 | 2.3 | 2.0 | 31 | - |
| **Mean Catch/Set** | - | | | | | | | | | | **28.9** |

* Half FWIN counts converted to full FWIN counts

Appendix D. Catch Summary of Yellow Perch at Wadlin Lake, 2012 Fall Walleye Index Netting.

| Set Number | Set Time | 25 | 38 | 51 | 63 | 76 | 102 | 127 | 152 | Total Catch | CUE/Net |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 25.33 | 10 | 25 | 9 | 1 | - | - | - | - | 45 | 38.8 |
| **2** | 22.58 | 5 | 19 | 3 | - | - | - | - | - | 27 | 26.1 |
| **3** | 22.42 | 4 | 11 | 6 | - | - | - | - | - | 21 | 20.5 |
| **4** | 25.33 | 24 | 45 | 14 | 3 | 2 | - | - | - | 88 | 75.9 |
| **5** | 22.67 | 12 | 48 | 20 | - | - | - | - | - | 80 | 77.1 |
| **6** | 23.08 | 8 | 72 | 20 | 6 | - | - | - | - | 106 | 100.4 |
| **7** | 22.42 | 12 | 38 | 16 | 2 | - | - | - | - | 68 | 66.3 |
| **8** | 22.58 | 6 | 14 | 4 | 2 | - | - | - | - | 26 | 25.2 |
| **9** | 22.58 | 58 | 72 | 14 | 4 | - | - | - | - | 148 | 143.3 |
| **10** | 22.58 | 2 | - | - | - | - | - | - | - | 2 | 1.9 |
| **11** | 22.50 | 14 | 48 | 18 | - | - | - | - | - | 80 | 77.7 |
| **12** | 25.00 | 7 | 21 | 13 | 7 | - | - | - | - | 48 | 42.0 |
| **Mean Catch/Net*** | - | 13.5 | 34.4 | 11.4 | 2.1 | 0.2 | - | - | - | - | - |
| **Mean Catch/Set** | - | - | - | - | - | - | - | - | - | **-** | **58.0** |

* Half FWIN counts converted to full FWIN counts

Appendix E. Catch Summary of Lake Whitefish at Wadlin Lake, 2012 Fall Walleye Index Netting.

| Set Number | Set Time | 25 | 38 | 51 | 63 | 76 | 102 | 127 | 152 | Total Catch | CUE/Net |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 25.33 | 1 | 4 | 5 | 4 | 10 | 20 | 1 | 1 | 46 | 39.7 |
| **2** | 22.58 | 2 | 7 | 7 | 6 | 3 | 5 | 4 | - | 34 | 32.9 |
| **3** | 22.42 | - | - | 3 | 9 | 12 | 13 | 3 | - | 40 | 39.0 |
| **4** | 25.33 | - | 1 | - | 2 | 8 | 9 | 3 | - | 23 | 19.8 |
| **5** | 22.67 | 2 | 2 | 12 | 12 | 18 | 20 | 6 | 4 | 76 | 73.3 |
| **6** | 23.08 | - | - | - | 12 | 14 | 6 | 4 | - | 36 | 34.1 |
| **7** | 22.42 | - | 2 | 8 | 12 | 10 | 16 | 18 | 4 | 70 | 68.2 |
| **8** | 22.58 | - | 2 | - | 2 | 6 | 8 | 6 | - | 24 | 23.2 |
| **9** | 22.58 | - | - | - | 4 | 12 | 6 | 6 | 4 | 32 | 31.0 |
| **10** | 22.58 | - | 3 | 4 | 6 | 10 | 11 | 5 | 1 | 40 | 38.7 |
| **11** | 22.50 | 2 | 2 | - | 10 | 18 | 14 | 8 | - | 54 | 52.5 |
| **12** | 25.00 | - | 4 | 5 | 15 | 17 | 32 | 11 | - | 84 | 73.4 |
| **Mean Catch/Net*** | - | 0.6 | 2.3 | 3.7 | 7.8 | 11.5 | 13.3 | 6.3 | 1.2 | | |
| **Mean Catch/Set** | - | | | | | | | | | | **43.8** |

* Half FWIN counts converted to full FWIN counts

Appendix F. Comparative catch rates of Walleye in Wadlin, 2012 Fall Walleye Index Netting to several Alberta lakes from 2001 to 2011 (Wadlin Lake, CUE = 28.8 fish/100m²/24hr; 95% CI = 18.0 – 42.0; provincial average 17.1 fish/100m²/24hr).