

# SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F21-R-40

Name: Gardner Lake County(ies): Harding  
Legal description: T 19 N, R 4 E Sec. 10, 15, 22  
Location from nearest town: 3 miles west and 1 mile north of Buffalo, SD  
Dates of present survey: May 29-31, 2007  
Date last surveyed: May 27-28, 2006  
Most recent lake management plan: F21-R-36 Date: 2004  
Management classification: Warmwater permanent  
Contour mapped: Date 1985

Primary Species: (game and forage)

1. Walleye
2. Black crappie
3. Yellow perch
4. Channel Catfish
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_

Secondary and other species:

1. Black bullhead
2. Common carp
3. White sucker
4. River carpsucker
5. Spottail shiner
6. Fathead minnow
7. Largemouth bass
8. Northern pike

## PHYSICAL CHARACTERISTICS

Surface Area: 203 acres; Watershed: 13,340 acres  
Maximum depth: 10 feet; Mean depth: 7 feet  
Lake elevation at survey (from known benchmark): -3 feet

1. Describe ownership of lake and adjacent lakeshore property:

South Dakota Department of Game, Fish and Parks owns most of the land adjacent to Gardner Lake. However, three small lakeside portions are privately owned. Game, Fish and Parks has easements, including public access, on this land.

2. Describe watershed condition and percentages of land use:

The Gardner Lake watershed is approximately 21 square miles and consists primarily of private land used for livestock grazing and limited farming. The watershed has been experiencing drought conditions over the past several years.

3. Describe aquatic vegetative condition:

Due to extremely turbid water no vegetation was observed in Gardner during the 2007 survey.

4. Describe pollution problems:

No pollution problems were identified by departmental personnel during the 2007 survey.

5. Describe condition of all structures, i.e. spillway, level regulators, boat ramps, etc.:

In 1987-88 extensive reconstruction of the dam and spillway occurred. Since the reconstruction, problems with the spillway have been identified and are currently under consideration for repair.

## **BIOLOGICAL DATA**

### **Methods**

A lake survey was conducted on Gardner Lake, May 29-31, 2007. Sampling consisted of 2 gill net nights and 7 trap net nights (Appendix C). All gill nets were monofilament experimental nets. Each net was 45.7-m (150-ft) long and 1.8-m (6-ft) deep with six 7.6-m (25-ft) panels of bar mesh sizes: 12.7-mm (0.5-in), 19.1-mm (0.75-in), 25.4-mm (1.0-in), 31.8-mm (1.25-in), 38.1-mm (1.5-in), and 50.8-mm (2.0-in). All trap nets were modified fyke-nets with a 1.3-X 1.5-m frame, 19.1-mm (0.75-inch) mesh and a 1.2- X 23-m (3.9- X 75.5-ft) lead. Collected fish were measured for total length (TL; mm), fish were weighed in grams. In addition, scale samples for the first five fish per centimeter group were collected from selected fish per gear type for age and growth analysis. Scale samples were pressed onto acetate slides and viewed with a microfiche projector (40X) and the distance between scale annuli were recorded on paper strips. All data was entered into WinFin 2.95 (Francis 1999).

Fish population parameters, confidence intervals and standard errors were computed using WinFin Analysis (Francis 2000). Parameters calculated were catch-per-unit-effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr) based on length categories. Abundance was expressed as the mean catch-per-unit-effort (CPUE; mean number per net night or mean number per hour of electrofishing). Population structural characteristics were expressed as length frequency histograms and stock density indices (PSD and RSD-P). Fish condition was expressed as mean Wr.

## Results and Discussion

### *Fish Community Survey*

Overall, six species of fish were collected during the 2007 lake survey (Tables 1 and 2). Thirty two fish were collected by frame nets with channel catfish (31.3%) and yellow perch (25.0%) being the most numerous (Table 1). Thirty fish were collected out of the two gillnets with walleye (80%) being most abundant (Table 2). Population parameters of dominant game and forage species in Gardner Lake are discussed individually below.

**Table 1.** Total catch (N), catch per net night (CPUE; 80% CI's in parentheses), catch per net night of stock-length fish (CPUE-S; 80%CI's), proportional stock densities (PSD, RSD-P; 90% CI's in parentheses) for all fish species collected from eight, ¾ inch frame nets in Gardner Lake, Harding County, May 29-31, 2007.

| Species         | N  | CPUE     | CPUE-S   | PSD      | RSD-P    | Wr>S        |
|-----------------|----|----------|----------|----------|----------|-------------|
| Channel catfish | 10 | 2.1(0.8) | 2.1(0.8) | 50 (31)  | 0 (--)   | 84.3 (1.9)  |
| Common carp     | 4  | 0.5(0.5) | 0.1(0.2) | 100 (--) | 0 (--)   | --          |
| Northern pike   | 3  | 0.4(0.4) | 0.4(0.4) | 100 (--) | 0 (--)   | 107.9 (2.2) |
| Walleye         | 3  | 0.4(0.4) | 0.4(0.4) | 100 (--) | 0 (--)   | 100.4 (1.5) |
| White sucker    | 4  | 0.5(0.4) | 0.5(0.4) | 100 (--) | 100 (--) | 73.1 (8.5)  |
| Yellow perch    | 8  | 1.0(0.6) | 0.5(0.4) | 50 (50)  | 50 (50)  | 95.2 (9.1)  |
| <b>Total</b>    | 32 |          |          |          |          |             |

**Table 2.** Total catch (N), catch per net night (CPUE; 80% CI's in parentheses), catch per net night of stock-length fish (CPUE-S; 80%CI's), proportional stock densities (PSD, RSD-P; 90% CI's in parentheses) for all fish species collected from two 150-ft experimental sinking gill nets in Gardner Lake, Harding County, May 29-31, 2007.

| Species         | N  | CPUE      | CPUE-S    | PSD     | RSD-P  | Wr>S         |
|-----------------|----|-----------|-----------|---------|--------|--------------|
| Channel catfish | 3  | 1.5 (4.6) | 1.5 (4.6) | 67 (--) | 0 (--) | 101.4 (12.2) |
| Walleye         | 24 | 12 (9.2)  | 10 (12.3) | 75 (17) | 0 (--) | 105.9 (1.8)  |
| Yellow perch    | 3  | 1.5 (4.6) | 1.0 (3.1) | 50 (50) | 0 (--) | 98.4 (14.5)  |
| <b>Total</b>    | 30 |           |           |         |        |              |

### **Black crappie**

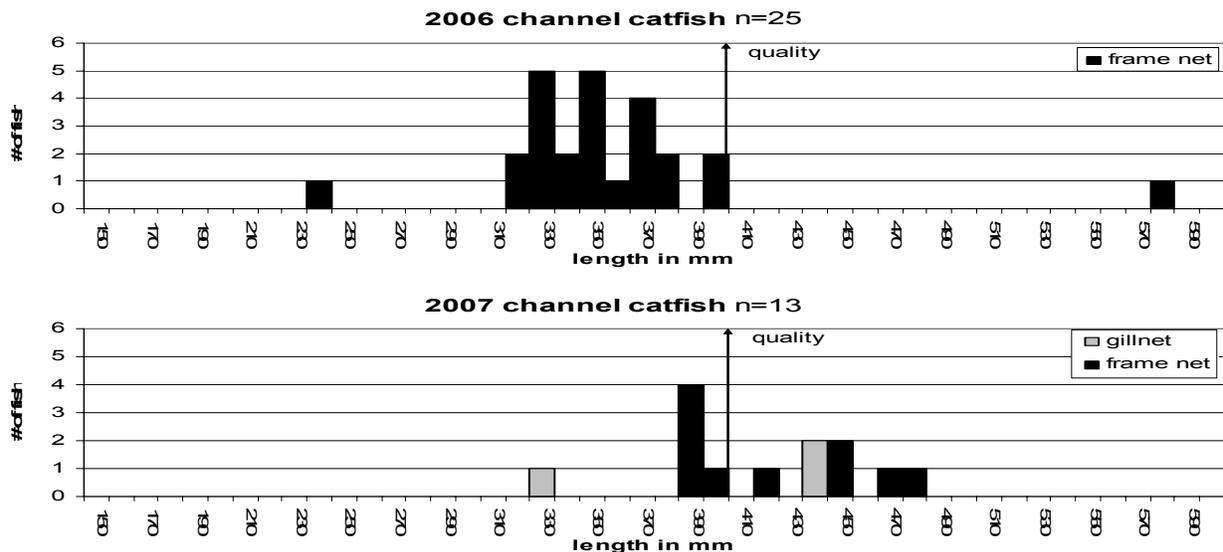
Current black crappie management objectives are to increase the black crappie trap-net CPUE between 10 and 50, and maintain PSD between 50 and 80. No crappies were sampled during the 2007 survey. Recent winterkills have taken their toll on the black crappie population. In addition, consecutive years of low water levels may be suppressing crappie numbers because of the lack of spawning habitat and nursery areas for the crappie. After seeing the results of this survey, 660 juvenile crappies were stocked in June to re-establish crappie into Gardner Lake.

**Table 3.** Composite listing of sample size (N), catch per unit effort (CPUE; standard error is given in parentheses), mean total length (TL; standard error is given in parentheses), and proportional stock densities (PSD, RSD; 90% confidence intervals are given in parentheses) for black crappie collected by frame nets in Gardner Lake, 1994-2007.

| Year | N   | CPUE      | PSD     | RSD-P   |
|------|-----|-----------|---------|---------|
| 1994 | 0   | 0         | --      | --      |
| 1996 | 253 | 31.2      | 95      | 45      |
| 1999 | 593 | 74.1      | 98 (1)  | 0 (--)  |
| 2003 | 67  | 8.4 (1.6) | 77 (10) | 8 (6)   |
| 2004 | 50  | 6.3 (3.2) | 88 (8)  | 28 (11) |
| 2006 | 2   | 0.3 (0.3) | --      | --      |
| 2007 | 0   | 0         | --      | --      |

### Channel Catfish

Current catfish management objective is to maintain a channel catfish fishery with a minimum gill-net CPUE for stock-length catfish of 10 and a PSD range of 30-60. This survey our gillnet CPUE was 1.5 with a frame net CPUE of 2.1 (Table 1& 2). The numbers show we have a ways to go to achieve our objectives. Stocking adult channel catfish should continue when sources are available. It may be time to look at catfish spawning structures to increase reproduction potential.



**Figure 1.** Length frequency of channel catfish in Gardner Lake, 2006-2007..

## **Common carp**

Frame net catch per effort was 2.0 with a gill net CPUE of 0.5 (Tables 1 and 2). In 2004, no carp were sampled in the two gillnets, and three were caught in the frame nets. Efforts should be made to keep predator densities high to keep rough fish in control.

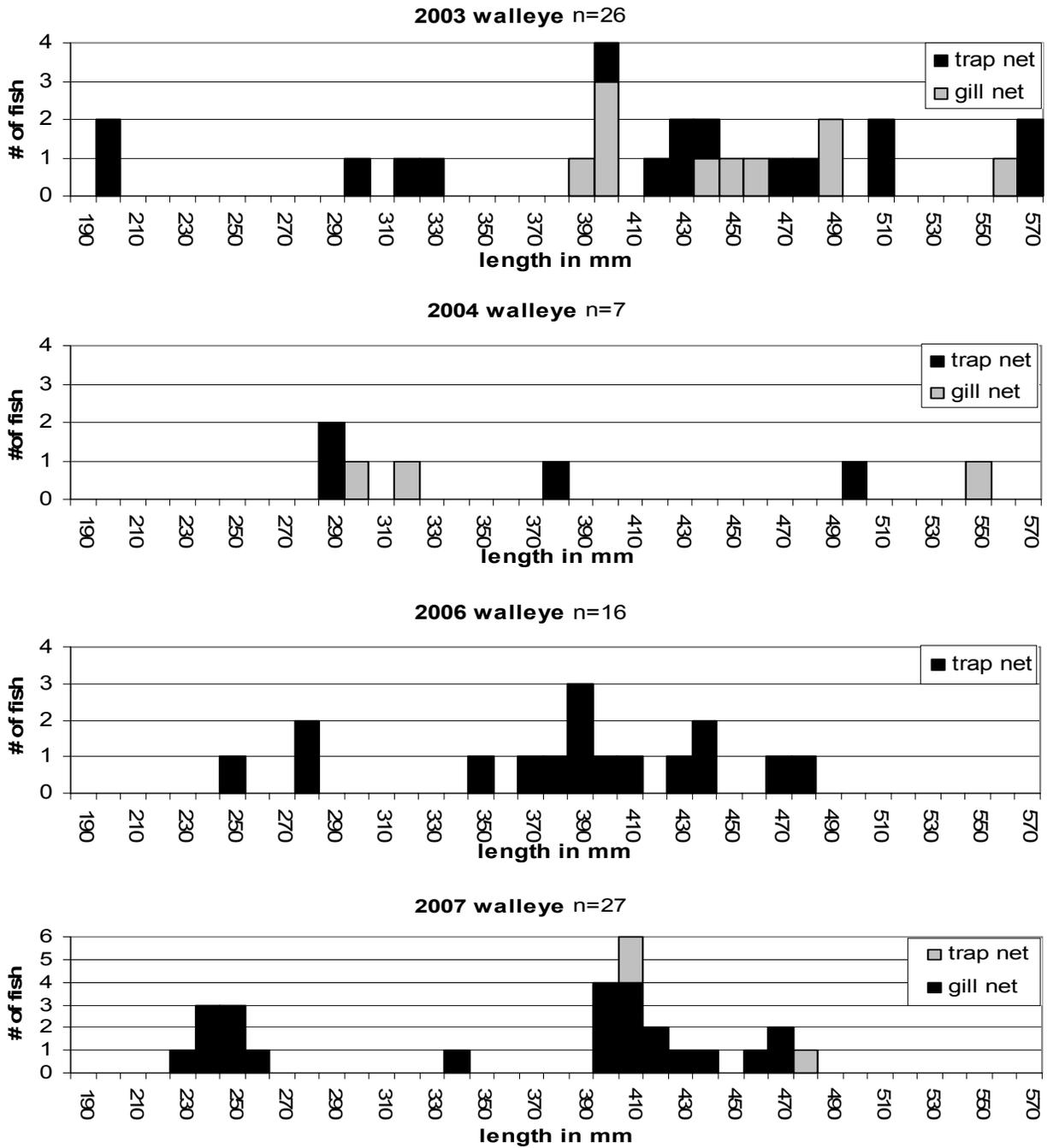
## **Northern Pike**

The pike population in Gardner remains stable with a frame net CPUE of 1.3 compared to 2.9 in 2004. Five of the eight pike were over 530 mm. No small pike were observed probably due to lack of spawning habitat caused by low water.

## **Walleye**

The current management objective for walleye in Gardner Lake is to maintain a walleye fishery with a minimum gill-net CPUE for stock-length walleye of 10, a PSD range of 30-60, RSD-P of 10 or greater, and a growth rate of 35.5 cm at age-3. Right now Gardner is pretty close to meeting those objectives. It appears recent stockings are increasing walleye density. In 2006, gill net CPUE was 0.5 and frame net CPUE was 2.7. This year our gill net CPUE was 12.0, while our frame net CPUE was 0.4 (Table 2).

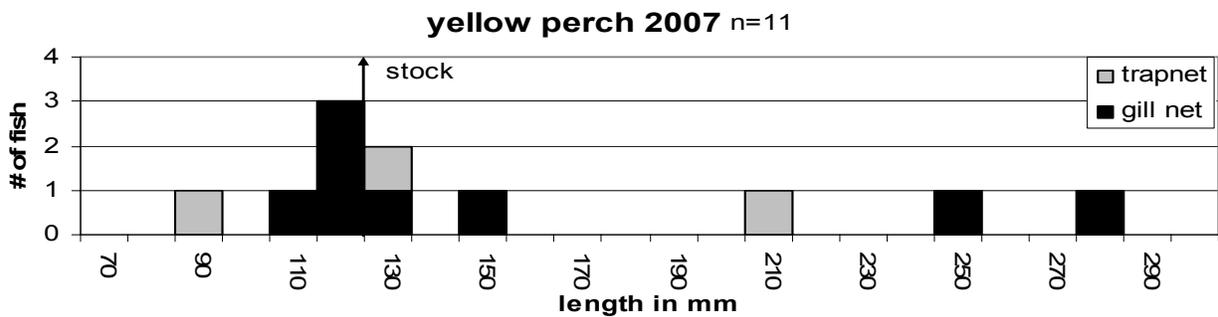
Growth, condition and size structure also appear to be increasing. PSD for the 24 fish gill net sample was 75. Fish condition was excellent with a  $W_r$  for stock length and larger fish of 105.9. Growth was excellent for a small lake with fish reaching around 14 inches at age 3 (Table 4). Fifty thousand small fingerlings were stocked in June of 2007. Large fall fingerlings were stocked in 2004 and again in 2006 to supplement the existing population and provide more consistent walleye fishing. In addition, prespawn yellow perch were stocked in 2005 along with 100 Christmas trees, in hopes of establishing a perch fishery and a forage base. A few recruits were seen in the 2007 survey (Figure 3).



**Figure 2.** Length frequencies of walleye collected by gill nets and frame nets in Gardner Lake, 2003-2007.

**Table 4.** Gardner Lake walleye year class, age in 2007, sample size (N), mean back-calculated total length-at-age, population standard error (SE), the Region 1 and South Dakota walleye mean length-at-ages (Willis et al. 2001).

| Year<br>Class      | Age | N         | Age             |                 |                 |                 |                 |                |  |
|--------------------|-----|-----------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|--|
|                    |     |           | 1               | 2               | 3               | 4               | 5               | 6              |  |
| 2006               | 1   | 8         | 218             |                 |                 |                 |                 |                |  |
| 2005               | 2   | 1         | 139             | 308             |                 |                 |                 |                |  |
| 2004               | 3   | 11        | 145             | 256             | 394             |                 |                 |                |  |
| 2002               | 5   | 3         | 124             | 220             | 288             | 357             | 450             |                |  |
| 2001               | 6   | 1         | 163             | 293             | 371             | 413             | 430             | 453            |  |
| <b>Sample Size</b> |     | <b>24</b> | <b>158 (16)</b> | <b>269 (20)</b> | <b>351 (32)</b> | <b>385 (28)</b> | <b>440 (10)</b> | <b>453 (0)</b> |  |
| Region 1 Mean      |     |           | 164 (17)        | 260 (22)        | 332 (27)        | 385 (32)        | 444 (42)        |                |  |
| Statewide Mean     |     |           | 168 (3)         | 279 (6)         | 360 (7)         | 425 (8)         | 490 (9)         |                |  |



**Figure 3.** Length frequencies of yellow perch collected by gill nets and frame nets in Gardner Lake, 2007.

#### LITERATURE CITED

- Francis, J. 1999. Winfin, Version 2.95; Microsoft Access Program for data entry. Nebraska Game and Parks Commission, Lincoln.
- Francis, J. 2000. WinFin Analysis Program. Version 1.5. Nebraska Game and Parks Commission, Lincoln.
- Willis, D.W., D.A. Isermann, M.J. Hubers, B.A. Johnson, W.H. Miller, T.R. St. Sauver, J.S. Sorenson, E.G. Unkenholz, and G.A. Wickstrom. 2001. Growth of South Dakota Fishes

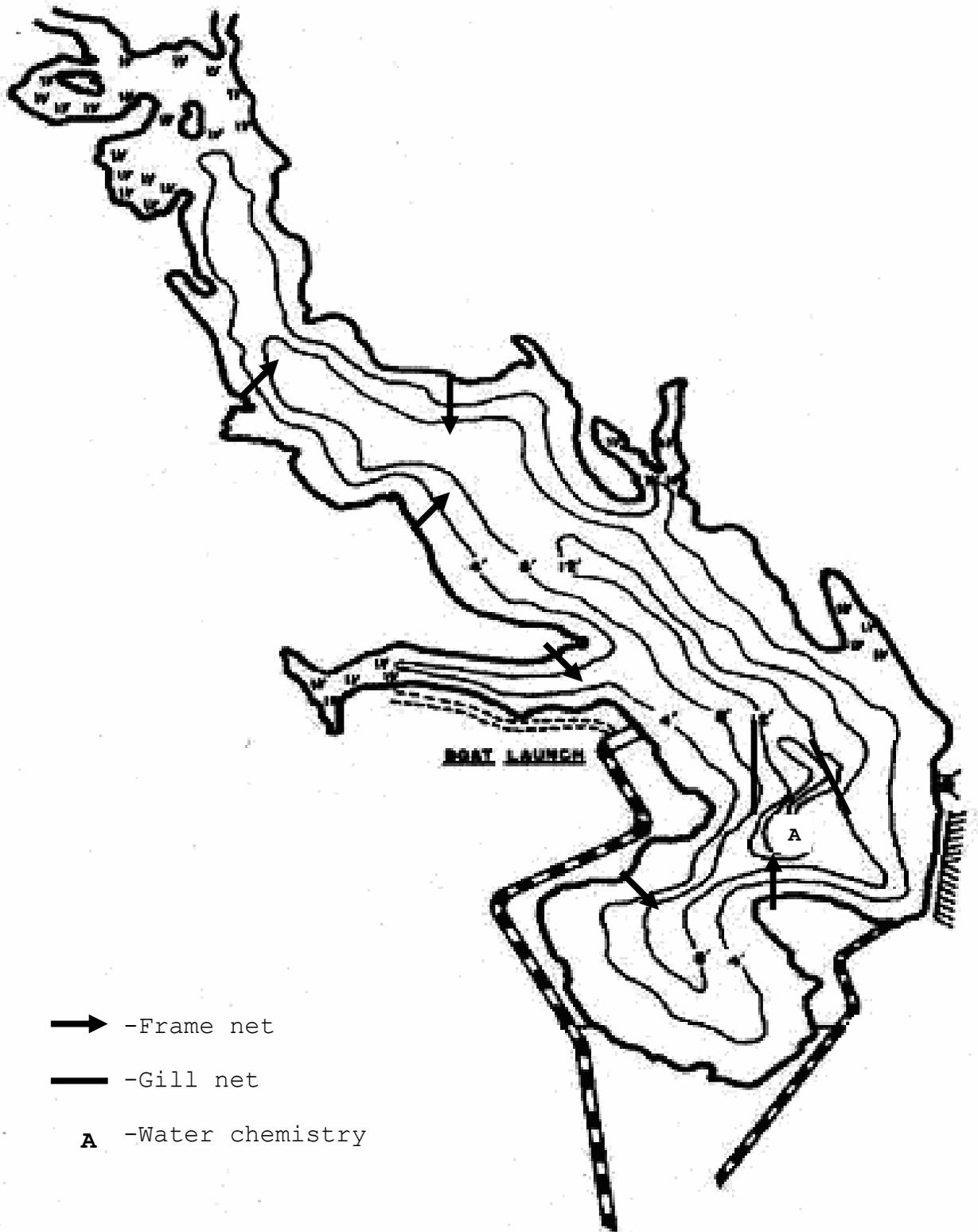
## RECOMMENDATIONS

1. Stock Gardner with large fall walleye fingerlings at a rate of 20 per acre every other year. This should increase predator abundance which should help keep control of carp numbers, as well as help improve angler catch rates.
2. If water conditions allow, stock prespawn yellow perch and black crappie to help provide a better panfish fishery and increase walleye forage. Add Christmas tree structures to provide spawning habitat.
3. Stock channel catfish when available and look into putting in channel catfish spawning structures.

## APPENDICES

**Appendix A.** Stocking record for Gardner Lake, Harding County, 1991-2007.

| Year | Number | Species         | Size             |
|------|--------|-----------------|------------------|
| 1991 | 20,000 | Largemouth bass | Fingerling       |
| 1996 | 280    | Black crappie   | Adult            |
|      | 151    | Channel catfish | Adult            |
| 1997 | 800    | Black crappie   | Adult            |
|      | 60     | Channel catfish | Adult            |
| 1998 | 107    | Channel catfish | Adult            |
| 2003 | 310    | Channel catfish | Adults           |
| 2004 | 5,759  | Walleye         | Large fingerling |
|      | 912    | Channel catfish | Adults           |
| 2005 | 368    | Yellow perch    | Adult            |
| 2006 | 1,000  | Largemouth bass | Fingerling       |
|      | 800    | Walleye         | Large fingerling |
| 2007 | 660    | Black crappie   | Adult            |
|      | 50,000 | Walleye         | Fingerling       |



- -Frame net
- -Gill net
- A -Water chemistry

Appendix C. Map of Gardner Lake net locations and water chemistry.