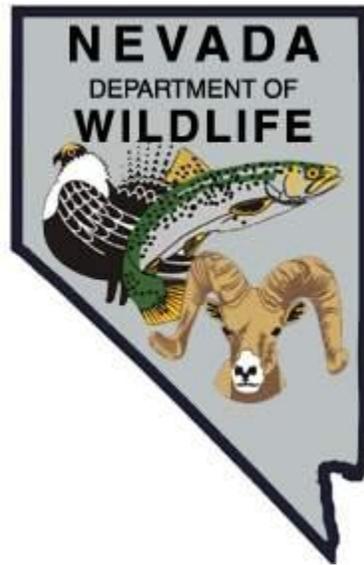


NEVADA DEPARTMENT OF WILDLIFE
STATEWIDE FISHERIES MANAGEMENT



FEDERAL AID JOB PROGRESS REPORTS

F-20-49
2013

RUBY LAKE NWR AND COLLECTION DITCH
EASTERN REGION



**NEVADA DEPARTMENT OF WILDLIFE, FISHERIES DIVISION
ANNUAL JOB PROGRESS REPORT**

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**NEVADA DEPARTMENT OF WILDLIFE, FISHERIES DIVISION
ANNUAL JOB PROJECT REPORT**

State: *Nevada*
Project Title: *Statewide Fisheries Program*
Job Title: *Ruby Lake NWR and Collection Ditch*
Period Covered: *January 1, 2013 through December 31, 2013*

SUMMARY

Ruby Lake National Wildlife Refuge (NWR) is separated into the Collection Ditch and the marsh area, which includes the dike units, South Lake, and the South Springs.

There were 42,778 trout stocked at Ruby Lake NWR in 2013. This included 3 different rainbow trout strains and 19,500 excess fingerling brown trout.

Between June and August, eight creel survey visits were made to Ruby Lake, with an additional five voluntary, angler drop-box questionnaires being received. Creel survey efforts contacted 126 anglers who put forth 566.5 hrs of angling effort to catch 973 fish, resulting in catch rates of 1.7 fish per hour and 7.7 fish per angler, which is slightly lower than 2012 success rates. Of the 5 received questionnaires, 4 were used for analysis, resulting in 5 anglers catching 89 fish in 31 hrs of fishing effort. Catch rates were 17.8 fish per angler and 2.9 fish per hour.

Due to windy spring conditions and low water, only one thermograph was put in place at the south lake main boat ramp. The bass nesting temperature was reached on June 2, and with a short cold snap shortly after, it was expected that the initial nesting attempt was successful. The bass fry survey was not conducted due to low water, but agency personnel and anglers observed bass fry, which suggests some level of breeding success in 2013.

Due to low water levels and weedy conditions, only two transects were completed for the South Lake electroshocking survey. The two transects produced 217 largemouth bass and 5 trout in 1,441 electroshocking seconds, resulting in a capture rate of 554.6 fish per electroshocking hour. Body condition ratings for the 88 measured bass averaged 4.94 for a rating of good.

The 2012-2013 winterkill was considered very low for fish populations in the South Lake, with dissolved oxygen (DO) levels taken at the main boat landing from December to February indicating adequate levels for fish survival. The dike units were a different story, with low water levels and minimal water flow creating critically low DO levels in the units, particularly units 14 and 20. A spring winterkill survey of these units produced several fish mortalities.

BACKGROUND

Ruby Lake (Ruby Lake National Wildlife Refuge) is a major warmwater fishery in northeastern Nevada, while also providing an excellent coldwater fishery during the cooler months of the year. It lies at an elevation of 6,000 feet and contains over 9,000 acres of lakes, ponds, and waterways that are intermixed with islands, bulrush stands, and manmade dikes. The slow growth rates of the largemouth bass are due to a short growing season and a limited food source, combined with fluctuating water conditions that require close monitoring of this fishery. The yearly fluctuation in water levels, reproductive success, fish health, and angler use, requires a thorough understanding of the fishery to allow for adequate management decisions. Working with the Refuge and their management needs is also required to reduce the impacts on the fish population and distribution, as well as the extent of angler use.

In January of 2007, it was found that quagga mussels might have been transported to Ruby Lake via hatchery-stocked fish from Lake Mead Hatchery. Quagga mussel monitoring, which includes artificial substrates, veliger plankton tows, and tactile surveys, was started in the summer of 2007 and will continue at varying levels of intensity.

OBJECTIVES and APPROACHES

Objective: General Sport Fisheries Management

Approaches:

- Conduct a pre-stocking evaluation of water quality/quantity.
- Conduct a general fisheries assessment through opportunistic angler contacts.
- Maintain and check for returns of volunteer, angler drop-box surveys during the course of other duties.
- Conduct a single nighttime electroshocking survey at three established transects during summer.
- Monitor water temperature during early spring and late fall with two thermographs within the Dike Units and South Lake to assess sport fish spawning activity.
- Visually assess overwinter fish mortality after spring ice breakup.
- Monitor dissolved oxygen levels once a month throughout the ice period.
- Salvage largemouth bass from closed or drained ponds/areas as needed and stock in suitable waters of the Ruby Lake NWR.
- Conduct bass ball surveys in early summer in the North Dike Unit 20.
- Sample for occurrence of quagga mussel veligers through plankton net tows conducted two to four times between June and September at up to three sites. Conduct visual and tactile surveys of artificial and natural solid substrates in conjunction with veliger sampling.

PROCEDURES

Angler assessment at Ruby Lake was scheduled at periodic intervals to include weekdays, three weekend days, and boat openers in an effort to sample anglers uniformly throughout the largemouth bass fishing season. Anglers contacted were questioned as to their residence, number of anglers in their party, hours fished, target species, total fish harvested, and fish released. Harvested fish were recorded by species and fork length, total length, and weight measured. Any clipped fins or tags were noted.

Recording thermographs were placed at predetermined locations shortly after spring ice breakup and pulled prior to winter ice-up. The timeframe for thermographs was expanded to incorporate monitoring of the quagga mussel spawning season. Thermographs were placed in Unit 20 and the South Lake.

The electroshocking survey was accomplished using the electroshocking barge at two predetermined transects in the South Lake. The fixed probes were used for the anode and the barge served as the cathode. All fish were netted and held in the live well until the completion of a transect. The fish were then measured, weighed, and released.

Water chemistry data included measurements of dissolved oxygen, temperature, ice thickness, snow depth on ice, current weather conditions, and water flow. Sites in the North Dike units were checked at water control structures along the dike system and the South Lake was checked near the main boat landing. These sites were sampled at regular intervals throughout the winter, ice-up period.

The South Lake winterkill survey was accomplished from a boat with a one or two-man crew. Preferred conditions included calm and clear weather, which provided for maximum visibility in the water. Areas that have experienced winterkill in the past were checked closely, as well as a shoreline survey throughout portions of the South Lake complex. The North Dikes were periodically checked along the roadway borrow ditch. In units that revealed low dissolved oxygen and/or low water levels during the ice up period, an in-depth search was done from a canoe.

Black bass fry surveys were conducted in Unit 20 using a two-man crew in a canoe. The transect was located in Unit 20 and started at the weed line just south of the S-turn on long dike and continued north to the culvert leading to Unit 14. Observations of both shorelines along the borrow area were made from the canoe. Largemouth bass fry balls were identified and categorized based on their size, small (50 to 250 fish), medium (250 to 500 fish), and large (over 500 fish).

FINDINGS

Stocking

There were 42,778 trout stocked at Ruby Lake NWR in 2013. This included 3 different rainbow trout strains and 19,500 excess fingerling brown trout. A summary of trout stocking can be seen in Table 1.

Table 1. Ruby Lake NWR Trout Stocking Summary.

	RB	TT	BN	
South Lake	12,240		19,500	
Collection Ditch	6,707			
South Springs	1,422			
Unit 21	1,702			
Unit 10	1,207			
	23,278	0	19,500	42,778

Angler Contacts

Between June and August, 8 creel visits were made to Ruby Lake, resulting in the contacting of 126 anglers that put forth 566.5 hrs of angling effort to catch 973 fish. This effort produced angler success rates of 1.7 fish per hour and 7.7 fish per angler. A total of 97 largemouth bass anglers (77.0%) expended 446 hrs of angling effort to harvest 124 bass and release an additional 762 bass, resulting in total catch rates of 9.2 bass per angler and 2.0 bass per hour. Twenty-nine trout anglers (23.0%) put forth 120.5 hrs of angling effort to harvest 10 trout and release an additional 74 trout. Success rates for these trout anglers were 2.9 trout per angler and 0.2 trout per hour.

The average length of largemouth bass harvested from the South Lake was 11.1 in (280.7 mm), which is the management target length. Eight rainbow trout were measured during creel contacts, with total lengths ranging from 14.0 to 20.2 in (355 to 513 mm). Angler catch rate objectives for Ruby Lake are set at 1.0 trout per angler, 0.45 trout per hour, 4.0 bass per angler, and 1.5 bass per hour. In 2013, angler catch rates were above the management objectives for both species. The high catch rates for largemouth bass were due to anglers catching high numbers of bass below the 10 in minimum size limit. Numerous reports of fish in the 7 to 9 in range were received throughout the fishing season. If water conditions remain suitable, it is expected that the numerous fish approaching the 10 in mark will continue to reach harvestable size in 2014 and provide for a quality fishing experience again at Ruby Lake NWR.

Supplemental angler information was received through an angler drop-box that was installed at the main boat ramp. A total of five angler questionnaire forms were received, with four of these forms being used for analysis. These 4 questionnaires showed that 5 anglers caught 89 fish in 31 hrs of fishing effort, producing catch rates of 17.8 fish per angler and 2.9 fish per hour. The largemouth bass angler catch rates were 21.5 bass per angler and 3.1 bass per hour, while one trout angler produced catch rates

of 3.0 trout per angler and 1.0 trout per hour. A comparison of angler catch rates between contact creel surveys and the angler drop-box survey can be seen in Table 2. The catch rates for trout are relatively consistent, considering the possible fluctuations caused by a small sample size. The bass catch rates are noticeably higher for the angler drop-box data, which can be attributed to a small sample size and an over estimation of captured fish under 10 in. The numbers for the bass anglers are nearly double that of the creel data numbers and is a trend that has been seen at this water for several years.

Table 2. Ruby Lake NWR Angler Catch Rates.

	T/A	T/H	B/A	B/H	F/A	F/H
Creel	2.9	0.7	9.2	2	7.7	1.7
Angler Box	3	1	21.5	3.1	17.8	2.9
Combined	2.9	0.7	9.6	2.1	10.5	1.8

The Nevada Department of Wildlife Mail-in, Angler Questionnaire Survey for the calendar year 2012 reported that 1,187 anglers fished 3,759 days and had a success rate of 27.87 fish per angler. Figure 1 shows a 15-year trend using expanded data for harvest, angler days, and fish per angler.

Angler use and harvest peaked in 2000 following five years of above average water years; however, as the water levels dropped due to poor water years from 2001 to 2004, harvest, angler days, and angler catch rates also dropped. Angler days continued to drop until 2009 when the number of angler days almost doubled. Unfortunately, since 2009 angler days has continued to drop, reaching a 15 year low in 2012. The last 10 years of data has shown an average of 6,939 angler days, which is well below the 25,000 angler day average seen in the late 1990s. Decreasing water levels at Ruby Lake have been the trend since 2006. Between 2004 and 2013, the average percentage of annual precipitation in the Upper Humboldt was 101%, which is due to four years above 115%. Contrary to these positive years, there were also four years below 90% that have been more detrimental in the overall water levels at Ruby Lake.

As mentioned above, water levels have not only been below the objective for several years, but they have been on the decline since 2006 (Figure 2). No data is available for 2011 through 2013, as the refuge did not have the data available. Since 2006, which was the most recent high water year, the South Lake water level has dropped two vertical feet in elevation when comparing October water levels. Water levels and the associated available habitat at Ruby Lake are critically important to a successful fishery. It will be interesting to follow the water levels in 2014, which are expected to be low due to what appears to be a below average precipitation year. If the below average water years of 2012 and 2013 are followed again with another poor water year in 2014, the impacts to Ruby Lake as a fishery and recreation site will continue to compound as summer progresses.

Figure 1. 2002-2012 Angler Questionnaire Data.

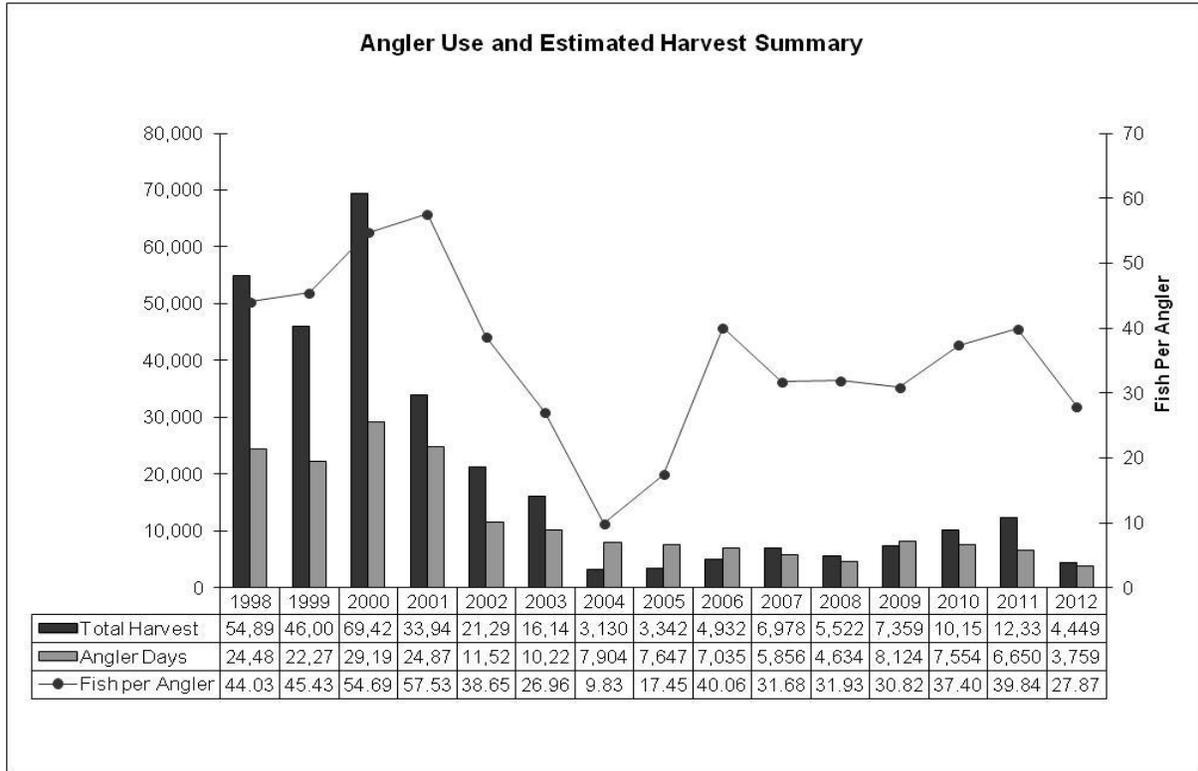
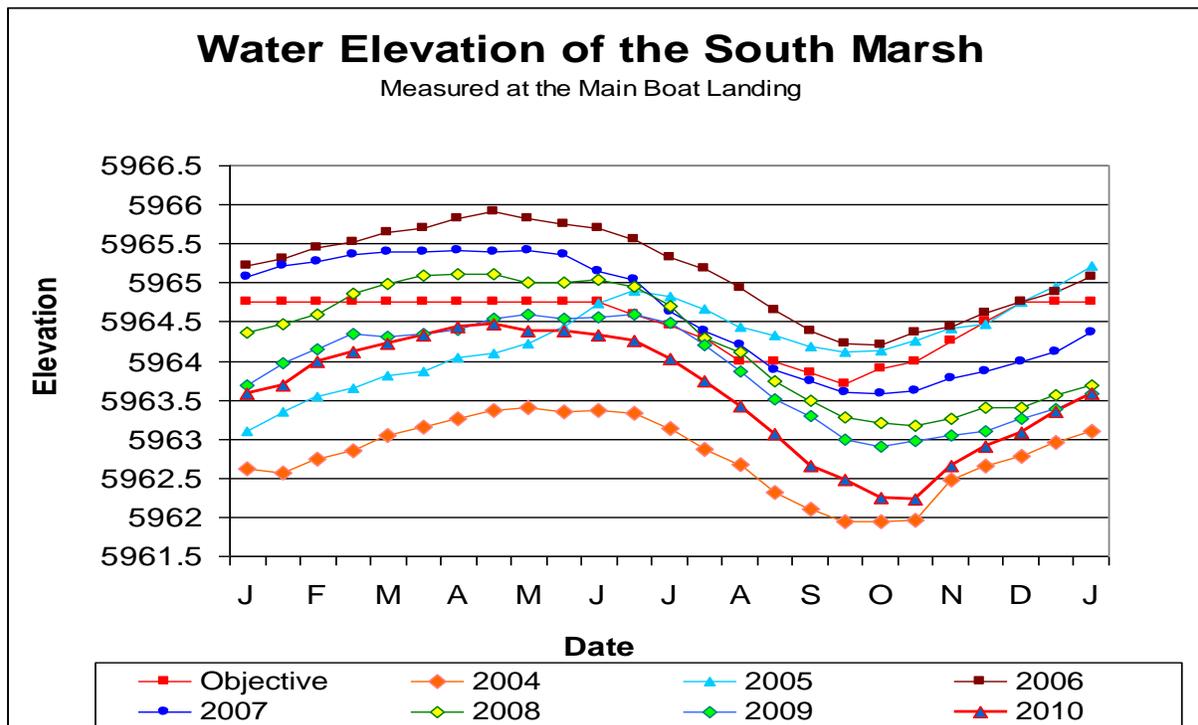


Figure 2. South Lake Water Elevation (Courtesy of Ruby Lake NWR).



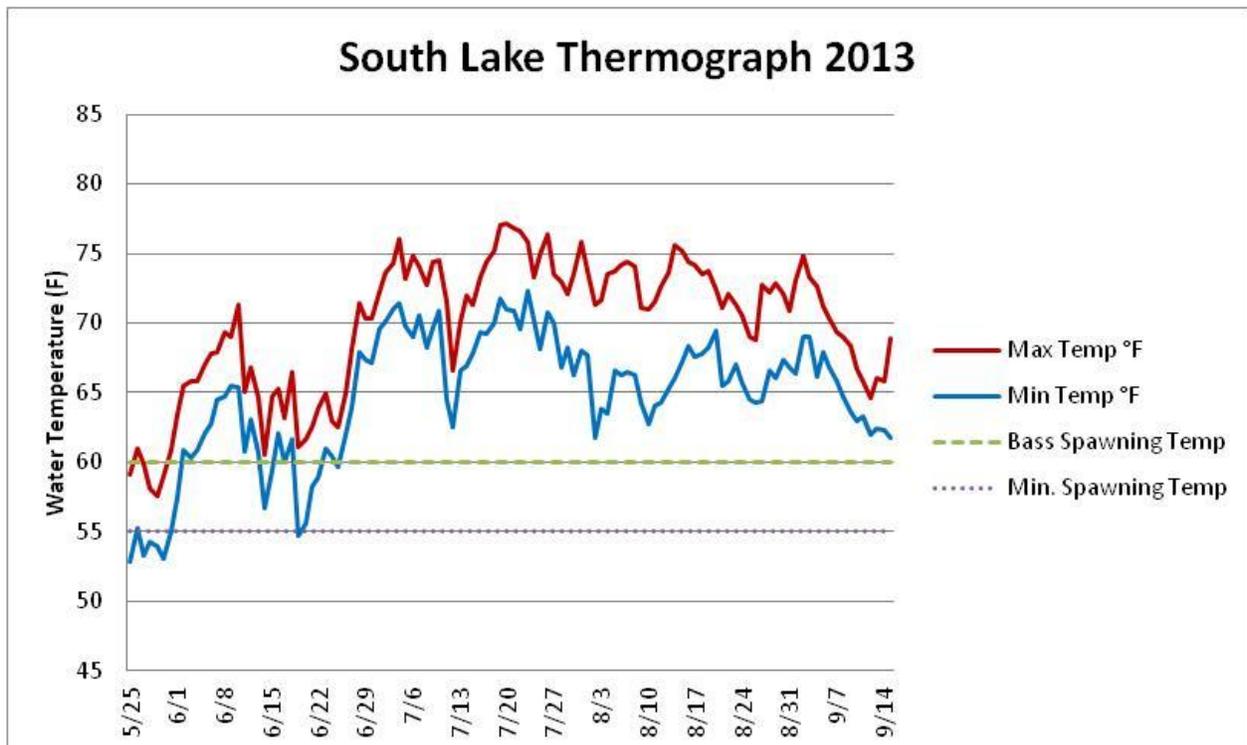
Creel surveys in the North Dike units were done secondarily to South Lake creel surveys and no anglers were contacted. Angler use in most units was minimal during 2013, with reports of slow angling success for largemouth bass, mostly due to low water and dewatering events.

Thermographs

Springtime water temperatures at Ruby Lake have demonstrated a wide range of fluctuations. The severity of these fluctuations hampers the largemouth bass spawning success and, in severe cases, an entire year class can be weakened. Largemouth bass at Ruby Lake begin nesting activities when the water temperature approaches 60°F (15.5°C), with the majority of nest abandonment occurring when the temperature then drops below approximately 55°F (12.8°C). Water temperature fluctuations are typically less varied in the South Lake as compared to the North Dike units mainly due to greater water depth.

Due to unsettled windy weather in the spring, a thermograph was not placed at the regular location in the South Lake. To assure that data was still collected, a thermograph was placed on the main boat ramp dock on May 25 and later pulled on September 15 (Figure 3). On June 2, the minimum water temperature reached the bass spawning temperature of 60°F (15.5°C) and although the water temperature experienced a short cold snap shortly after, the nest abandonment temperature was not reached. It is suspected that there was a successful spawn in 2013.

Figure 3. South Lake Thermograph 2013.



A thermograph was not placed in Unit 20 due to low water conditions. Due to water management practices, this unit went nearly dry by the end of summer.

Bass Ball Surveys

Because of the low water in Unit 20, the bass ball survey was not conducted. Anglers reported few bass fry and during the electroshocking survey, several observations of YOY were made. Although the thermograph showed water temperatures conducive to a successful spawn, the current low water level makes it difficult to assess the overall success of the bass spawn, however, future electrofishing surveys will shed some light on the success of the 2013 cohort.

Largemouth Bass Population Monitoring

The electroshocking survey was conducted under clear and calm weather conditions, with a water temperature of 67°F (19.4°C). Transect I, located on the west shoreline north of “Otis Island” was electrofished for 669 s and produced 91 fish, resulting in a capture rate of 489.7 fish per electroshocking hour. These fish averaged 7.9 in (200.6 mm) total length (TL), and ranged in size from 3.8 to 12.2 in (96 to 309 mm). The capture rate was considered fair, with several smaller age class fish being observed, including YOY, but going un-captured. There were also three rainbow trout captured that averaged 16.3 in (414.7 mm) TL and ranged in size from 15.7 to 17.0 in (400 to 432 mm).

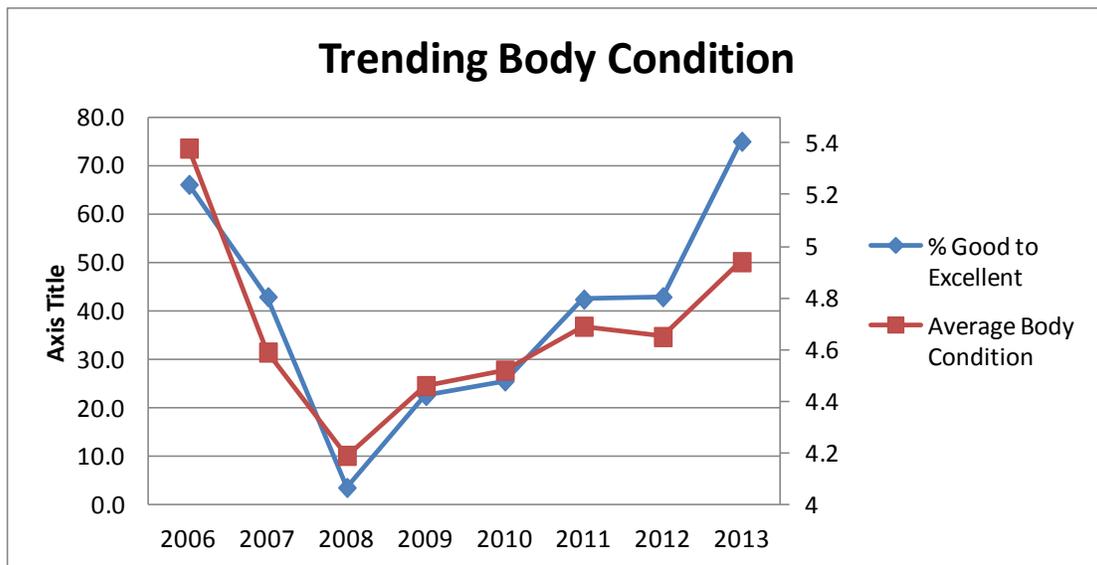
Transect II, located along the west shoreline of the “Water Ski Ponds” was electroshocked for 772 s and produced 131 fish, resulting in a capture rate of 610.9 fish per electroshocking hour. These bass averaged 8.1 in (206.3 mm) TL and ranged in size from 4.7 to 12.0 in (120 to 304 mm). Two trout were also captured in this transect, each measuring 15.0 and 15.1 in (380 and 383 mm). The third transect at “Jason’s Pond” was not completed due to low water and dense aquatic vegetation, which precluded access.

Overall, 1,441 electroshocking seconds were used to capture 217 largemouth bass and 5 rainbow trout, resulting in a capture rate of 554.6 fish per electroshocking hour. All fish were measured for total length to evaluate age classes, and 93 of those fish were weighed to evaluate body condition. The measured 217 largemouth bass averaged 8.0 in (204 mm) TL and ranged in size from 3.8 to 12.2 in (96 to 309 mm). The body condition of the 88 measured bass were as follows: 3 fish in poor condition (3.4 %), 19 fish in fair condition (21.6%), 62 fish in good condition (70.5%), and 4 fish in excellent condition (4.5%). The average body condition of the 63 fish was 4.94 for a rating of good. The five captured rainbow trout resulted in an average total length of 15.8 in (401.4 mm) with a range of 14.9 to 17.0 in (380 to 432 mm). Body conditions for these five trout were 3 fish in good condition (60%) and 2 fish in fair condition (40%).

Beginning in 2006, the percentage of sampled fish in good to excellent body condition had dropped every year, bottoming out in 2008 with 3.5% of the sample being

in good to excellent condition. This number started an upwards trend in 2009 with 22.5% and has since continued to improve. The 2013 survey shows a noticeable increase in body condition at 75%, with 70% of the measured fish being in god condition. A similar trend is seen with the average body condition for the sampled fish (Figure 4).

Figure 4. Largemouth Bass Body Condition.



The 202 measured bass were broken into age classes to evaluate and follow the cohorts from various years. To make year-to-year comparisons, Figure 5 shows the age class breakdown from 2008 to 2012. The graph shows two dominate cohorts, starting in 2007 with Class II and III, which continue into 2008 with Class III and IV. As these fish approach the 10 in mark, Class V, the age class dominance is lost as anglers target them. However, as these fish reached maturity in 2009 and 2010, their reproductive success can be seen in the class I and II's in the 2011 survey. These two cohorts are clearly represented in the 2012 survey as well. The success of these two cohorts may also be contributing to the highest percentage of class V+ bass in the last seven years, as well as the lowest small (under 10 in) to keeper bass (over 10 in) ratio in the same time frame.

If water conditions continue to persist, it appears that the current age structure of the largemouth bass fishery is in place to maintain a healthy and stable fishery. Because the capture rate was reduced for the smaller age class fish, it appears that strong age classes are more easily identified in age class II, III, and IV. Based on this premise, it appears that the last six years have produced strong age classes on a yearly basis that seem to be showing a more consistent age class distribution and an overall increase in fish over 10 in starting in 2009. As shown in the past, water is a limiting factor that can have drastic impacts on the Ruby Lake fishery. Future water management practices and snow-water amounts will play a critical role in the largemouth bass fishery.

Figure 5. Largemouth Bass Age Class Summary.



Winterkill Survey

The winterkill survey in the South Lake for 2013 was not conducted, with windy spring weather conditions not allowing for suitable conditions for the survey. Additionally, ice thickness at the main boat ramp peaked at around 10 in and remained clear and free of snow most of the winter. The refuge was ice free by March 31 and overall it is expected that winterkill in the South Lake was very low.

Due to low oxygen levels in the dike units and the lack of flowing water in most units, the refuge was contacted several times to move water for the purpose of increasing oxygen levels. Water was pushed into the units, but only in a manner that allowed for the quickest flow through and large portions of the units were not adequately oxygenated. Due to this, it was expected that a fish kill likely occurred.

On March 21, the eastern half of the dike running between Units 14 and 20 was walked to evaluate for any fish mortalities. Survey conditions were poor due to a steady wind that was creating a chop on the water. Along the south shore of Unit 14, five dead bass and one dead northern leopard frog were observed. This unit did have water running from the collection ditch directly to the east marsh, so there was some level of oxygenation occurring in the north portion of the unit, which may have alleviated some of the low oxygen impacts. This unit was later drained, which resulted in a total fish kill. Along the north shore of Unit 20, 56 dead bass were observed. The rate of decomposition of all of the documented fish was quite advanced and most of the fish were not floating. This indicates there were many more fish that sank to the bottom and not visually detected. This unit was also drained in 2013, resulting in a total fish kill.

Largemouth Bass Salvage

Based on a spring coordination meeting with NWR staff, Unit 14 was scheduled for dewatering in 2013. The water level in the unit was quite low, as it appeared to be at the lowest available water elevation allowed by natural flow at the control structure located at the NE corner of the unit. All the remaining water in the unit was concentrated in the borrow ditch. On June 4, the water level had reached a point where accessing a majority of the unit was prevented due to shallow water. Due to this shallow water, approximately 625 yds of the southern borrow ditch was shocked along with approximately 400 yds of the eastern borrow ditch. A total of 10 largemouth bass were captured, with an additional 30 bass being seen but going un-captured. The poor shocking efficiency was highly impacted by the high total dissolved solids (TDS) in the water, which greatly affects the conductivity of the water. These 10 bass ranged in size from 3 to 11 in (76.2 to 279.4 mm) TL and were released into Unit 20, the unit directly south of Unit 14.

Visibility in the water was good and considering the water conditions, very few fish were actually seen. Due to the southern portion of this unit reaching critical dissolved oxygen levels during the winter, it is concluded that the low number of observed bass was due to a partial die off. The northern portion of this unit, which did have low dissolved oxygen levels in the winter, but did have a short inflow of water, was not salvaged due to access difficulties. Although the water appeared shallow in the northern portions of the unit, it was expected to have a slightly higher density of bass in this portion due to the water flow that was allowed during the winter.

As mentioned above, Unit 20 was also dewatered in 2013. This unit was not knowingly scheduled for dewatering and by the time that water levels were observed, it was too shallow to attempt a fish salvage. Due to the large winter bass mortality, there was most likely little mortality due to the dewatering.

Quagga Mussel Monitoring

Surveys were conducted on June 11, July 23, August 21, and September 10, which included checking artificial samplers and plankton sampling at two separate locations. A total of 16 individual samples were evaluated for the presence of quagga veligers, all of which came back negative. All visual and tactile surveys were also negative for quagga mussels. Due to positive PCR tests in 2012, Ruby Lake NWR is currently listed as a Watch List Water, which requires continued and increased monitoring.

MANAGEMENT REVIEW

Objective: General Sport Fisheries Management.

All approaches were completed at Ruby Lake NWR. Due to weather and water conditions only one thermograph was placed in the South Lake and the South Lake was

not surveyed for winterkill. These objectives will be continued in the future when conditions allow. Although the management concept is being met at Ruby Lake, anglers continue to be concerned with the size of largemouth bass. Considering that the South Lake has seen a steady seven-year drop in water level, the fishery is doing as well as can be expected. Slow growth and available habitat directly impact the success of this fishery and if the future provides adequate water levels, the fishery will continue to improve.

RECOMMENDATIONS

- Schedule an April/May electroshocking survey of the Collection Ditch in 2014 as the start of biannual trend surveys.
- Continue to assess angling pressure and angler success rates throughout the fishing season.
- Continue to monitor and utilize the angler drop-box and improve the visibility of the box, with the intent of increasing angler participation.
- Recording thermographs should continue to be placed in the South Lake and North Dike Units to help predict timing and possible success of largemouth bass spawning.
- Periodic nest surveys and fry ball surveys should continue during spring to evaluate largemouth bass spawning success.
- An annual electroshocking survey in mid-summer/summer should be conducted to evaluate the status of this recovering largemouth bass fishery.
- Winter water chemistries and associated spring winterkill surveys should be continued to aid in the assessment of projected angler success and fish loss. This information also justifies the need for supplemental trout stocking.
- Continue to assess the angling pressure and angler harvest in the Collection Ditch as well as coordinate with the hatchery on trout stocking conditions and numbers.
- Salvage largemouth bass from closed or drained areas within the Ruby Lake NWR and stock in suitable waters.
- Work with Ruby Lake NWR, when applicable, on the completion of their Comprehensive Conservation Plan to ensure that quality fishing at the Refuge continues.

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Date: February 2013