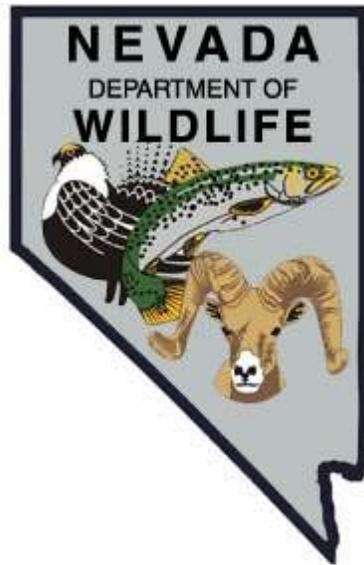


NEVADA DEPARTMENT OF WILDLIFE  
STATEWIDE FISHERIES MANAGEMENT



FEDERAL AID JOB PROGRESS REPORTS

F-20-52  
2016

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, 2016 through December 31, 2016*

**SUMMARY**

Ruby Lake National Wildlife Refuge (NWR) is separated into the Collection Ditch and the marsh area. The marsh area includes the Dike Units, South Lake, and the South Springs.

There were 10,692 trout stocked at Ruby Lake NWR in 2016. This included two different rainbow trout strains and tiger trout.

Between June and August, nine creel survey visits were made to Ruby Lake NWR, with an additional fourteen voluntary, angler drop-box questionnaires received. Creel survey efforts contacted 83 anglers putting forth 260 hrs of effort to catch 188 fish. Catch rates came to 0.7 fish per hour and 2.3 fish per angler, which were slightly lower than the 2015 success rates. All drop-box questionnaires were used for analysis, resulting in 14 anglers catching 97 fish in 73 hrs of fishing effort. Catch rates were 6.9 fish per angler and 1.3 fish per hour.

A thermograph placed in the South Lake on March 18 showed that a successful spawn occurred at the start of May. Multiple reports from anglers and agency personnel were received on a very high number of bass fry by late summer, suggesting that the spawn was successful. No bass ball surveys were done due to low water conditions.

Due to low water levels and weedy conditions, an electroshocking survey was not completed and the number of AIS veliger samples was reduced. Only three samples were collected in 2016, two in June and one in July, all of which came back negative for quagga mussel veligers.

**BACKGROUND**

Ruby Lake (Ruby Lake National Wildlife Refuge, from here on called the 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 rate of largemouth bass is 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 of water level, reproductive success, fish health, and angler use requires a thorough understanding of the fishery to make adequate management decisions.

Working with the needs of the Fish and Wildlife Service at the Refuge is also necessary to reduce impacts to fish populations as well as angler use. Following four years of drought and low water levels, the 2015-16 winter finally provided an above average water year, with the 2016-17 winter seemingly intending to repeat an above average water year.

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 continues annually 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 temperatures during early spring to late fall with a thermograph in the 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 Refuge.
- 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 the Refuge was scheduled at periodic intervals on 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.

A recording thermograph was placed in the South Lake shortly after spring ice breakup and pulled prior to winter ice-up. The timeframe for this thermograph was expanded to include temperature collection during the quagga mussel spawning season.

The electroshocking survey was to be accomplished using the electroshocking barge at two transects in South Lake. However, the water level was too low and no sampling occurred.

Water chemistry data included measurements of dissolved oxygen, temperature, ice thickness, snow depth covering the 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 to be conducted in Unit 20 using a two-man crew in a canoe. The transect is 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. Due to low water levels, this survey could not be completed.

## FINDINGS

### Stocking

There were 10,692 trout stocked at the Refuge in 2016. This included two different rainbow trout strains and tiger 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	4,250			
Collection Ditch	500			
South Springs	1,438	1,000		
Unit 21	1,704	1,800		
	7,892	2,800		<b>10,692</b>

## Angler Contacts

Between June and August, anglers were contacted at the Refuge on nine separate days, resulting in contacting 84 anglers that put forth 260 hrs of angling effort to catch 188 fish. This effort produced success rates of 0.7 fish per hour and 2.3 fish per angler. A total of 62 largemouth bass anglers (74.7%) expended 226 hrs of angling effort to harvest 45 bass and release an additional 122 bass. This resulted in largemouth bass success rates of 2.7 per angler and 0.7 per hour. Twenty-one trout anglers (25.3%) put forth 34 hrs of angling effort to harvest one trout and release an additional 21 trout. Success rates for trout anglers were 1.0 per angler and 0.6 per hour.

The average length of largemouth bass harvested from the South Lake was 11.2 in (284.6 mm), which is right at the management target length of 11 in (279.0 mm). One rainbow trout was measured at 18.3 in (465 mm). The management objectives for angler catch rates at the Refuge 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 2016, angler catch rates were at or above management objectives for both species, with the exception of bass per angler, which was below the objective at 2.7 bass per angler. This lower number of bass per angler has been an increasing trend during the drought that occurred between 2012 and 2015. As water conditions improve, these catch rates should increase as habitat improves in quality/quantity and the bass population responds to those improvements.

Supplemental angler information was received through an angler drop-box installed at the main boat ramp. A total of 14 completed questionnaires were received that showed 14 anglers caught 124 fish in 73.0 hrs of fishing effort, producing catch rates of 8.9 fish per angler and 1.7 fish per hour. Largemouth bass catch rates were 6.4 bass per angler and 1.4 bass per hour, while one trout angler produced catch rates of 14 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.

**Table 2.** Ruby Lake NWR Angler Catch Rates.

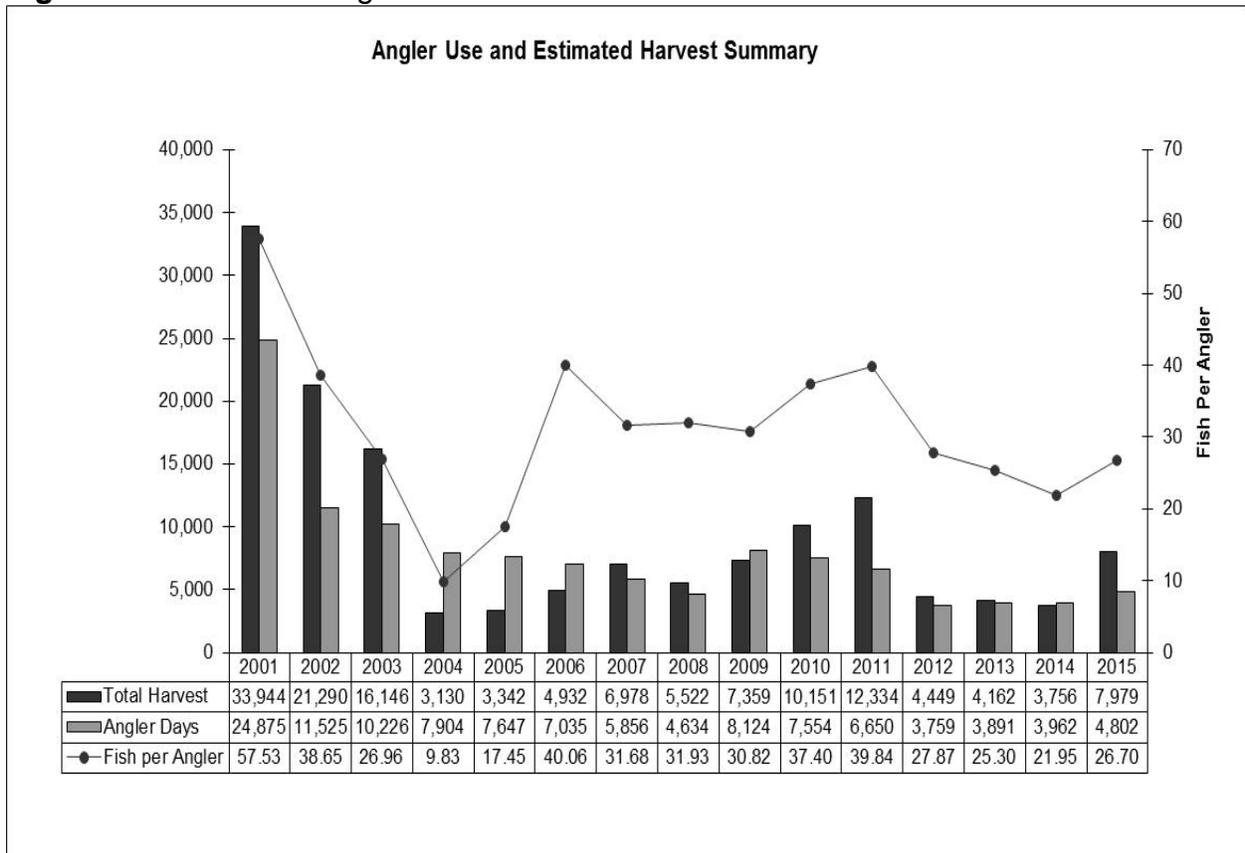
	<b>T/A</b>	<b>T/H</b>	<b>B/A</b>	<b>B/H</b>	<b>F/A</b>	<b>F/H</b>
<b>Creel</b>	1	0.6	2.7	0.7	2.3	0.7
<b>Angler Box</b>	14	1	6.4	1.4	6.9	1.3
<b>Combined</b>	1.6	0.7	3.3	0.9	2.9	0.9

The Nevada Department of Wildlife's Mail-in, Angler Questionnaire Survey for the calendar year 2015 reported that 1,123 anglers fished 4,802 days and had a success rate of 26.7 fish per angler. Figure 1 shows the 15-year trend using expanded data for harvest, angler days, and fish per angler.

Angler use and harvest peaked in 2000/2001 following five years of above average winter precipitation; however, as the water levels dropped during poor water years from 2001 to 2004, harvest, angler days, and angler catch rates plummeted.

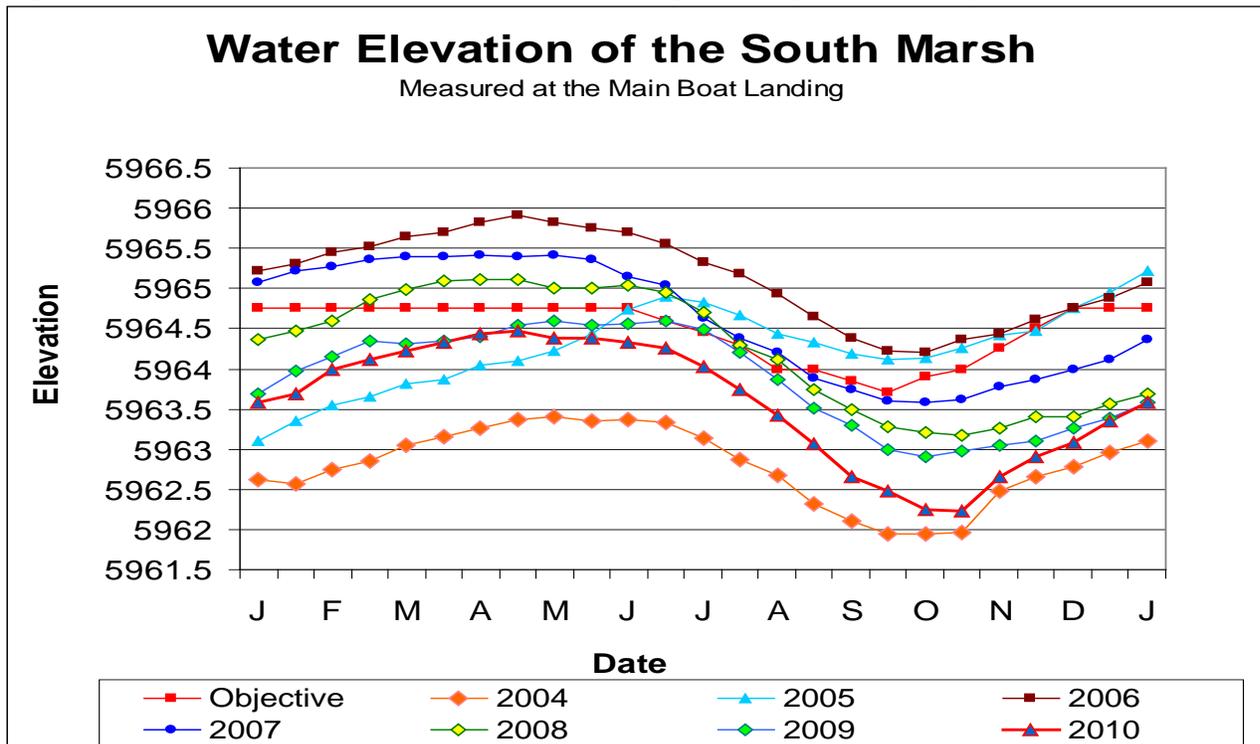
Angler days showed a small increase in 2009 and 2010 before again dropping to a 15-year low in 2012. Angler use and access dropped from 2012 to 2016, during the four years of consecutive drought. The last 10 years of data have shown an average of 5,627 angler days, which is well below the 25,000 angler days average observed in the late 1990s. Decreasing water levels at the Refuge have been the trend since 2006, which can be attributed to below average water years and changes in the Refuge's water management practices.

**Figure 1. 2001-2015 Angler Questionnaire Data.**



As mentioned above, water levels have not only been below the objective for several years, but they were in a steady decline from 2006 to 2010 (Figure 2). No data is available for 2011 through 2015, but there was a serious drought from 2012 to 2015 that continued this downward trend. A water report was created by the Refuge in 2016, but the elevations are not compatible with the older reports, with what appears to be a discrepancy of a couple of feet. Two consecutive good water years (2015 and 2016) should help increase water levels in the South Lake and provide a higher quality and quantity of habitat for this fishery. It will be interesting to follow the water levels in 2017, which are expected to increase substantially from past years due to recent snow pack levels. The 2016/17 winter is currently well above average and should provide better spring flows in the late summer of 2017.

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



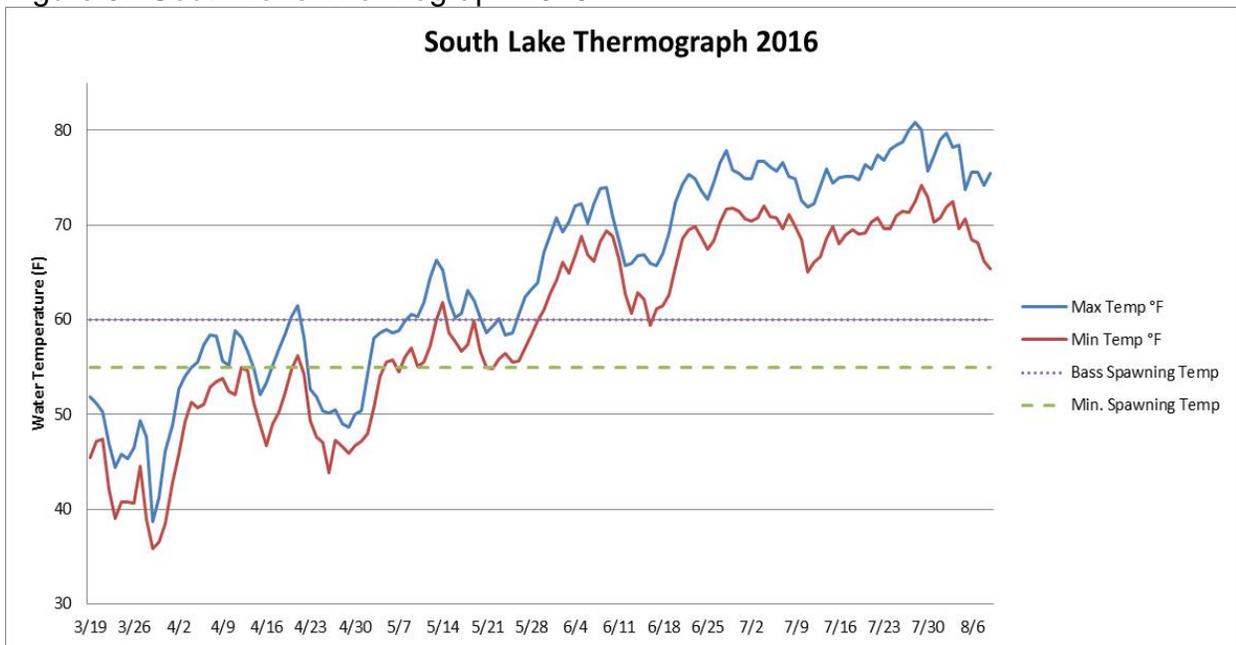
Creel surveys in the North Dike units were done secondarily to South Lake creel surveys and no anglers were contacted. Angler use in most units was minimal during 2016, due to water management at the Refuge that has left units nearly void of fish.

### Thermographs

Springtime water temperatures at the Refuge have demonstrated a wide range of fluctuations. The severity of these fluctuations has the ability to hamper largemouth bass spawning success and, in severe cases, an entire year class can be weakened. Largemouth bass at the Refuge 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 North Dike Units, mainly due to greater water depth.

A thermograph was placed in the South Lake on March 18 and later pulled on August 9 (Figure 3). On April 20, the minimum water temperature reached the bass spawning temperature of 60°F (15.5°C) for only two days before a substantial drop in temperature occurred. This short time period most likely did not allow for the initiation of the main spawn, however, the temperature again reached this spawning temperature on May 9 and remained above the minimal spawning temperature. It is suspected there was a successful spawn in 2016, which was later confirmed by the large number of young-of-year bass observed throughout the South Lake.

Figure 3. South Lake Thermograph 2016.



### Largemouth Bass Ball Surveys

Because of the low water conditions and water management practices that have left the dike units nearly fishless, Dike Unit 20 bass ball surveys were not conducted. Anglers reported many balls of bass fry throughout the summer and several observations of young-of-year were made during other work activities. Future electroshocking surveys should shed light on the success of the 2016 cohort.

### Largemouth Bass Population Monitoring

Due to low water levels in South Lake, the electroshocking survey was not conducted in 2016. By late July, water levels had reached an elevation that made launching a small Gregor boat difficult, let alone a large electroshocking barge. It appears that the water conditions at the Marsh are expected to improve and the yearly electroshocking surveys will continue.

### Winterkill Survey

The South Lake survey began at 9:30 am on March 18 and continued to 12:00 pm. Survey conditions were cool, partly cloudy, and a light breeze, with the wind picking up near the end of the survey. Water temperatures ranged from 40 to 43°F, and the survey included areas that have experienced fish losses in the past. No dead fish were observed during the survey; however, there were five bass observed swimming.

After a report was received of a fish kill in unit 21, a survey was conducted. On March 3, under clear and calm conditions, over 80 dead bass and trout were observed in unit 21. Water had been manipulated in this unit by refuge staff for breaking up the

ice and it is expected that a nearly complete mortality event occurred in the unit. Additional observations of the other units also produced a few dead largemouth bass scattered amongst the units. As the remaining units had already been nearly void of fish due to water management practices, it is expected that they have greatly reduced bass numbers. Overall, the fish losses in the dike units was considered high due to the large loss of fish in unit 21 and the continued loss of fish in the remaining units.

Water levels continued to rise in the South Lake during the fall, winter, and spring following ice breakup. Many areas of deeper water (4-6 ft), which largemouth bass can use to overwinter, were observed during the survey. Collecting dissolved oxygen readings were difficult during the winter months as snow levels and drifts on roadways made traveling difficult. Ice started building in mid-December and reached a thickness of eight inches in February, with ice breakup beginning in early March.

The overall fish loss for the winter of 2015-16 was considered very low in the South Lake. The moderate water levels and shallow ice conditions provided adequate refuge for fish to overwinter with minimal losses.

### Largemouth Bass Salvage

Based on late winter coordination with Wildlife Refuge staff, dike units were not scheduled to be drained, thus no fish salvage was necessary.

### Quagga Mussel Monitoring

Surveys were conducted only on June 28 and July 25 due to low water conditions that restricted sampling in August and September. Three individual samples were evaluated for the presence of quagga mussel veligers, all of which came back as negative. All visual and tactile surveys were also negative for quagga mussels. Due to positive PCR tests in 2012, the Refuge is currently listed as a Watch List Water, which requires continued and increased monitoring.

## **MANAGEMENT REVIEW**

All approaches were completed at Ruby Lake NWR, with the exception of a bass salvage, a bass ball survey, and the electroshocking survey. Due to low water conditions that made launching a boat nearly impossible by late July, the bass ball and electroshocking surveys was not completed. The water management schedule did not provide a need to salvage fish. Objectives will be completed in the future when conditions allow. Although management objectives are being met at the Refuge, anglers continue to be concerned with the size of largemouth bass. Considering that the South Lake has seen a steady ten-year drop in water level, the fishery has been doing as well as can be expected. Slow growth and lack of available habitat directly influences the success of this fishery, but if the future provides adequate water levels, the fishery will continue to improve.

## RECOMMENDATIONS

- 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 South Lake to help predict timing and 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 summer should be conducted to evaluate the status of the 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 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 into suitable waters.
- Coordinate with the Ruby Lake NWR on completing the Comprehensive Conservation Plan.

Prepared by: Jeff Petersen  
Biologist III, Eastern Region

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