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Here for quick access is the Discussion and Results:

### **STANDARD LAKE SURVEY REPORT SPECIAL ASSESSMENT DATED 09/24/2013 FOR DOW NUMBER 31-0826-00**

#### **Discussion**

A special assessment was conducted on Sand Lake in September of 2013. This assessment consisted of 15 gill net sets. It should be noted that catch per unit comparisons to past summer netting may not be representative of population changes, as gill net catch rates typically display seasonal variation.

The purpose of the assessment was to collect data to determine a baseline walleye spawning stock density as part of an OTC marking study to evaluate stocked fry success. Secondary purposes of the assessment were to determine the baseline status of walleye in terms of age and size structures to provide data for a proposed walleye protected slot limit. Another secondary purpose was to determine the status of the northern pike population as part of an ongoing regulation evaluation. This was the first fall gill net assessment on Sand Lake.

#### **Results**

##### **Walleye**

Walleye were captured at a rate of 4.9 per gill net, resulting in a sample size of 73 fish. Sand Lake has a history of producing a walleye population dominated by small, young fish. Length indices in 2013 were similar to past assessments, as the proportional stock density (PSD) of walleye exceeding the quality length of 15 inches was 47. Relative stock density (RSD-17) of walleye exceeding 17 inches was 17 and RSD-20 was 6. Walleye length ranged from 8.9 to 22.6 and averaged 14.4 inches.

Walleye populations are often characterized by dominate year classes and irregular recruitment (Kelso and Bagenal, 1977; Kocovsky and Carline, 2001). Age and growth analysis from Sand Lake indicated nine year classes with inconsistent recruitment, as 57% of the sampled walleye belonged to the 2011 (37%) and 2010 (20%) year classes. Growth was similar to past assessments and near the statewide average, as walleye typically exceeded 15 inches by age 5. Walleye averaged 3.2 years of age.

Age of maturity is often variable in fish populations, and can be impacted by compensatory responses resulting from exploitation. Heavy exploitation often results in a shift in size at first maturation, with fish reaching maturity at a smaller size and age (Spangler et al, 1977; Muth and Wolfert, 1986; Gangl, 2001). Female walleye in Sand Lake were fully mature by 15 inches and males were mature by 14 inches. The size of maturity in Sand Lake was smaller than expected when compared to some other populations and suggests an exploited fishery.

Q\_abg modeling (Anderson 1998) was run for all walleye and separately for mature females to estimate female spawning stock density. Q\_abg modeling estimated a total walleye population of 29,120 walleye with a 95% confidence range of 17,575 to 41,680. Density was estimated at 6.7 walleye per acre (4.3 pounds per acre) with a 95% confidence range of 4.1 walleye (2.9 pounds) per acre to 9.6 walleye (6.1 pounds) per acre. Female spawning stock density was estimated at 0.9 pounds per acre with a 95% confidence range of 0.4 to 1.5 pounds per acre. Density, in terms of numbers of mature females, was very low, as two acres only produced one mature female walleye (density = 0.5 walleye per acre, 95% CI = 0.2-0.9 per acre). This represents a relatively low female spawning stock density compared to some other Minnesota lakes (MN DNR, unpublished).

The Sand Lake walleye population continues to be dominated by small, young walleye. Maturity schedule and low female spawning stock density suggests high angler exploitation. Natural reproduction has been documented in past assessments, indicating the potential for a self-sufficient population. Low numbers of

spawning adults may limit natural reproduction and subsequent recruitment, however. As such, Sand Lake has been managed using supplemental walleye stocking.

### **Northern pike**

Northern pike populations typically exhibit density dependent growth. Average size and growth rates are typically poor when northern pike occur at high densities (Pierce 2012). Northern pike in Sand Lake have occurred in high numbers and size structure has predictably been poor in past assessments. A special regulation was implemented in 2007 to improve the northern pike size structure. This regulation requires the immediate release of all pike from 22 to 36 inches, but allows nine legal-length fish to be in possession. The goals of this regulation are to improve northern pike size structure by improving gill net catch of pike > 22 inches to 2/net, increase the mean length to 20 inches with 25% of sampled pike exceeding 21 inches and 5% exceeding 28 inches.

Pike were captured at a rate of 6.4 per gill net in 2013. Size structure remained relatively poor, as PSD (21 inches) was 16 and RSD-P (28 inches) was 5. Northern pike length ranged from 9.3 to 33.8 inches and averaged 19.2 inches. Although the goals of the regulation were not met in 2013, it should be noted that PSD and RSD-P were the highest observed for the dataset.

Total mortality of northern pike often exceeds 50% and natural mortality rates are often high. Exploitation is typically size selective resulting in additive mortality for older, larger fish (Allen et al. 1998; Pierce 2012). Given relatively high exploitation and mortality, northern pike populations often show a preponderance of 2 to 5 year old fish, as few pike survive beyond age-7 (Griffiths et al, 2004; Becker 1982). Age and growth analysis from Sand Lake in 2013 identified 7 year classes with a preponderance of pike from age-1 to 5 and few pike exceeding age-7. Pike averaged 2.7 years of age. Growth was similar to past assessments and near the statewide average as pike exceeded 21 inches by age-5.

Becker (1982) reported that males reached maturity in 1-2 years (16-18 inches) while females matured in 2-3 years (20-22 inches). Pike from Sand Lake matured by age 1 (males) or 2 (females) and all pike exceeding 16 inches were mature, suggesting an early maturity schedule indicative of a high density, exploited fishery.

A lack of older, larger pike still limits the potential popularity of the pike fishery in Sand Lake. Improvements in the pike size structure may be difficult to attain given poor to average growth, consistent recruitment, early maturation, and apparently high adult mortality. ?

### **Black crappie**

Black crappie is an important management species in Sand Lake. Crappies were captured at a rate of 6.4 per gill net in 2013. Size structure was moderate, as crappie ranged from 4.3 to 11.1 inches. Black crappie populations often exhibit irregular recruitment resulting in dominate year classes, shifting age and size structures, and inconsistent angler success (Parsons et al. 2004). Recruitment appeared inconsistent in 2013, as only three year classes were present. Age-1 crappie were most common in the gill net (62%), followed by age-3 (23%). The oldest crappie sampled was age-4. The lack of crappie exceeding age-5 may indicate poor recruitment in the past, high mortality, and/or high angler exploitation. Growth rates from Sand Lake have generally exceeded the statewide average and remained good in 2013, as crappie generally exceeded 8 inches by age-4. Given the current size and age structure, good angling opportunities presently exist in Sand Lake.

### **Status Of The Fishery**

**The Sand Lake walleye population has a history of being dominated by young, small walleye. Age and size structure remained poor in 2013. Maturity schedule and low female spawning stock density suggests high angler exploitation. Natural reproduction has been documented in past assessments, indicating the potential for a self-sufficient population. Low numbers of spawning adults may limit natural reproduction and subsequent recruitment, however. As such, Sand Lake has been managed using supplemental walleye stocking.**

Sand Lake has a history of producing a high density northern pike population dominated by young, small pike. A special regulation was implemented in 2007 to improve the northern pike size structure. This regulation requires the immediate release of all pike from 22 to 36 inches, but allows nine legal-length fish to be in possession. Size structure remained poor in 2013, although length indices were the highest observed for the dataset, suggesting marginal improvements. A lack of older, larger pike still limits the potential popularity of the pike fishery in Sand Lake. Improvements in the pike size structure may be difficult to attain given poor to average growth, consistent recruitment, early maturation, and apparently high adult mortality.

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