

State of California
The Resources Agency
Department of Fish and Game

New Hogan Reservoir General Fish Survey
Spring 2012

By

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North Central Region

Introduction

In an effort to the fishery of New Hogan Reservoir (New Hogan), a general fish survey was conducted on May 16, 2012. This data along with future efforts will be used to monitor the status of this fishery.

Location

New Hogan is owned and operated by the United States Army Corps (U.S.A.C) and is located approximately 30 miles northeast of the city of Stockton and 62 miles southeast of Sacramento (Figure 1). New Hogan sits at an elevation of approximately 554 ft. above sea level in the western foothills of the Sierra Nevada. At maximum pool the lake occupies 4,410 surface acres and has 317,000 acre-feet of water storage. New Hogan was first filled in 1965 and now supports a significant warmwater fishery including bluegill (BG) (*Lepomis macrochirus*), green sunfish (GSF) (*Lepomis cyanellus*), largemouth bass (LMB) (*Micropterus salmoides*), smallmouth bass (SMB) (*Micropterus dolomieu*), spotted bass (SPB) (*Micropterus punctulatus*), channel catfish (CCF) (*Ictalurus punctatus*), redear sunfish (RE) (*Lepomis microlophus*), and pumpkinseed (PSD) (*Lepomis gibbosus*). New Hogan also supports a native fishery including prickly sculpin (PSC) (*Cottus asper*) and sacramento pikeminnow (SPM) (*Ptychocheilus lucius*). New Hogan also produces a temperate and coldwater fishery including striped bass (SB) *Morone saxatilis*, and a small wild rainbow trout (RBT) (*Oncorhynchus mykiss*) fishery.

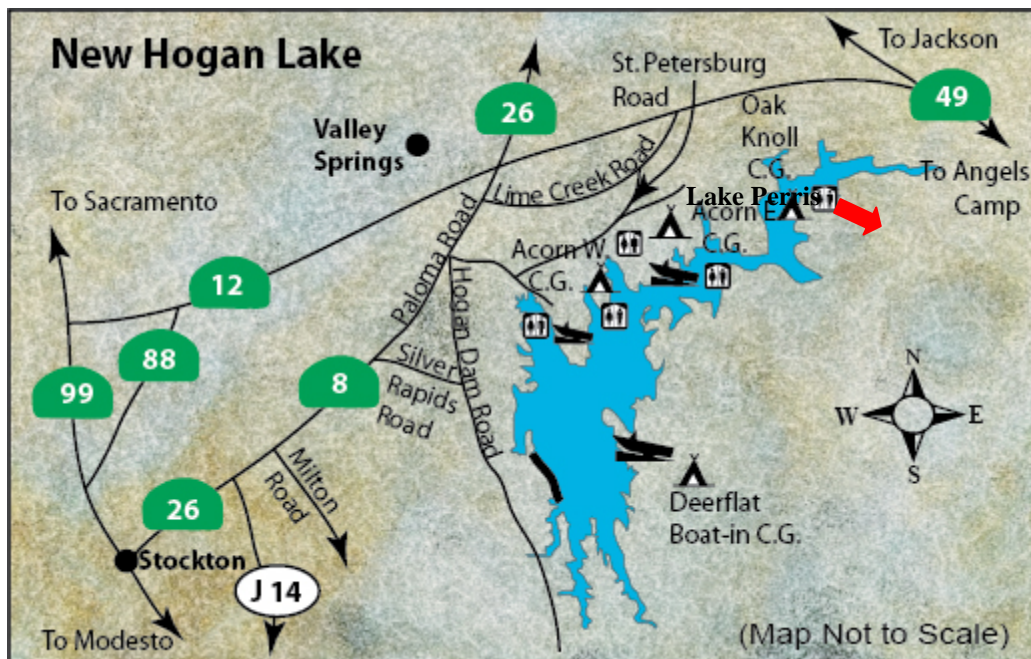


Figure 1. Map of New Hogan Reservoir in relation to Stockton and Sacramento.

Methods and Materials

Eight selected sites (Figure 2) were sampled for approximately 600 electrofishing seconds (10 minutes) each using an 18 ft. Smith-Root electrofishing boat. All sites were sampled approximately between the hours of 18:00 – 23:30. Pulsed DC current (8-12 amps) was used to “stun” the fish. This survey was completed and data analyzed using methods described in the Lake Perris General Fish Survey, October, 2008 (Ewing 2008).

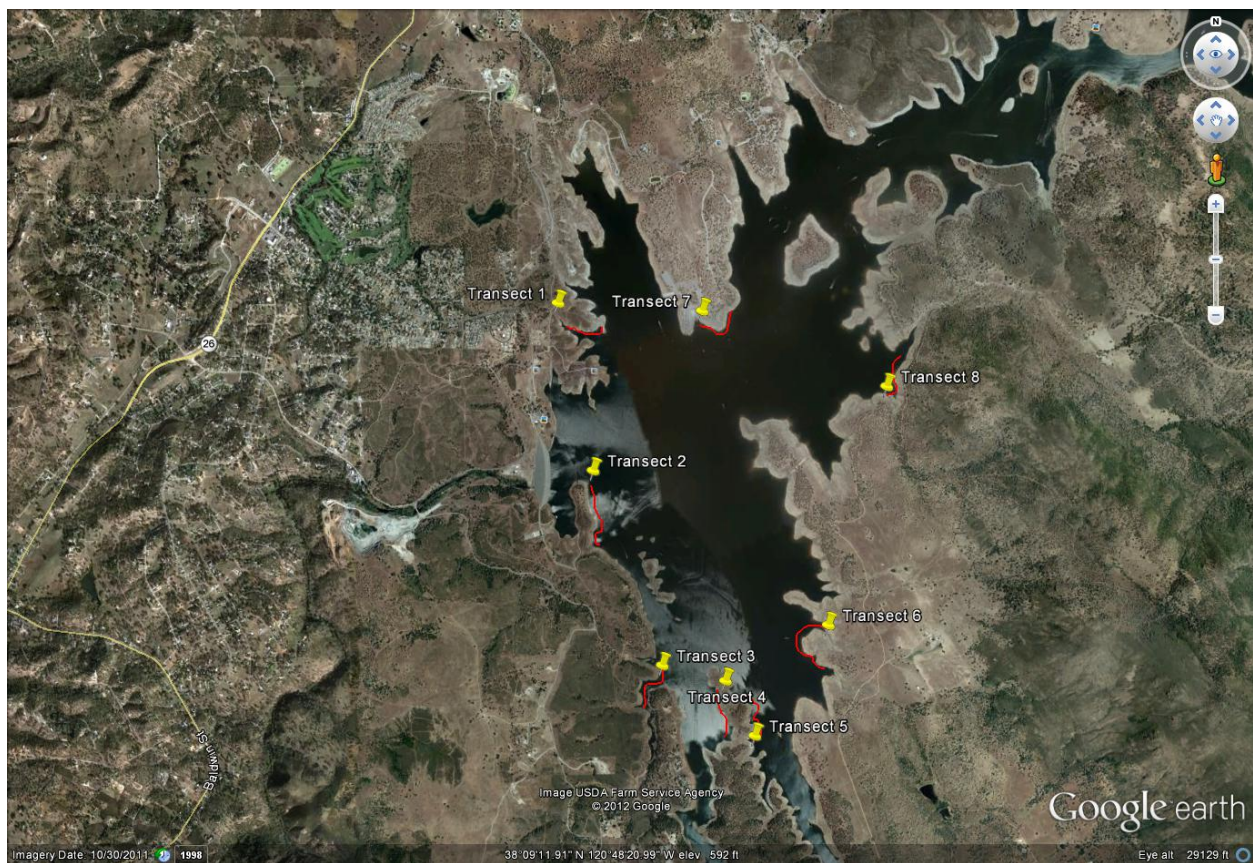


Figure 2. Electrofishing transect location for the New Hogan Reservoir general fish survey May 16, 2012.

Data Analysis

The mean length and weight for each species was determined and an analysis of population indices were evaluated for selected species. Of primary concern will be indices for the largemouth bass, and bluegill populations. These indices include catch per unit of effort (CPUE) weight-length relationships, Relative Weight (W_r), and proportional stock density (PSD)

(Anderson, R.O. and R.M. Neumann 1996).

In this spring survey there was a minimum total length of a specie measured in order to calculate a known weight. Murphy and Willis (1996) emphasize that small fish should not be included if accuracy is low. Various minimum standards found in Murphy and Willis (1996) will be used for the species collected during the survey. The relative weight index ranges for determining the condition of selected species are: 110 and above as excellent, 90-110 as good, 70-89 as average, and 69 and below as poor.

Results and Discussion

Table 1 summarizes the species composition, mean total length and weight, length ranges and relative weights. A total of 817 fish representing eleven species were collected during the survey (Table 1). Bluegill comprised 56.5 percent of the total fish sampled. Green sunfish and LMB followed with 17.7 and 14.7 percent each. Smallmouth bass and spotted bass finished with 4.0 and 3.2 percent of the total catch. Striped bass (SB) *Morone saxatilis* and channel catfish both comprised 1.1% of the total catch. Redear sunfish, prickly sculpin, sacramento pikeminnow, and pumpkinseed all represented less than one percent of the total catch. The total CPUE for this survey effort was 10.14 fish/min.

Table 1. Species composition from New Hogan Reservoir, May 16, 2012.

Mean Total Length (TL) was measured in millimeters (mm). Average Weight was in grams (g)

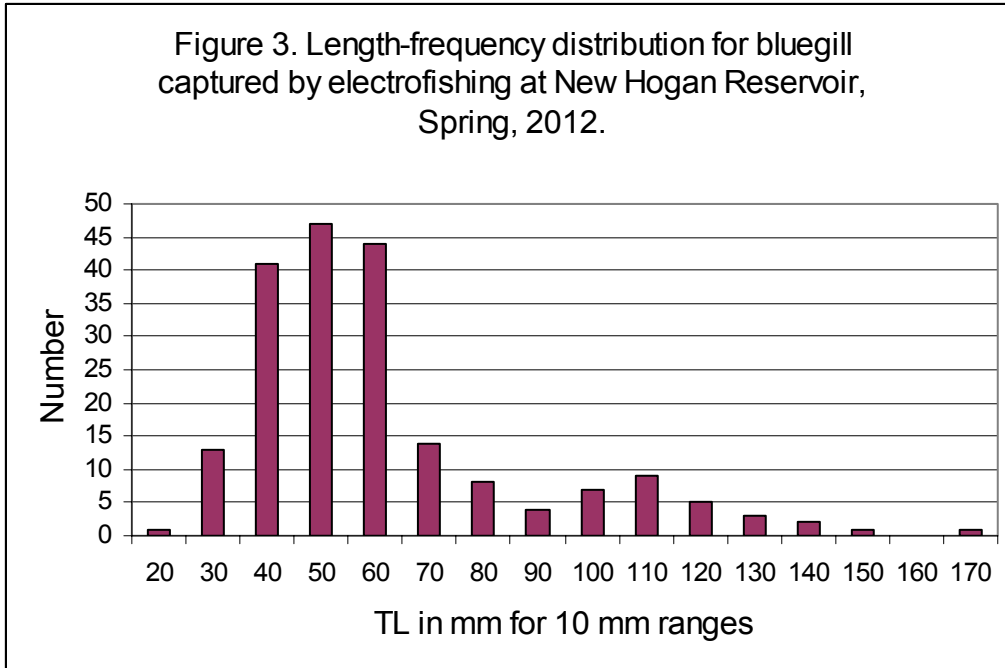
	Species	Number	Percent	CPUE	(TL)	Weight	Length Ranges	Mean Relative Weight (Wr)
1	Bluegill	462	56.5%	5.73	64.6	28.2	24 - 170	105
2	Green sunfish	145	17.7%	1.80	79.6	20.3	45 - 156	101
3	Largemouth bass	120	14.7%	1.49	249.1	347.1	80 - 515	86
4	Smallmouth bass	33	4.0%	0.41	198.5	162.6	91 - 305	NA
5	Spotted bass	26	3.2%	0.32	180.3	176.6	65 - 349	NA
6	Striped bass	9	1.1%	0.11	234.1	129.6	222 - 255	NA

7	Channel catfish	9	1.1%	0.11	431.6	1341	NA	NA
8	Redear sunfish	6	0.7%	0.07	226.8	306.7	156 - 315	NA
9	Prickly sculpin	5	0.6%	0.06	46.0	NA	31 - 65	NA
10	Sacramento pikeminnow	1	0.1%	0.01	89.0	NA	NA	NA
11	Pumpkinseed	1	0.1%	0.01	155.0	107.0	NA	NA
Total		817						
Generator minutes:		80.6						
CPUE (Fish/ gen. min)		10.14						
Water Temperature		70° F						

* Average weight for black bass and CCF was calculated for any black bass or CCF equal to or greater than 150 mm total length and 80 mm or greater for sunfish.

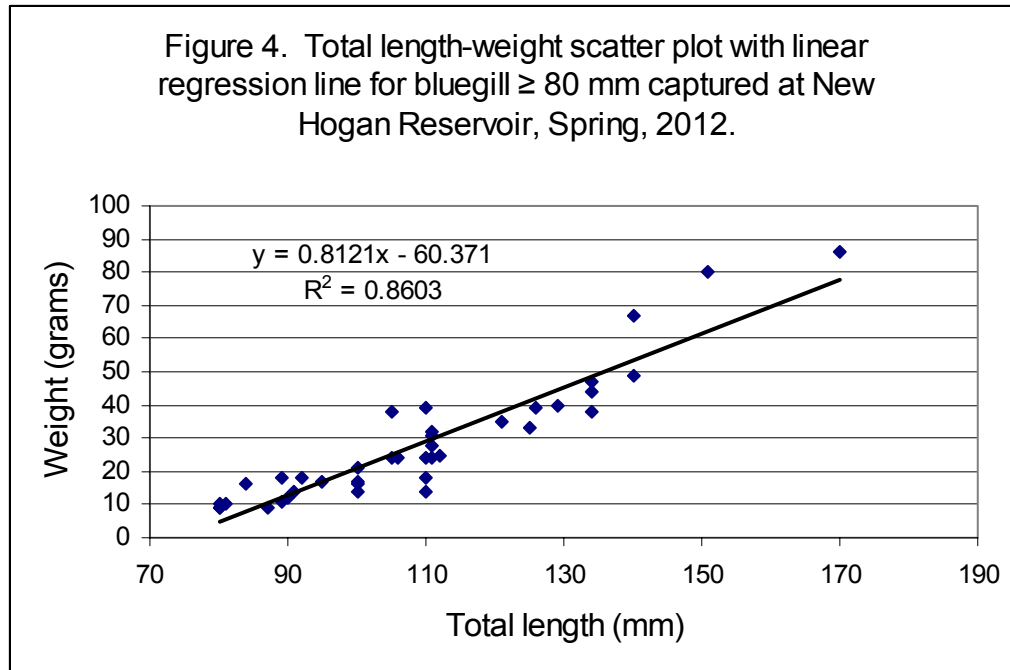
Bluegill

Bluegill captured and measured ranged from 24 - 170 mm (0.9 and 6.7inches) (Table 1). This indicates the BG range from young of the year to five plus years of age at the time of sampling (Moyle 2002). The length class with greatest frequency was the 50 mm class (2.0 in.) (Figure 3). These fish are likely one year of age (Moyle 2002). Figure 3 indicates there was not a lot of quality size fish collected. It is possible two to three years ago that there was a poor spawn, larger bluegill were occupying greater depths, and/or survival was down. The mean total length for bluegill was 64.6 mm (2.5 inches) which when combined to the length frequency data suggests that the majority of bluegill in New Hogan are less than quality size. The number of BG collected compared to other species combined with the small sizes might also suggest a stunted population.



The PSD for BG was five. This falls into the unbalanced population range according to the range index of BG (Anderson 1985).

The mean relative weight (Table 1) for BG based on the intercept and slope parameters determined by Hillman (1982) was 105. This indicates the BG population was in good condition. The high W_r value could be attributed to the great amount of forage food in New Hogan. Using the linear regression equation present in Figure 4, a reliable estimated weight can be determined for BG 80 mm (3.1 in.) and greater in total length. It is not recommended to collect a weight under 80 mm for BG due to the fact that a small weight miscalculation can inhibit gathering a reliable R^2 value as well as W_r value (Gablehouse 1984a). These estimates are considered reliable due to the high R^2 (coefficient of determination) for this equation.

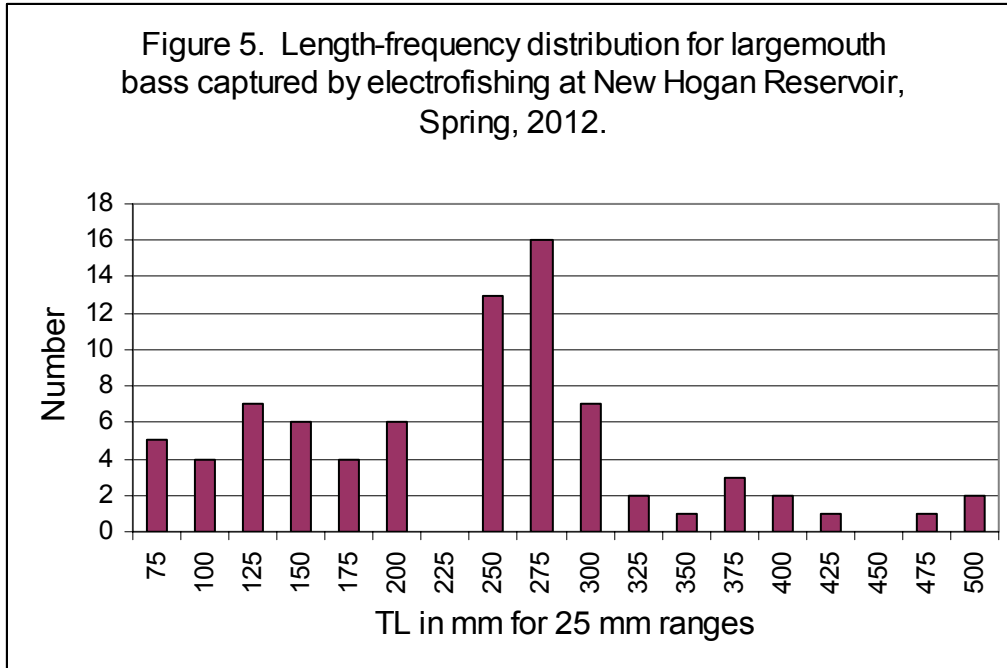


Largemouth bass

LMB total length ranged from 80 mm (3.1 in.) to 515 mm (20.3 in.) (Table 1). The LMB length frequency distribution is presented in Figure 5. The length class with the highest frequency was the 275 mm (10.8 in.) class. These fish are likely three to four years of age (Moyle 2002). There was not any young of the year LMB collected which suggests a poor spawning year.

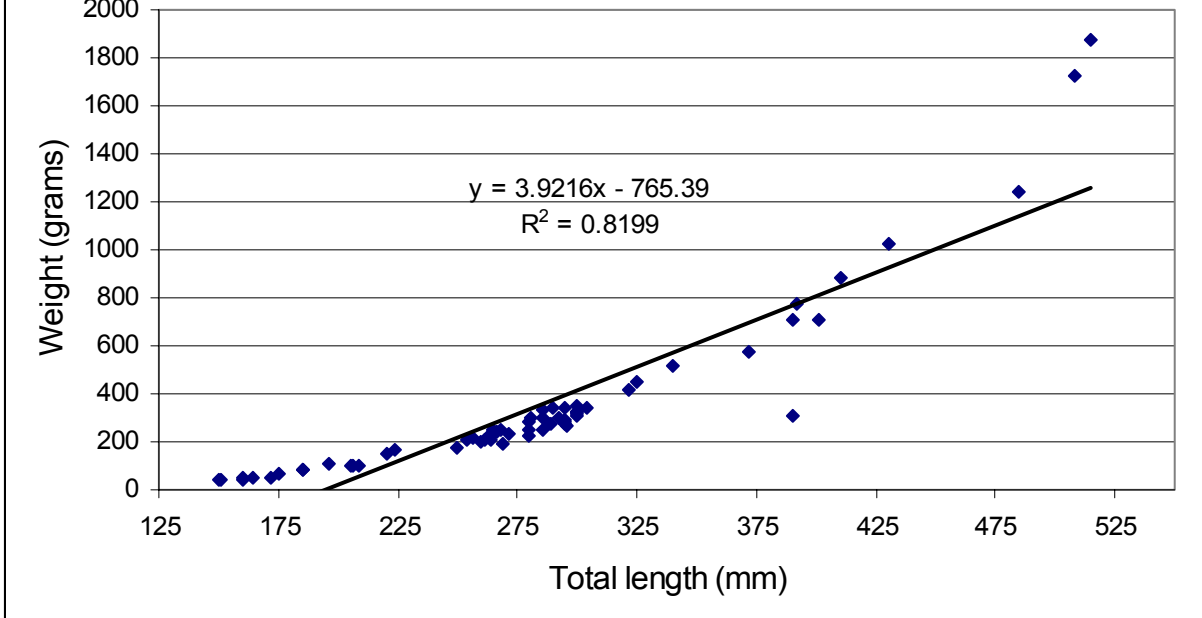
No PSD for LMB was calculated due to the small sample size of stock size and greater fish collected.

Figure 5. Length-frequency distribution for largemouth bass captured by electrofishing at New Hogan Reservoir, Spring, 2012.



LMB had a mean relative weight of 86 using the intercept and slope parameters determined by Gablehouse (1984a) (Table 1) which indicates the LMB collected were in average condition as this value is proximal to 100. The amount of forage fish such as the various sunfish present in the lake have allowed the LMB to remain healthy. Using the linear regression equation present in Figure 6, a reliable estimated weight can be determined from the length of a LMB 150 mm (5.9 in.) and greater in total length. It is not recommended to collect a weight under 150 mm for LMB due to the fact that a small weight miscalculation can inhibit gathering a reliable R^2 value as well as W_r value (Wege and Anderson 1978). These estimates are considered reliable due to the high R^2 (coefficient of determination) for this equation.

Figure 6. Total length - weight scatter plot with linear regression line for largemouth bass ≥ 150 mm captured at New Hogan Reservoir, Spring, 2012.



Green sunfish

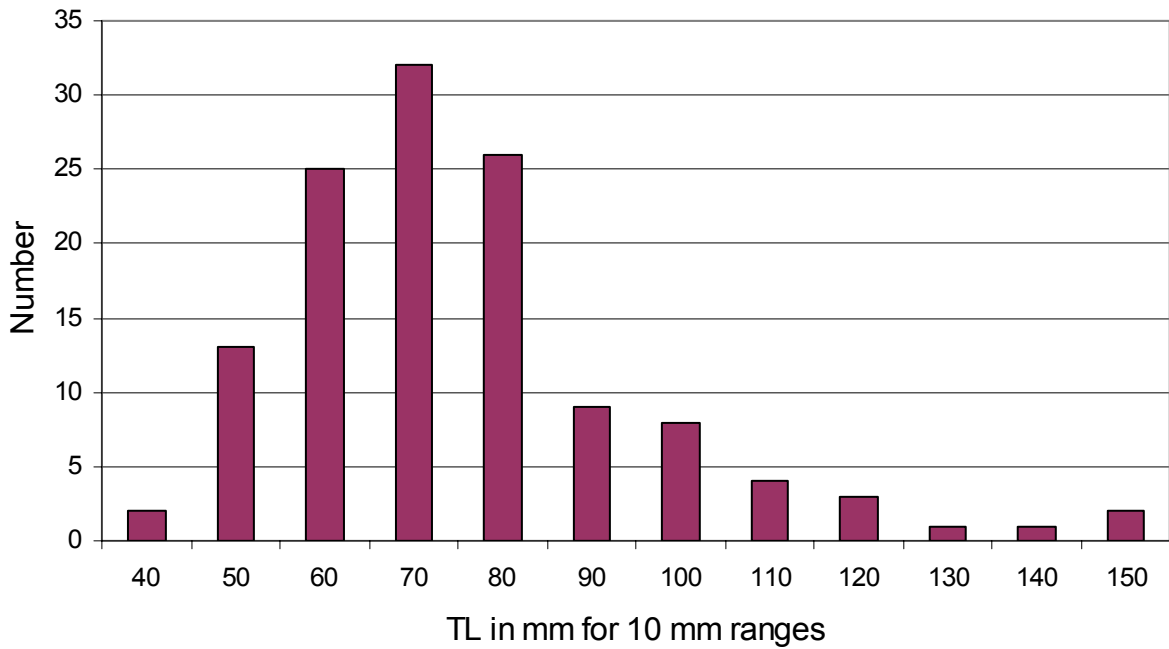
One hundred forty five GSF were collected ranging from 45 - 156 mm (1.8 to 6.1 inches) (Table 1). Length range data shows the GSF sampled are in the young of the year to three plus year age classes (Moyle 2002). The majority of GSF measured were in the 60 – 80 mm (2.4 – 3.1 inches) length ranges (Figure 7). These fish are most likely one year of age (Moyle 2002).

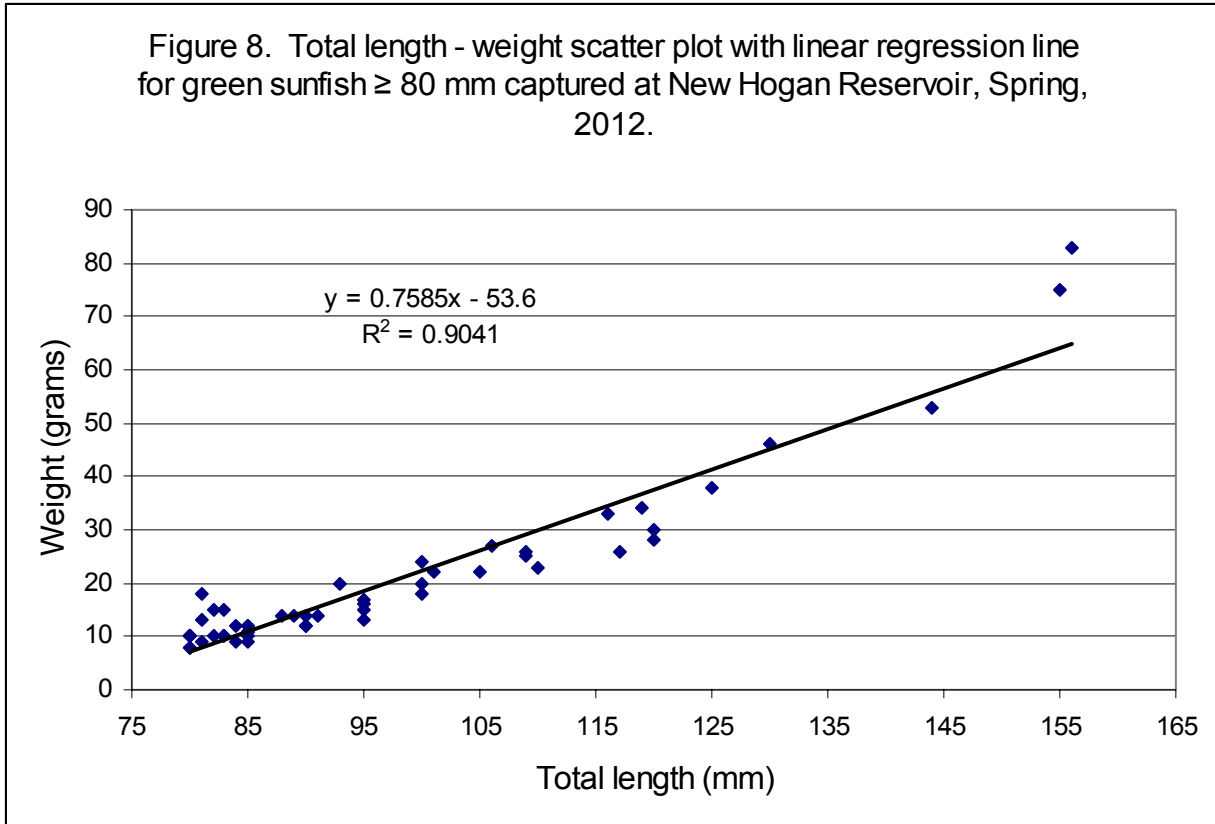
The PSD for GSF was four. Since GSF have a similar body shape to bluegills we used the bluegill PSD index reported by Gablehouse (1984) to determine if the population was in balance. Using these values, the GSF population appears to be out of balance for PSD with very few quality size fish measured.

Average W_r for GSF was 101 using the intercept and slope parameters determined by Bister et. al (2000) (Table 1). This value indicates the GSF at New Hogan are in good condition.

Using the linear regression equation present in Figure 8, a reliable estimated weight can be determined from the length of a GSF 80 mm (3.1 in.) and greater in total length.

Figure 7. Length-frequency distribution for green sunfish captured by electrofishing at New Hogan Reservoir, Spring, 2012.





Smallmouth bass

Thirty – three SMB were collected ranging from 91 - 305 mm (3.6 to 12.0 inches) (Table 1). Length range data shows the SMB sampled are in the one to three plus year age classes (Moyle 2002). There was a fairly even distribution in size classes (Figure 9). The small number of SMB collected makes drawing any solid conclusions from the length-frequency difficult unreliable. Future surveys to compare to this spring’s survey could help the Department of Fish and Game (Department) get a better understanding of how the different age classes are doing in New Hogan.

No PSD or W_r for SMB was calculated due to the small sample size of fish greater than 150 mm, stock size, and greater fish collected.

Using the linear regression equation present in Figure 10, a reliable estimated weight can be determined from the length of a SMB 150 mm (5.9 in.) and greater in total length.

Figure 9. Length-frequency distribution for smallmouth bass captured by electrofishing at New Hogan Reservoir, Spring, 2012.

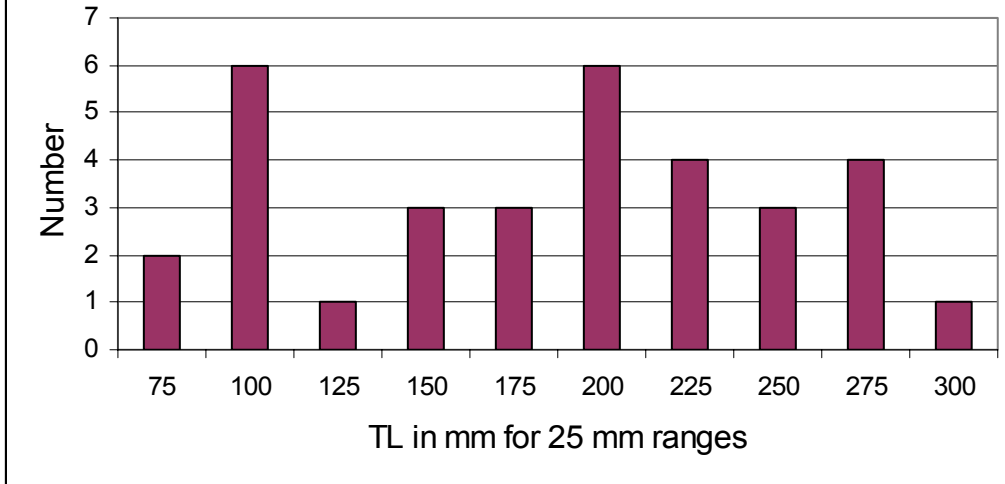
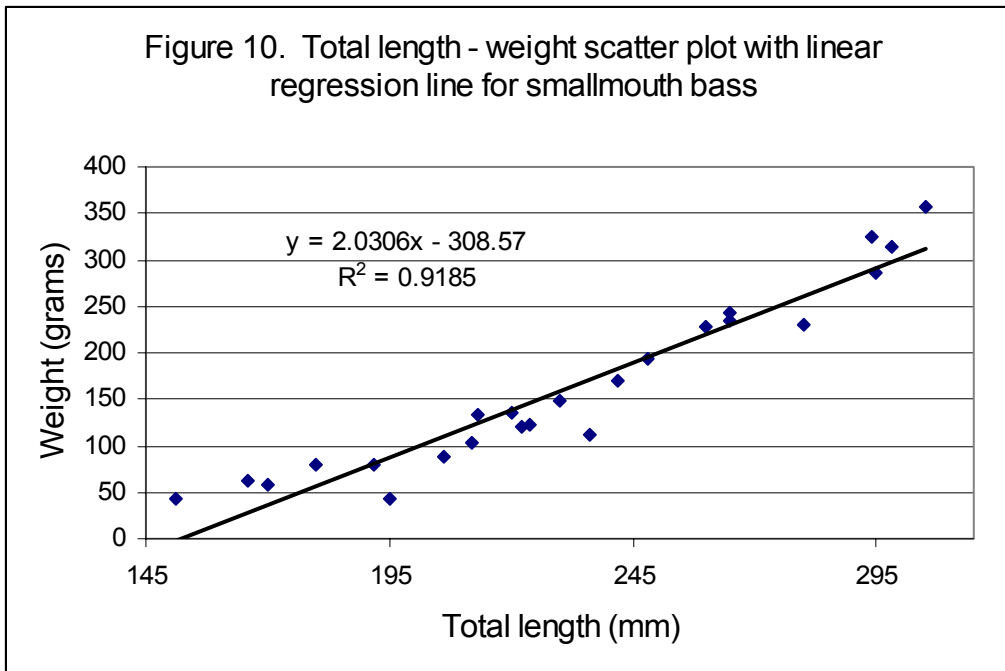


Figure 10. Total length - weight scatter plot with linear regression line for smallmouth bass

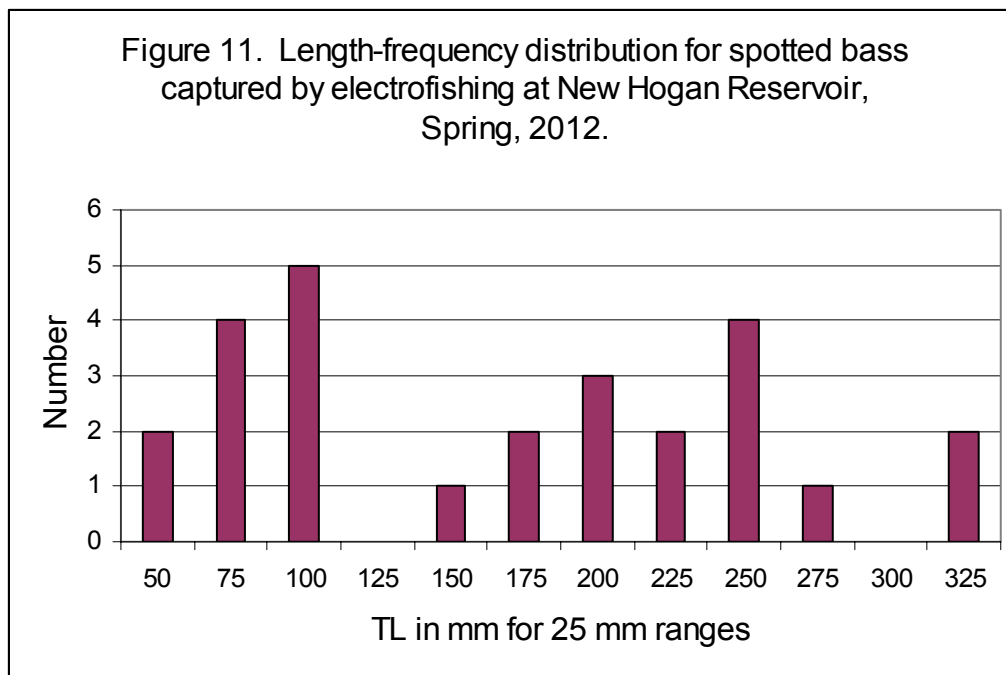


Spotted bass

Twenty - six SPB were collected ranging from 65 - 349 mm (2.6 to 13.7 inches) (Table 1). Length range data shows the SPB sampled are young of the year to three plus years of age (Moyle 2002). There was a fairly even distribution in size classes (Figure 9). The small number

of SMB collected makes drawing any solid conclusions from the length-frequency difficult unreliable. Future surveys to compare to this spring's survey could help the Department of Fish and Game (Department) get a better understanding of how the different age classes are doing in New Hogan. Like SMB, there was a fairly even distribution in size classes (Figure 11) but the small number of SPB collected makes drawing any solid conclusions from the length-frequency difficult unreliable. Future surveys to compare to this spring's survey could help the Department of Fish and Game (Department) get a better understanding of how the different age classes are doing in New Hogan.

No PSD, W_r , or length-weight correlation figure was calculated for SPB due to the small sample size of fish greater than 150 mm, stock size, and greater fish collected.



Conclusions

Due to the lack of suitable sample sizes for the other species collected during the survey, no summaries were made since it would be unreliable. Bluegill numbers seem to be doing well but the larger size classes seem to be lacking which could be due to high surface water temperatures. A fall survey as well as a spring 2013 survey can help determine the survivorship of these fish in this vulnerable age when they are prone to being predated on. It looks as though there is a healthy population of black bass in New Hogan. It is possible with the surface temperature of 70° F at the time of the survey that the SMB and SPB were occupying cooler,

greater depths. New Hogan also is home to a substantial striped bass population. Though we only sampled a handful of SB, they visually looked healthy with noticeable fat reserves. Being able to sample only a few SB is not out of the ordinary since SB generally occupy greater depths than the electrofisher can target. New Hogan Reservoir has a good diversity of species inhabiting the reservoir. Due to the large amount of shoreline that was sampled that was very flat with no structure or plants, it is likely a significant number of fish were at greater depths. Future spring surveys at New Hogan will be conducted during a timeframe that is suitable for capturing all life stages present in the reservoir.

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