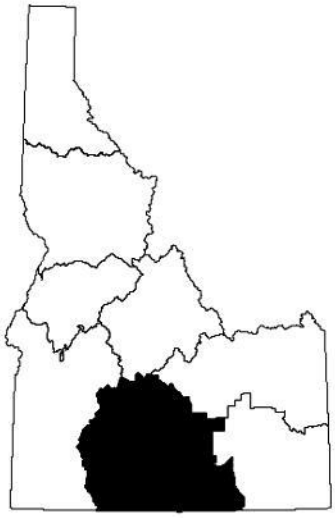
FISHERY MANAGEMENT INVESTIGATIONS

IDAHO DEPARTMENT OF FISH AND GAME
FISHERY MANAGEMENT ANNUAL REPORT

Ed Schriever, Director



MAGIC VALLEY REGION
2015

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2015 MAGIC VALLEY REGION
ANNUAL FISHERY MANAGEMENT REPORT

REPORT PREFACE

Some standard formatting is applied throughout this report. Sampling locations including georeferenced data are reported in Appendix A. Specific sampling equipment used for completed surveys are found in Appendix B.

LAKES AND RESERVOIRS INVESTIGATIONS

ANDERSON RANCH RESERVOIR

ABSTRACT

Anderson Ranch Reservoir supports a very popular kokanee *Onchorhynchus nerka* fishery. Population densities fluctuate substantially requiring differing management strategies from stocking to controlling escapement. In order to assess this population and fishery, we sought to: 1) characterize population density as well as size and age structure using gill nets, and 2) monitor angling success by documenting average angler catch, harvest, and effort. In all, seven nets were deployed resulting in a total catch of 45 kokanee. Kokanee CPUE averaged 6 kokanee/net-night (± 3, 95% CI). Kokanee lengths ranged from 130 to 470 mm. Kokanee mean length at age-1, age-2 and age-3 were 176, 339, and 405 mm, respectively. Age-0 kokanee were not sampled during 2015, possibly due to sample timing and the small size of age-0 kokanee at this time.

A total of 100 anglers were interviewed from July 14-Aug 7, 2015. Average trip length of anglers fishing at Anderson Ranch Reservoir was 5.3 h (± 1.4, 95% CI). Overall, anglers caught and harvested 1.6 and 1.5 kokanee/trip, respectively. The overall angler catch rate of kokanee was 0.3 fish/h (± 0.12, 95% CI). Objectives formalized in the statewide fisheries management plan for length (>305 mm) were met, but those for catch rate (>1.0 kokanee/h) were not.

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INTRODUCTION

Anderson Ranch Reservoir supports quality angling opportunities for several game fishes including kokanee *Onchorhynchus nerka*, Rainbow Trout *O. mykiss*, Smallmouth Bass *Micropterus dolomieu*, Yellow Perch *Perca flavescens*, and Bull Trout *Salvelinus confluentus.* However, the vast majority of angling effort is directed at kokanee which are managed to provide high catch rates (>1.0 kokanee/h), moderated sizes (>305 mm), and ample harvest opportunity (daily bag limit is 25 and possession limit is 75).

The kokanee population in Anderson Ranch Reservoir is maintained primarily through natural recruitment, though kokanee are stocked in some years. Kokanee are known to spawn in several tributaries including the upper South Fork Boise River, Lime Creek, Fall Creek, and are suspected to spawn in others. Population abundance fluctuates substantially from year-to-year due to inconsistent recruitment, entrainment, or other factors. Because of these fluctuations, staff have implemented disparate management strategies depending on population status including stocking (at low abundances) or limiting escapement into spawning tributaries (at high abundances).

Determining appropriate management strategies requires adequate population and fisheries monitoring information. Historically, kokanee population data had been collected by trawling; however, this technique may provide biased information especially by underrepresenting larger kokanee. A recent study indicated that gill nets provide better more representative indices of abundance (catch per unit effort) as well as size and age structure. During summer 2015, we initiated gill nets surveys to collect kokanee population information. In addition, we conducted creel surveys to collect angler catch and harvest information. Angler catch and harvest information will be used to assess fisheries performance relative to objectives as well as, in the future, to build predictive models relating kokanee demographic information to subsequent fishing quality.

STUDY SITE

Anderson Ranch Dam and Reservoir are operated by the US Bureau of Reclamation to provide irrigation, hydropower, and flood control. Located in Elmore County, Idaho, the dam impounds the South Fork Boise River and several tributaries. At full pool, the reservoir's surface area is 1,950 ha. Maximum reservoir storage capacity is 60,833 cubic meters, of which 3,575 cubic meters is considered dead storage (USGS 1996). Generally, the reservoir is drafted, up to and exceeding 25 m below full pool, during late summer to provide irrigation water and to begin preparation for capture of the subsequent winter's snowmelt. During drought periods, the reservoir may be drafted up to 60 m below full pool.

OBJECTIVE

The objectives of 2015 sampling efforts at Anderson Ranch Reservoir were to: 1) characterize the kokanee population including size and age structure, as well as to index abundance, and 2) characterize the recreational fishery including calculation of indices of catch, harvest and catch rate. Collection of these two types of data for several years should allow description and management of factors that influence population abundance and allow for forecasting of future fisheries quality to communicate to anglers.

METHODS

Kokanee Gill Netting

The kokanee population in Anderson Ranch Reservoir was sampled with experimental gill nets on July 21-23, 2015. Reservoir surface elevation was approximately 1,230 m or about 40-m below full pool. Gill net dimensions were 55-m wide × 6-m deep with 3-m wide × 6-m deep panels of various-sized, monofilament mesh net. Panels were randomly ordered and included two each of 13-, 19-, 25-, 38-, 51-, 64-, 76-, 89-, and 102-mm stretch mesh. The nets were suspended at various depths in the water column generally targeting the thermocline. Each net soaked overnight equaled one unit of gill net effort.

Captured fish were identified to species, measured to total length (TL, mm), and weighed (g). Catch data were summarized as the average number of kokanee caught per net-night. Kokanee longer than 100 mm were necropsied to determine sex, sexual maturity, and fecundity. Otoliths were removed from all kokanee longer than 100 mm to allow calculation of mean length-at-age. Kokanee shorter than 100 mm were assumed to be age-0.

Angler Creel Survey

Creel information was collected by surveying anglers at a check station located at the Curlew boat ramp, similar to a portion of the access-access survey design described by Pollock et al. (1994). No on-the-water angler counts were completed. The timing of the creel was set to coincide with peak kokanee fishing effort. Only kokanee catch, harvest, and effort data was recorded.

The main focus of the survey was on completed fishing trips. Each angler contact was assigned an interview number for that day, based on the numerical order by which anglers were contacted. We recorded number of anglers in the fishing party, time spent fishing, number of rods/angler, number of kokanee harvested, number released, fishing method, gear type, and TL (mm) and weight (g) of harvested fish. Otoliths were removed from all kokanee longer than 100 mm for aging purposes. Mean catch rate, $\widehat{R_2}$, was estimated using the ratio of means (ROM), where trip interviews were considered complete:

$$\widehat{R_2} = \frac{\frac{\sum_{i=1}^{n} c_i}{n}}{\frac{\sum_{i=1}^{n} e_i}{n}}$$

where $\hat{R}$ is the mean catch rate in fish/angler hour, c_i is the number of fish caught during the trip, and e_i is the length of the trip in hours (equation $\widehat{R_2}$ from Pollock et al. 1994).

RESULTS

Kokanee Gill Netting

In all, seven nets were deployed resulting in a total catch of 45 kokanee. CPUE ranged from 0 to 22 kokanee/net-night and averaged 6 kokanee/net-night (± 3, 95% CI). Length of kokanee ranged from 130 to 470 mm (Figure 2).

All kokanee collected from gill nets were aged. In addition, we collected otoliths from 14 kokanee during the creel survey for a combined sample size of 59. Kokanee ranged from age-1 to age-3 with no age 0s. Mean length at age-1, age-2, and age-3 was 176 (± 82), 339 (± 18), and 405 mm (± 9, 95% CI), respectively (Figure 3)

Angler Creel Survey

A total of 100 anglers were interviewed from July 14 to August 7, 2015. Average trip duration was 5.3 h (± 1.4, 95% CI). Anglers kept nearly all kokanee caught. Overall, anglers caught and harvested 1.6 and 1.5 kokanee/trip. The average angler catch rate was 0.3 kokanee/h (± 0.12, 95% CI). Angler catch rates dramatically declined through the duration of the creel (Figure 4).

DISCUSSION

This was the first year gill nets designed specifically to catch kokanee were used as the primary population sampling tool at Anderson Ranch Reservoir. The gill net survey allowed calculation of an index of abundance for which we have no comparison. Logistical complications precluded concurrent trawl or hydroacoustic estimates; therefore, no correlations could be made to past trawl or hydroacoustics surveys and their abundance estimates.

After several years of consistent data collection, it may be possible to utilize CPUE of younger age classes to predict angler catch in subsequent years. CPUE of kokanee during 2015 was relatively low and was comprised primarily of age-2 and age-3 kokanee. No age-0 and relatively few age-1 kokanee were sampled during 2015. The lack of age-0 kokanee in gill nets is not surprising as wild age-0 kokanee would be very small in June and not highly susceptible to being caught in gill nets with our mesh sizes and their swimming speed. The low catch rate for age-1 kokanee suggest that recruitment from 2014 may have been low.

Overall gill net catches were relatively low. Due to the lack of previous data, it is not possible to determine whether this was due to low population abundance, insufficient gill-netting effort, or net placement in locations with few kokanee. Because of these uncertainties, we recommend that netting effort be increased for several years to determine optimal sampling effort and net-setting locations.

Fisheries objectives for catch rate (1 fish/h) were not met; however, the length of creeled kokanee exceeded objective (305 mm). The timing of our angler interviews may have caused an inaccurate index of the average catch rate for the 2015 season. Based on past observations, we scheduled the creel to target the highest amounts of angling effort and catch rates; however, anglers reported substantially higher catch rates prior to our scheduled creel during May and early June. Gaining better understanding of the optimal time to index angler catch is needed to ensure accurate indexing of catch rate.

RECOMMENDATIONS

1. Increase gill-netting effort to ensure adequate catch of kokanee. Ensure net sets sample a proper range of depths and locations.
2. Improve understanding of angler catch rates related to season to allow optimal index creel scheduling.

CASTLE ROCKS STATE PARK FISHING POND

ABSTRACT

During 2015, we estimated exploitation and use of hatchery Rainbow Trout *Onchorhynchus mykiss* stocked as catchables in Castle Rocks State Park Fishing Pond. For the June 9, 2015 stocking event, we received 17 tag reports from the release of 77 t-bar anchor tagged trout. Adjusted exploitation and use were 37% and 45%, respectively. For the September 28, 2015 stocking event, we received tag reports from 4 of 75 tagged trout, resulting in adjusted exploitation and use rates of 5% and 11%, respectively. Study results indicate that summer-stocked trout were able to survive well and return to anglers at adequate rates. Late-fall stocked trout were able to survive winter, but return to anglers was poor. However, the poor performance of fall-stocked trout may be influenced by the fact that this is a newly-developed water. We expect, with time, that effort will increase leading to higher use and exploitation of stocked trout.

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INTRODUCTION

Castle Rocks State Park Fishing Pond was constructed during spring 2015. The pond's construction was a collaborative effort between Idaho Department of Parks and Recreation (IDPR) and the Idaho Department of Fish and Game (IDFG). The fishing pond's construction was part of IDPR's Master Plan which was completed in 2006.

As part of the collaborative effort, IDFG agreed to stock the new pond. Since this is a new stocking program, IDFG and IDPR discussed stocking options and ultimately agreed upon a reasonable put-and-take stocking schedule that would be subject to adaptive management. As such, it was important to determine whether stocked trout are caught by anglers. Since a full season creel survey would be costly and logistically difficult, we elected to assess performance by implementing a "Tag-You're-It!" study.

STUDY SITE

Castle Rocks State Park Fishing Pond is located in Cassia County approximately 5 km north-west of Almo, Idaho. The pond was constructed to provide habitat for fish and wildlife and to provide angling opportunity. Surface area of the pond at full pool is 1.2 ha (Figure 5). Water levels fluctuate seasonally due to inconsistent water availability and volume from Almo Creek. IDPR possesses a water right for Almo Creek to supply water to the pond. IDPR and IDFG staff believed that ground water connectivity combined with the cooler water from Almo Creek would provide suitable trout habitat for most of the year. However, staff thought year-round trout survival was unlikely since water could only be diverted into the pond during the irrigation season. Because of the unlikelihood of year-round survival and small size, this pond will be managed as put-and-take trout fishery.

OBJECTIVE

The objective of this effort was to collect data that would inform hatchery trout stocking decisions. As such, staff tagged a portion of the trout stocked during 2015 to allow assessment of exploitation and use.

METHODS

During 2015, Castle Rock State Park Pond was stocked in June, August, and September with a combined total of 1,950 catchable-sized Rainbow Trout. As per methods described in Meyer et al. (2012), approximately ten percent of the early and late release groups were tagged. For instance, 77 tagged trout were released on June 9, 2015 including eight that were double tagged. An additional 75 tagged trout were released on September 28, 2015 including eight that were double tagged.

All tagging occurred at the release location. Rainbow Trout were anesthetized, measured (TL, mm), tagged, and released. Tags were orange, t-bar anchor tags that included a unique tag number, a website address, and a toll free number for reporting purposes. Fish were released at several locations around the pond's perimeter to ensure equal distribution of tagged and untagged trout.

Tag reporting information was collected by phone or direct return by anglers, via IDFG "Tag Your It!" Hotline. Tag return data were queried from the "Tag-You're-It!" database during August 2019 and separately evaluated by release date. Adjusted exploitation and adjusted total use (harvest plus release) were calculated according to the methods in Meyer et al. (2012).

RESULTS

For the June 9th stocking event, at total of 17 tags were reported by anglers, which resulted in an adjusted exploitation rate of 37% and adjusted total use (harvest plus release) of 45%. Reporting information indicated that anglers caught Rainbow Trout throughout the summer in relatively equal numbers with no distinct peak. Reported catches for June, July, August, and September were 4, 5, 6, and 2 tagged trout, respectively. Days at large for this stocking event ranged from 18 to 102 with a mean days at large of 46.

For the September 28th stocking event, a total of four tags were reported by anglers, which resulted in an adjusted exploitation rate of 5% and adjusted total use (harvest plus release) of 11%. None of these tags were reported during 2015, and the earliest report occurred during March 2016. Reported catches for March 2016 and June 2016 were 2 and 2 tagged trout, respectively. Days at large for this stocking event ranged from 166 to 270 with a mean days at large of 214.

DISCUSSION

Results of this study indicate that June-stocked Rainbow Trout were able to survive and be caught at adequate rates in Castle Rocks State Park Fishing Pond. In addition the timing of reports indicated that June-stocked Rainbow Trout were caught at a relatively consistent pattern from summer through early fall. Unlike many community pond hatchery trout fisheries, the initial reported catch was much later than expected (i.e. 18 d after stocking) as effort and catch in many stocked ponds are commonly high shortly after stocking. We are unsure what may have caused this delay. It is possible that few people knew about this fishery due to its newness and remoteness. Additional information dissemination efforts may be needed. Considering this notion, hatchery trout use rates from June stocking appear adequate and are likely to increase in future years as more anglers become aware of this opportunity. In contrast, results indicate that late September-stocked Rainbow Trout performed poorly, though they survived the winter and contribute marginally to the spring and early summer fishery of the following year. There are several possible explanations for this poor performance including reduced fishing effort during fall or winter, poor water quality from reduced Almo Creek inflows, starvation, or a partial winter kill. Regardless of the cause, late fall stocking here should be discontinued if this pattern is consistent in future tagging studies and stocking years.

RECOMMENDATIONS

1. Repeat tagging study during future years to determine optimal stocking patterns. Tag a portion of fish from all stocking months or events.
2. Implement an angler use survey to assess angling effort.

DIERKES LAKE

ABSTRACT

Dierkes Lake is a community fishing water located in a park managed by the City of Twin Falls, ID. On June 23, 2015, we completed electrofishing surveys to assess and monitor the population of Largemouth Bass *Micropterus salmoides*. A total of 92 bass were sampled with six units of sampling effort. Mean CPUE for Largemouth Bass was 61 bass/h (± 17; 80% CI). Proportional stock density and relative stock density-quality were 38 and 34, respectively. Mean relative weight for stock- and quality-sized bass was 100 and 90, respectively. Bass older than age 5 and longer than 305 mm (legal harvest length) were present in the sample, but in low numbers. Maximum age in the sample was 11 years.

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INTRODUCTION

Dierkes Lake is a community fishing water located in a park managed by the City of Twin Falls, ID. Most of the angling effort is directed at Largemouth Bass *Micropterus salmoides*, Bluegill *Lepomis macrochirus*, and hatchery Rainbow Trout *Onchorhynchus mykiss* stocked as catchables. From 1994-2005, Largemouth Bass were managed with trophy regulations allowing a two-bass daily bag limit with none under 20". This rules was implemented to increase bass abundance and increase predation of Bluegill to improve Bluegill size structure (Partridge et al. 1994; Partridge et al. 1995). Regulation changes did not provide the intended benefit and were rescinded. Beginning in 2006, this water reverted to the general bass regulation allowing a six bass limit with none under 12". Largemouth bass have been sampled twice since the regulation change including 2003 (Warren and Megarle 2009) and 2011 (Stanton and Megargle, in press).

STUDY SITE

Dierkes Lake is a 10-ha community fishing water located in Twin Falls County (Figure 6). Lake elevation is 3,550'. The lake's bottom and surrounding uplands are composed primarily of basalt. Riparian vegetation is sparse and poorly developed. The fish community is comprised primarily of nonnative warm- and cold-water fish species.

OBJECTIVE

We sampled Largemouth Bass from Dierkes Lake to monitor and assess population abundance, stock structure, fish condition, growth, and survival.

METHODS

On the night of June 23, 2015, we sampled Largemouth Bass with boat electrofishing at six transects. Sampling transects were established by selecting a random starting point. From the starting point, sampling continued until 15 minutes of on-time electrofishing was completed. Two netters were used, and only bass were targeted during sampling. Abundance was indexed using average catch per unit effort. Sample size goals for electrofishing units were based on the variance around the mean catch per unit of effort and power analysis. The minimum sampling effort was determined in the field by entering data into a Personal Digital Assistant (PDA; i.e. electronic data device) which allowed quick calculation of mean catch per unit effort, the associated precision of that estimate, and estimated sampling units needed to achieve a desired precision (PDA software: Data Plus Solutions Software©, Cohen 1988). Sampling continued until the variation around the mean catch per unit effort achieved an 80% confidence interval (t-value = 1.26). Six transects were sampled.

All sampled bass were measured (TL, mm) and weighed (g). Otoliths were collected from a representative sub-sample to estimate length-at-age. Otoliths were prepared for age estimation by breaking centrally, burning or browning the broken edge with an alcohol burner, and viewing the broken edge with a dissecting microscope at 30X – 40X. Otoliths were coated with mineral oil to improve viewing clarity. Growth was estimated from mean length at age using the von Bertalanffy growth function generated in FAST (Fisheries Analysis and Simulation Tools, Version 2.1©).

Stock structure and condition indices were generated in FAST. Proportional stock density was calculated as an index of size structure (Anderson and Neumann 1996). Relative weights were calculated in FAST and were summarized as the mean within a designated size group.

RESULTS

A total of 92 bass were sampled among all sample locations. CPUE was 61 bass/h (± 17, 80% CI). In 2015, mean length of Largemouth Bass was 248 mm, and ranged from 130 to 500 mm (Figure 7). Mean weight of bass was 309 g and ranged from 27 to 1,862 g. All sampled bass were aged. Eight age classes were present in the 2015 sample. Length at age-5 was 307 mm. Bass older than age-5 and larger than 305 mm (legal harvest length) were present in the sample (Figure 8). Maximum age in the sample was 11 years. PSD was 38 (± 11, 95% CI) with a RSD-Q of 34 (Table 1). Mean relative weight for stock- and quality-sized bass was 100 and 90, respectively. Total annual mortality, derived from catch curve regression, was estimated to be 28 % (Figure 9).

DISCUSSION

Comparison of several metrics for the 2003, 2011, and 2015 surveys indicate that this population is doing well. Size structure has improved consistently throughout this period, including a higher proportion of quality-sized bass (longer than 400 mm) during 2015. Bass condition indices exceed the national average, except for fish longer than 305 mm which may have been influenced by sample timing which overlapped the post-spawn period. Furthermore, growth rates are higher than those documented during the 2011 survey (Stanton and Megargle, *in press*). Total mortality was relatively low and did not exceed 30%. In contrast, the only metric that declined from 2011 to 2015 was catch per unit effort. Catch per unit effort in 2015 was about one third of 2003 and 2011 indices. This bass population appears to be of lower abundance than recent years, but size structure has improved despite recent liberalization of bag limits and being highly accessible (in a park near a large city).

RECOMMENDATIONS

1. Continue periodic surveys to monitor population trends.
2. Incorporate bass tagging to future monitoring efforts to allow assessment of use and exploitation.

CREEL SURVEY ANALYSIS

FILER PONDS

ABSTRACT

An angler creel survey was conducted at Filer Pond in May and June 2015, in conjunction with stocking of catchable-sized hatchery Rainbow Trout *Onchorhynchus mykiss*. In July and August, water quality conditions (primarily water temperature) at Filer Pond became unsuitable for catchable stocking, thus no fish were stocked. By September, catchable stocking resumed, but the creel survey did not. A total of 101 anglers were surveyed in May and June 2015 at Filer Pond for completed trip catch and effort. Anglers expended a total of 4,630 h of effort (SE = 2,581) during these two months and caught 579 catchable-sized hatchery Rainbow Trout.

Based on results from the “Tag You’re It!” tag reporting system, 76% of the fish stocked in May and 28% of the fish stocked in June were caught by anglers. Combining all release events, anglers caught an average of 46% of the catchables stocked in Filer Pond. A total of 51 anglers were interviewed in May and June at Filer Pond to evaluate their satisfaction with current fishing conditions and regulations and their potential support for restricting harvest to two fish instead of the current six-fish bag limit.

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INTRODUCTION

The Idaho Department of Fish and Game (IDFG) partnered with the Twin Falls Canal Company (TFCC) to construct a new fishing ponds near Twin Falls and Filer, ID. The ponds were constructed and are owned by the TFCC and are being stocked with catchable-sized hatchery Rainbow Trout *Onchorhynchus mykiss* by IDFG.

Filer Ponds are managed as a community fishing water. IDFG stocked approximately 2,900 Rainbow Trout (8-15 inches long) in the Kids Pond during 2015, and approximately 15,000 Rainbow Trout in the large pond during 2015. The daily bag limit is six trout of any size.

STUDY SITE

The new ponds are 4.5 miles north of Filer in Twin Falls County. Surface area of Kids Pond is approximately ¼ acre, with a maximum depth of 10'. Surface area of the large pond is approximately 3 acres, with a maximum depth of 10' (Figure 11).

OBJECTIVE

A creel survey of the Filer Ponds was completed in 2015 to assess angling effort and utilization of stocked Rainbow Trout in this new fishery.

METHODS

An angler creel survey was conducted at Filer Pond in May and June 2015, in conjunction with catchable stocking. In July and August, water quality conditions (primarily water temperature) at Filer Pond became unsuitable for trout survival, thus no fish were stocked. By September, catchable stocking resumed, but the creel survey did not.

Creel survey days and start times were randomly selected for weekdays and weekend/holidays, with four weekend and four weekday surveys conducted each month. Anglers were surveyed for four hours each survey day, and catch and time fished was obtained only for completed trips. Angler counts were made at the beginning and end of the survey period to estimate total effort. Because all anglers surveyed once their trip was complete, we used the ratio of means estimator to estimate catch rates. Formulas and methods for estimating total catch and total effort are detailed in Pollock et al. (1994).

Catchables were also tagged with T-bar anchor tags as part of IDFG's "Tag You're It!" program in order to estimate angler harvest and total catch, as well as how long catchables provide a fishery. Tagged fish were released once in May, June, September, and October. Estimates of the percent of fish harvested and caught (i.e., harvested plus released fish) were made using the methods of Meyer et al. (2012) and Meyer and Schill (2014). Anglers who reported tags were asked a series of questions, including the date of capture, from which we calculated days-at-large from the time of stocking to the time of angler catch.

A subset of anglers were asked to participate in a questionnaire to gauge angler support for the current six-trout bag limit and to gauge potential support for a two-trout bag limit if it could improve fishing quality (i.e, catch rates); the questionnaire is provided in Figure 12.

RESULTS

A total of 101 anglers were surveyed in May and June 2015 at Filer Ponds for completed trip catch and effort. Anglers expended a total of 4,630 h (SE = 2,581) and caught 579 trout (SE = 2,581). Anglers harvested about 2/3 of their catch and released the remainder. Angler catch rate was estimated to be 0.23 fish/h, the vast majority of which was catchable-sized hatchery Rainbow Trout; a few Albino Trout were also caught. There was no indication that catch rate was higher on the days immediately following stocking compared to days well after stocking. In fact, based on our limited data, catch rates at Filer Ponds appeared to be lower on days soon after stocking and increased through time (Figure 13).

Based on tag reports and necessary corrections, 76% of the fish stocked in May and 28% of the fish stocked in June were caught by anglers; combining all release events, anglers caught an average of 46% of the catchables stocked in Filer Ponds. Extrapolating the catch percentages in May and June to the total number of fish stocked in May (686) and June (796) produced an estimate of 746 catchables caught by anglers in May and June, similar to the estimate of 579 from the creel survey. Mean days-at-large for catchables stocked in May and June was 13.6 d (median = 11 d), and 95% were caught within 32 d of stocking (Figure 14).

A total of 51 anglers were interviewed in May and June at Filer Ponds to evaluate their satisfaction with current fishing conditions and regulations and their opinion about reducing bag limits from 6 to 2. Few of the anglers surveyed (22%) were unsatisfied or very unsatisfied with their current fishing experience at Filer Ponds (Figure 15). Fewer still (8%) were unsatisfied or very unsatisfied with the current six-fish bag limit. Even if it were shown that daily catch rates would become more consistent between stocking events if the bag limit was reduced to two trout, more people would be satisfied or very satisfied with keeping the current six-trout bag limit (75%) rather than switching to the two-trout bag limit (66%). If the bag limit was changed from six trout to two trout, more anglers said they would fish less often (31%) than more often (20%).

DISCUSSION

The results from this study demonstrate that the vast majority of anglers are currently satisfied with fishing at Filer Ponds despite catch rates of 0.23 fish/h. Most anglers queried do not support switching to a two-trout bag limit, even if it were shown to smooth catch rates after stocking. Moreover, our results suggest that catch rates may not need smoothing at Filer Ponds. Indeed, rather than declining through time, catch rates appeared to increase as the number of days post-stocking increased, although this relationship was admittedly based on limited sample size. More data on catch rates at various days post-stocking at Filer Ponds and other similar moderate- or high-use community ponds would help clarify whether catch rates are higher on days immediately after catchable stocking compared to many days later; if not, there would be no reason to switch to a two-trout bag limit. Furthermore, a strong segment of community pond anglers will likely still not support switching to a two-trout bag limit even if declining catch rates were demonstrated. Most anglers were at least neutral if not already satisfied with their current angling experience at Filer Ponds, where they experience an average catch rate of about 0.2 fish/h. Anglers at small Alberta lakes stocked with catchable trout were generally satisfied if catch rates exceeded only 0.08 fish/h (Patterson and Sullivan 2013), suggesting high catch rates may not be necessary to achieve acceptable levels of angler satisfaction. Anglers at Filer Pond from May to October currently catch about 46% of the catchable IDFG stocks, which is above the Department's goal of 40% return-to-creel for successful catchable stocking events.

HAGERMAN WILDLIFE MANAGEMENT AREA

ABSTRACT

During September 2015, we chemically renovated Anderson Ponds 3 and 4, as well as Riley Pond within the Hagerman Wildlife Management Area in an effort to eradicate Common Carp *Cyprinus carpio*. We applied a total of 257 L of liquid rotenone into these three waters. Lethal concentrations were confirmed within two hours from initial application and no live fish were observed afterwards.

Reintroduction of Largemouth Bass *Micropterus salmoides* and Bluegill *Lepomis macrochirus* was completed in West Highway Pond on the Hagerman WMA in the spring of 2016. Translocation objectives for Largemouth Bass were not achieved in West Hwy Pond in 2016. Translocation objective for Bluegill was achieved in West Hwy Pond in 2016.

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INTRODUCTION

The Hagerman Wildlife Management Area (HWMA) is located approximately 4 km south of Hagerman, Idaho in Gooding County. It is located near several Magic Valley communities and the HWMA provides fishing opportunities to hundreds of anglers each year. The HWMA is primary managed for waterfowl; however, anglers and upland game hunters are the primary recreational users of the HWMA (Dennis Newman - IDFG Habitat Biologist, Personal communication).

The HWMA includes many small ponds most of which support fisheries. Since 1940, a series of ponds were developed with dikes and dams to provide habitat for fish and wildlife and associated recreational opportunities. In all, there are 16 ponds located on the HWMA including: Oster Lakes 1-6; Anderson Ponds 1-4; Big and Little Bass Ponds; the Goose Pond; Riley Creek Impoundment (aka Riley Pond); the Hatchery Settling Pond and the West Pond (aka West Highway Pond or Highway Pond). Pond water levels are maintained primarily by Riley Creek and Tucker Springs water. The 14º C spring water that flows through the HWMA provides high quality trout habitat.

The aquatic habitat is suitable for both cold water and warm water fish species depending on spring inflow and distance from spring heads. The ponds are shallow with mean water depths of approximately 1 m and maximum depths of 2.0-2.5 m. All ponds are characterized by having marsh-like bottoms which, combined with shallow water, support extensive emergent and submergent aquatic vegetation. Overhanging vegetation is present around all ponds where trees and shrubs are abundant.

There are three separate fishing seasons that cover all fisheries on HWMA. Because of the WMA's importance as a waterfowl resting area during the winter and nesting area during the spring, the fishing season on the Anderson Ponds, Goose Pond, and West Pond is open from July 1 to October 31. Riley Creek upstream of the state fish hatchery diversion is open to fishing year-round. All other waters on the WMA including the Oster Ponds are open from March 1 to October 31. The March 1st opening day is extremely popular with fishermen.

Based on an IDFG economic survey in 2011, it is estimated that anglers spent over $1,000,000 to fish at HWMA. Cost to IDFG for the fish stocked is about $40,000 based on the average annual stocking of 51,000 trout/year which demonstrates the value of these fisheries.

Historically, the Hagerman Wildlife Management Area (WMA) south of Hagerman, Idaho provided some of the best Largemouth Bass *Micropterus salmoides* and Bluegill *Lepomis macrochirus* fishing opportunities in the Magic Valley region. The Oster Ponds provided fishing opportunity for bass and Bluegill with anglers fishing from both the bank and from small watercraft such as float tubes. The establishment and spread of Common Carp *Cyprinus carpio* during the mid- to late-1990s is thought to have decreased fisheries quality.

Common Carp are native to Asia and are known to alter water quality, reduce primary productivity, and severely affect recreational fisheries (American Fisheries Society 1987). They are fast growing and can produce millions of offspring. Once carp become established in a fishery, they are extremely difficult to control.

In 2011, IDFG started a multifaceted approach to understanding the fish communities present on the HWMA. This included conducting an angler creel survey for comparison to surveys completed during the 1980s survey and inventorying water structures and water movement, as well as estimating carp occurrence and abundance throughout the HWMA. The 2011 creel census

results documented that angler use of the HWMA fisheries had significantly declined when compared to the 1986 study (Grunder 1986). We concluded use had declined in large part due to the lost productivity associated with the occurrence and abundance of carp.

The Department sampled the ponds and determined carp were present and relatively abundant in all but three ponds on the WMA (Big Bass Pond, Little Bass Pond, and the Goose Pond). It was determined that most of the resident fisheries would benefit if carp were either removed or their numbers were significantly reduced.

To accomplish this goal, we considered management options ranging from no action to complete renovation, with complete renovation being the most extreme and expensive alternative. Our initial efforts to mechanically reduce carp densities were costly and unproductive which led to the decision to use piscicides. In 2013, we applied liquid rotenone to kill all fish in Anderson Ponds #1 and #2. In 2014, we applied rotenone to Oster Lakes #1-6. In 2015, staff chemically renovated the last three ponds including Anderson Ponds #3 and #4 as well as Riley Pond.

The ultimate goal of this effort is to improve the sport fish fishing opportunity on the WMA and increase anglers use to levels that would match or exceed those estimated in 1986 (Grunder et. al 1986).

STUDY SITE

The HWMA is a 356-ha, IDFG-owned property that is located along Highway 30, south of the town of Hagerman, Gooding County, ID. The Anderson Ponds Complex resides within the WMA. The Riley Creek Impoundment receives outflow from Anderson Ponds #2 and #3 as well as water from Riley Creek (Figure 16)

OBJECTIVE

The objectives of our 2015 management efforts were to: 1) chemically renovate (eradicate carp) Anderson Ponds #3 and #4, as well as Riley Pond, and 2) re-establish Largemouth Bass and Bluegill populations in West Highway Pond and Anderson Pond #3.

METHODS

Rotenone Application

Prior to the application of rotenone, Largemouth Bass and Bluegill in the ponds were captured using electrofishing techniques and unbaited trap nets. These fishes were transported and temporarily held in the Goose Pond on the Hagerman WMA located approximately 0.5 km from the area. These translocated fishes would later serve as a source for reintroduction following the rotenone application.

Anderson Ponds #3 and #4, as well as Riley Pond were drawn down to maximize the efficiency of the treatment, to isolate the ponds (no outflow), to reduce the amount and cost of chemical needed, and to separate fish from the complex cover (i.e. near shore submergent and emergent vegetation). On July 7, 2015, all water control structures downstream of the West Highway Pond were opened which lowered water levels as much as possible considering outflow

design and without pumping. At the same time, all inflow to these ponds were curtailed. The ponds remained without inflow and open outlets for 75 d prior to the application of rotenone to minimize treatment volume (Figure 17). Additionally, water drawdown isolated fishes from complex cover associated with shorelines and concentrated them in shallow pools which would simplify the treatment and increase the probability of a complete eradication of carp.

We estimated the volume of each remaining pool to determine the volume of rotenone product needed for an effective treatment. Pool volumes were calculated by measuring average length, width, and depth. We used a laser rangefinder and manually measured water depths from a johnboat. Estimates are reported in Table 3. Flows from incoming irrigation canals and board leakage from Riley Creek diversion that could not be fully diverted were calculated.

Chemical treatment was implemented for Anderson Pond #3 and #4, Riley Pond, and Riley Creek from the hatchery diversion to the Riley Creek Impoundment. Staff followed rotenone application guidelines as outlined in the Planning and Standard Operating Procedures for the Use of Rotenone in Fish Management (Finlayson 2000). Prenfish™ Toxicant (5.0 % rotenone) was the product selected to complete the fishery renovation. We adhered to label prescribed mixing and application requirements. The ponds were treated at a label prescribed rate of 4 ppm prescribed use on carp in an organic rich environment. Fish toxicant was applied using backpack pesticide application sprayers, an ATV pesticide application setup (2.5-m boom) attached to a boat, and drip stations.

Sentinel cages were used to determine treatment efficacy. Sentinel cages containing eight to ten Rainbow Trout were deployed in all three treatment locations. These cages were checked to confirm if the product was applied at a lethal concentration with success being confirmed if all fish within the cage expired.

We also deployed sentinel cages downstream of the primary detoxification station to monitor detox efficiency and to provide a trigger to activate a failsafe should the primary station not function properly. A 190-L drum with premeasured potassium permanganate (KMnO4) mixture was positioned downstream of the primary detox. This drum would provide appropriate detox concentrations for up to one hour should it be needed.

The primary detoxification station was activated 30 minutes prior to rotenone application on September 22, 2015. The site was located at the outflow to Riley Pond. This detoxification station used a standard dry product hopper to introduce the potassium permanganate into a known flow generated by a Honda 60 gal/min trash pump. The potassium permanganate solution was calibrated to detox 8 ppm of rotenone at flows measured just below the bridge. Concentrations remained active until 24 h past the time when fish survival was documented in the treated ponds.

Riley Pond received the only outflow from the combined treatment area. Potassium permanganate was delivered using an auger delivery device that premixed the dry product with water prior to applying to rotenone water passing out of Riley Pond. The primary detoxification station delivered the potassium permanganate solution through perforated two-inch diameter PVC booms that spanned the entire wetted perimeter of the outflow.

Rotenone neutralization was implemented by applying potassium permanganate at a 1.5:1 ratio to the rotenone concentration. Rotenone was applied at 4 ppm; therefore we applied potassium permanganate at 6 ppm assuming rapid rotenone degradation. The application rate for the maximum expected discharge is shown in Table 3.

The detoxification site neutralized rotenone-laced discharges ranging from <1 to 15 cfs with 15 cfs only occurring after Riley Pond was fully refilled.

In addition to the potassium permanganate treatment, rotenone concentrations were further reduced through dilution. A total of 121 cfs of fresh water (Riley Creek and Tucker Springs) is currently released from the Hagerman State Fish Hatchery into the Riley Creek streambed downstream from the primary detoxification station. This mixing occurred about 350 meters downstream from the primary detoxification site which, based on dye test, took over two hours transport time for water to move through this reach. The two-hour transport time provided a sufficient detoxification window and the already detoxified water was further diluted at a rate range from 8:1 to 121:1 (fresh water : treated water) depending upon the discharge through the Riley Pond outlet (<1-15 cfs; 15 cfs is max flow possible).

A backup station was set up in a canal downstream of the primary station. This location was chosen to assure protection of a private fish production facility that was using the same water source for year-round fish production. This station will be conservatively calibrated to apply 2 ppm of potassium permanganate given the extreme dilution effect described above. A live cage was placed in the canal upstream of the backup detox station and about 1 mile downstream. This setup allowed for a rapid response should fish in the live cages shows signs of stress.

We began to reintroduce water into the complex at the beginning of the treatment. This occurred through seepage into Riley Pond as the dam boards were placed into the outflow of Riley Pond outlet. The water was introduced slowly to dilute the treated water and facilitate oxidation of the rotenone product. Sentinel cages were used to determine when the rotenone oxidized sufficiently and concentrations were no longer lethal. Cages containing live fish were placed in three locations approximately every three days and evaluated after 24 h. This testing continued until fish were documented to survive at least 24 h.

Warm Water Fishery Rebuild

We stocked at densities outlined in (Soderberg and Swistock 1995) to rebuild the warm water fish community in the West Highway Pond (5.6 ha). These densities were developed for northern latitude farm ponds. In order to achieve a balanced fish community, reintroduction or stocking ratios of 25 Largemouth Bass and 100 Bluegill per surface acre were utilized.

RESULTS

Rotenone Application

Prior to treatment, we salvaged 81 Largemouth Bass and 66 Bluegill. Those fish were transported and released into the Goose Pond for later reintroduction efforts.

The pre-rotenone drawdown was a successful approach toward maximizing treatment efficiency. The resulting standing pools could not be completely isolated from the connecting streams; therefore, the stream inflows were treated separately from the standing pools. Seven drip stations treated flowing water. One detoxification station was activated during the treatment. The volume of water to be treated was substantially reduced and fish access to complex habitat was essentially eliminated.

Treatment was initiated at approximately 0900 h and completed by 1630 h that same day. We cumulatively applied 257 L of product into the three impoundments (Table 3). Lethal concentrations were confirmed within two hours from initial application.

Detoxification was established approximately four days after treatment. Fresh water was introduced into the pond complex at the time of treatment to accelerate the dilution of the rotenone solution.

Warm Water Fishery Rebuild

Largemouth Bass reintroduction was completed in West Highway Pond during March and April 2016 and included the translocation of 100 Largemouth Bass. Full translocation objectives for Largemouth Bass were not achieved. One thousand four hundred Bluegill were stocked into the West Highway Pond. Full translocation objectives for Bluegill were achieved in West Hwy Pond in 2016.

DISCUSSION

Rotenone Application

Treatment time to dispense all chemical lasted longer than anticipated as the spray unit dispensed product more slowly than expected. No removal of dead fish took place after the treatment. Most fish were scavenged within a couple days by birds or mammals. Visual observations of treatment efficacy were conducted from a johnboat. No live fish were observed. Electrofishing surveys should be conducted in the near future.

Warm Water Fishery Rebuild

Warm water fish re-stocking efforts approached recommended densities and ratios reported in the literature for ponds in northern latitudes. Since stocking densities for Bluegill were achieved no additional Bluegill should be stocked in the West Hwy Pond. If possible, an additional 250 Largemouth Bass should be stocked in the West Hwy Pond in the spring of 2016 to meet overall stocking densities in the fishery.

RECOMMENDATIONS

1. Translocate an additional 250 Largemouth Bass into the West Hwy Pond.
2. Translocate Bluegill and Largemouth Bass in Anderson Ponds 3 and 4, as well as Riley Pond in spring of 2016.
3. Monitor newly-established Bluegill and Largemouth Bass populations after three years to determine if a balanced community has become established.
4. Evaluate habitat conditions for Bluegill and Largemouth Bass in all newly renovated waters of the Hagerman WMA.

FIGURES

Figure 1. Satellite image of Anderson Ranch Reservoir (Google Earth image). Top of map is north.

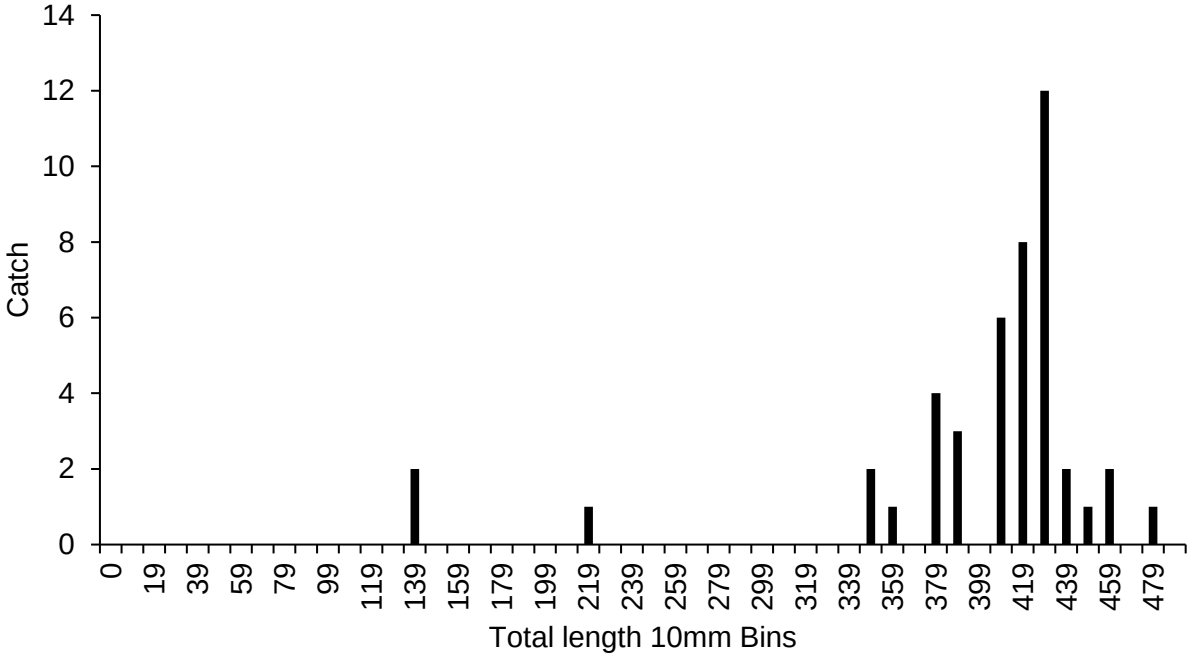

Figure 2. Length-frequency histogram for kokanee collected with gill nets during 2015 (*n* = 45).

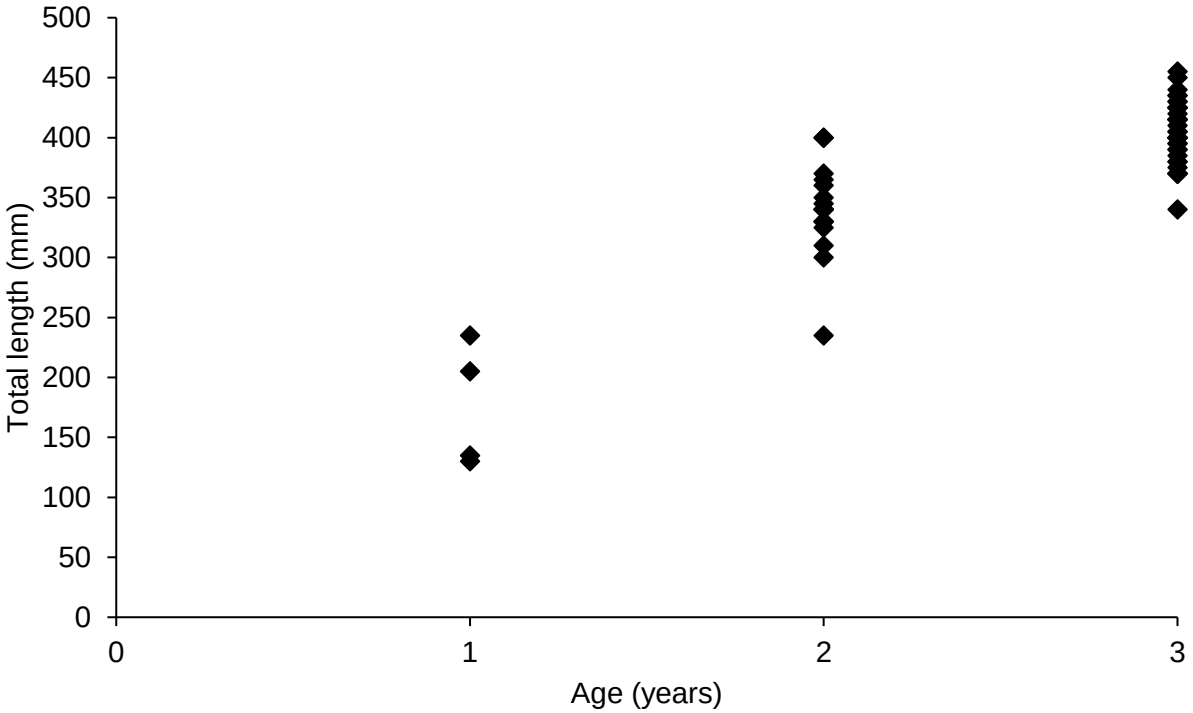

Figure 3. Length at age (at capture) for kokanee sampled from Anderson Ranch Reservoir with gill nets and creel in 2015 (*n* = 59).

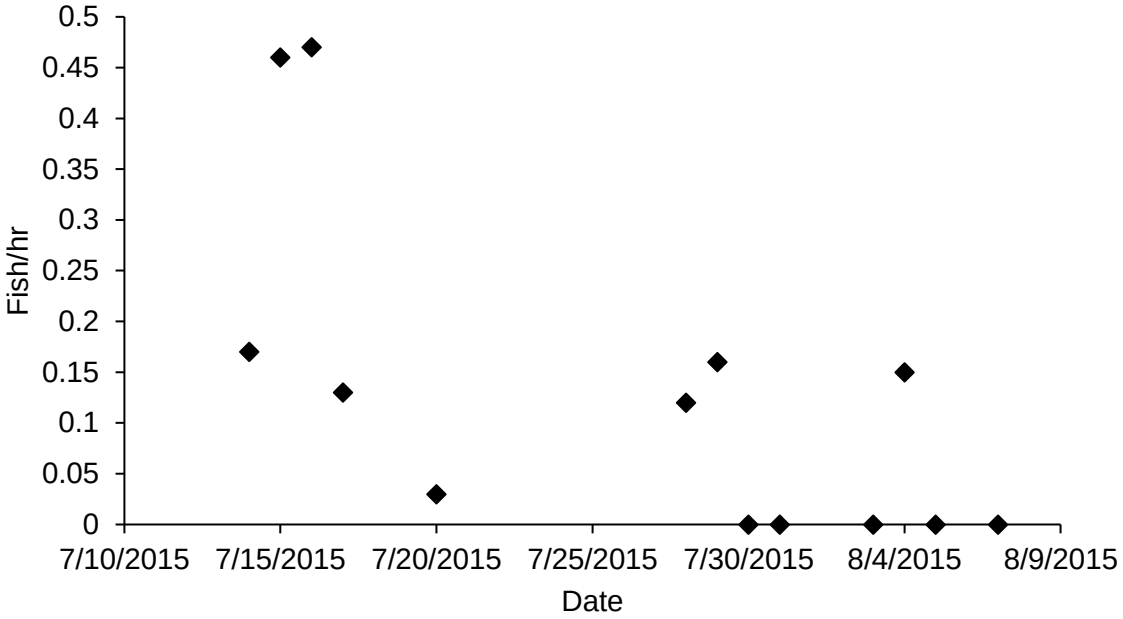

Figure 4. Mean kokanee catch rates for each creel survey date at Anderson Ranch Reservoir in 2015 (*n* = 13).

Figure 5. Satellite image of Castle Rocks State Park pond, (Google Earth). Top of map is north.

Figure 6. Satellite image of Dierkes Lake, (Google Earth). Top of map is north.

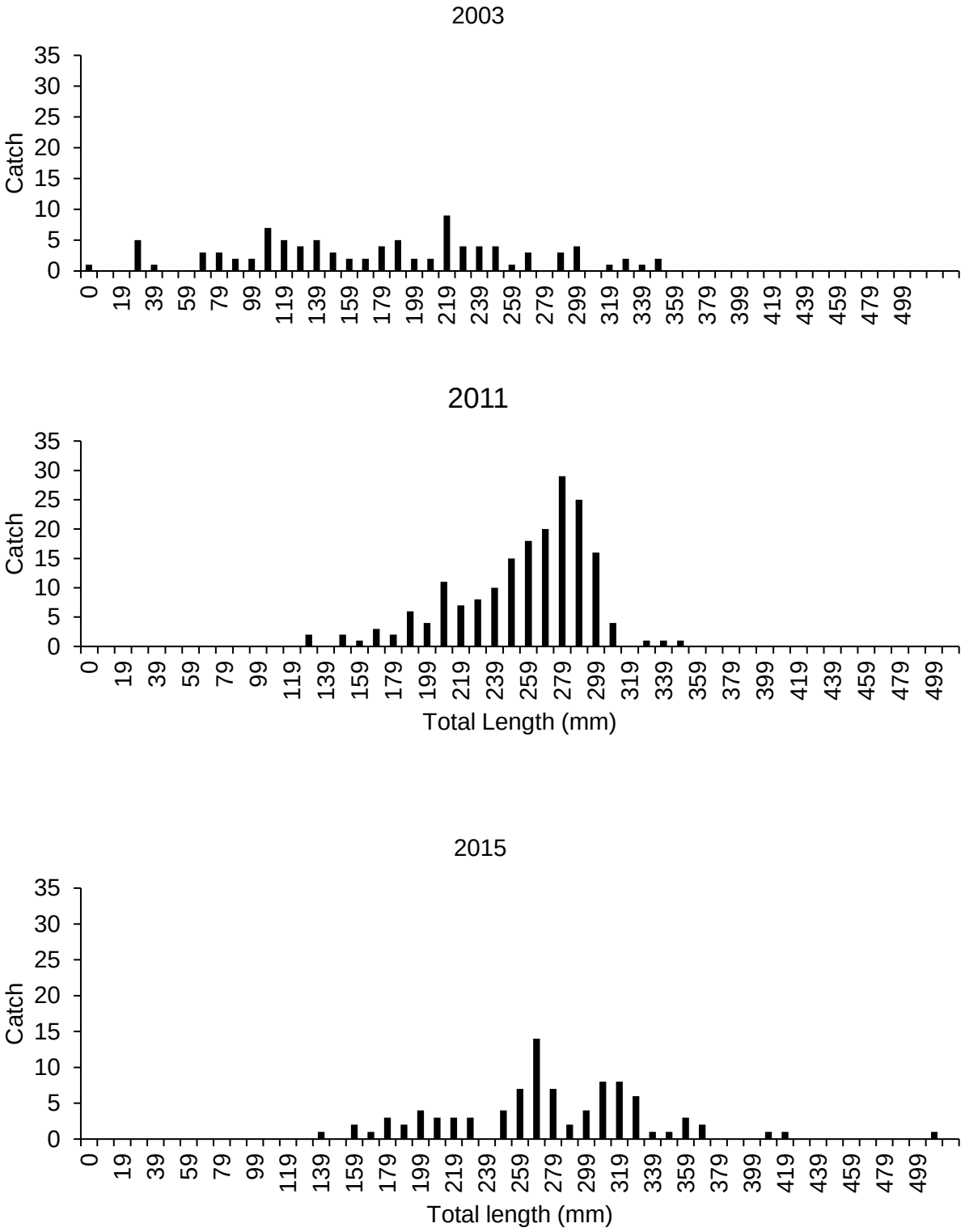

Figure 7. Comparative length-frequency histograms for Largemouth Bass sampled from Dierkes Lake in 2003 (*n* = 96), 2011 (*n* = 186), 2015 (*n* = 92) via electrofishing.

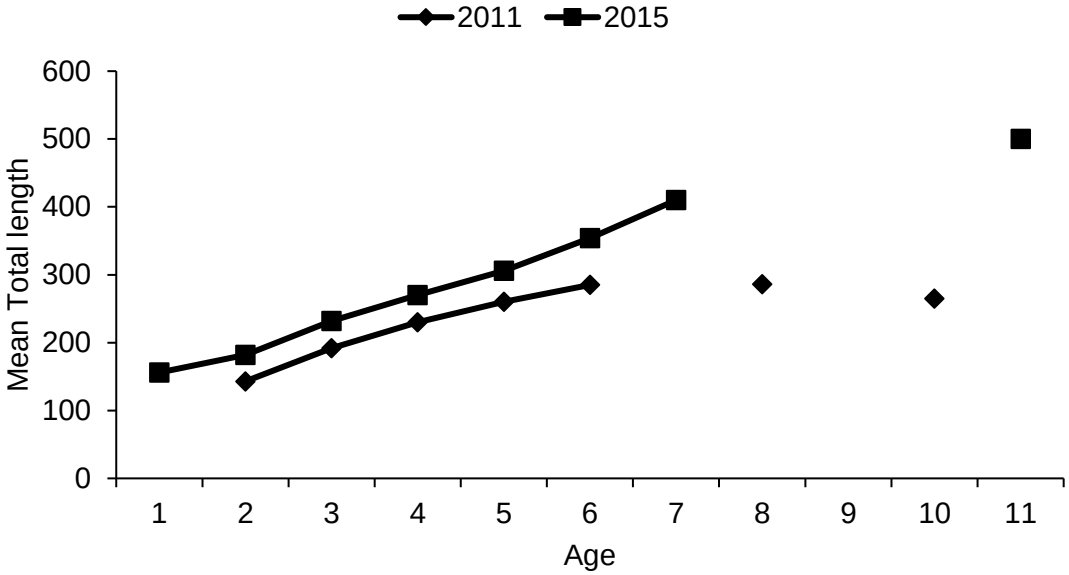

Figure 8. Comparative mean length at age (at capture) for Largemouth Bass sampled with electrofishing from Dierkes Lake during 2011 and 2015.

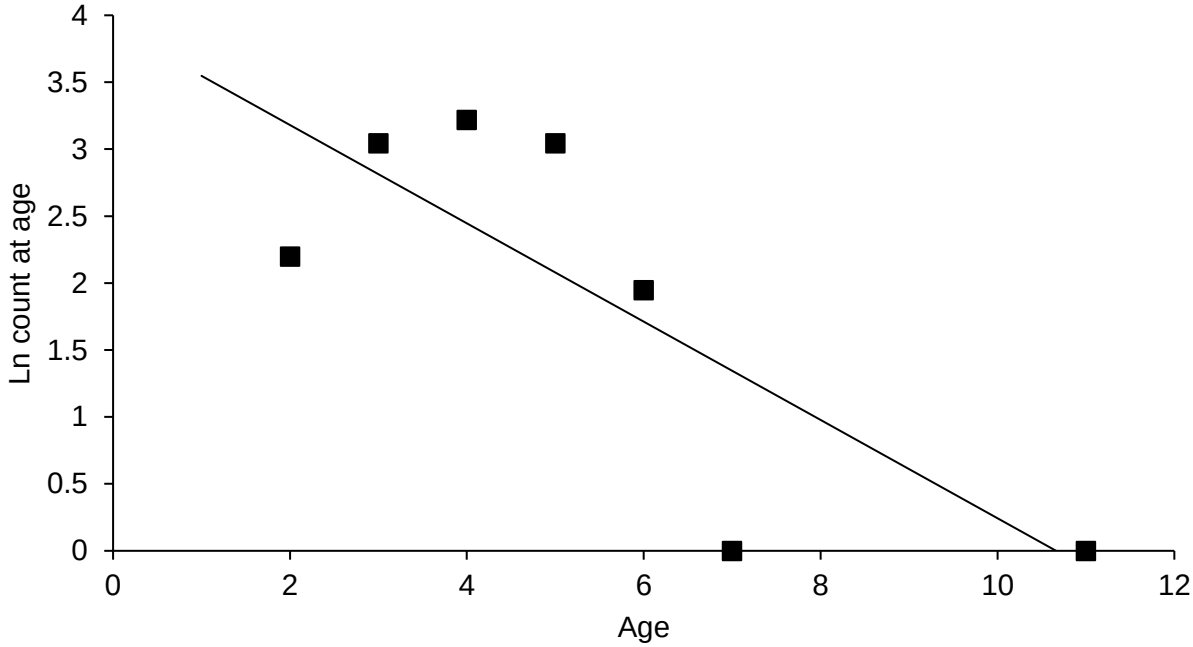

Figure 9. Weighted catch curve for Largemouth Bass (*n* = 92) sampled from Dierkes Lake during 2015 with electrofishing.

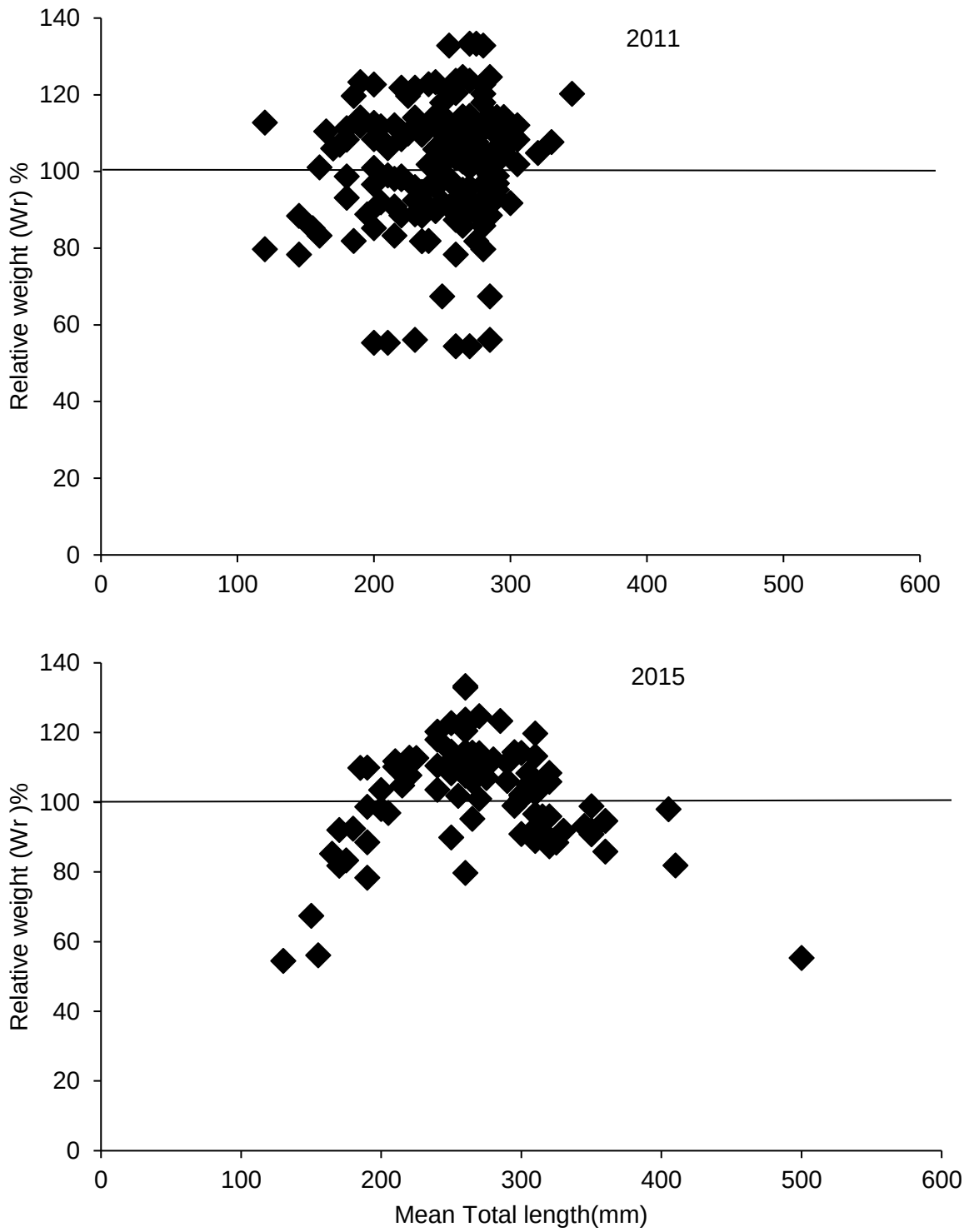

Figure 10. Relative weights for Largemouth Bass sampled during 2011 (*n* = 186) and 2015 (*n* = 92) from Dierkes Lake with electrofishing.

Figure 11. Satellite image of Filer Ponds (Google Earth). Top of map is north.

Idaho Fish and Game has been evaluating the harvest of hatchery trout in community ponds around the state. We have found that in many community ponds, most stocked trout are harvested soon after stocking. This results in good catch rates for a few days after stocking, followed by many poor days of fishing until the next stocking event. Stocking more fish or stocking more frequently is not an option due to costs.

The Department is considering reducing the bag limit in Filer Ponds with the expectation that stocked trout will last longer and/or be available to more anglers. Additionally, this may produce higher catch rates for more days after stocking than our current bag limit produces. Before we propose to make this change, we are interested in your opinions.

(Circle answer)

1: VERY UNSATISTIFIED	2: UNSATISFIED	3: NEUTRAL	4: SATISFIED	5: VERY SATISFIED

1	How satisfied are you with your current fishing experience in Filer Ponds?	1	2	3	4	5
2	How satisfied are you with the current 6 trout daily bag limit in Filer Ponds?	1	2	3	4	5
3	If it were shown that daily catch rates of stocked trout could be more consistent between stocking events if the bag limit was reduced to 2 fish daily:					
	3a. how satisfied would you be with changing to a 2 fish limit?	1	2	3	4	5
	3b. how satisfied would you be with keeping the current 6 fish limit?	1	2	3	4	5
4	If Filer was switched to a 2 fish daily bag limit, would you fish at Filer...	a. Less often. b. About the same. c. More often.				

Figure 12. Copy of the questionnaire administered to anglers surveyed at Filer Pond in 2015.

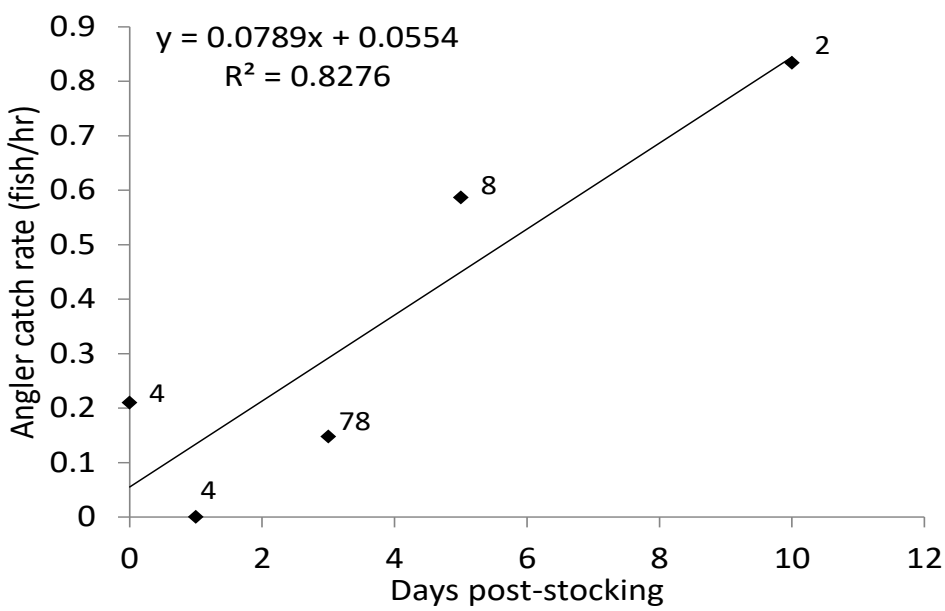

Figure 13. Mean angler catch rates in relation to days post-stocking at Filer Pond for May-June and Sep-Oct 2015. Numbers near each data point represent angler interview sample sizes. The equation and line through the data represent a linear regression fitted to the data.

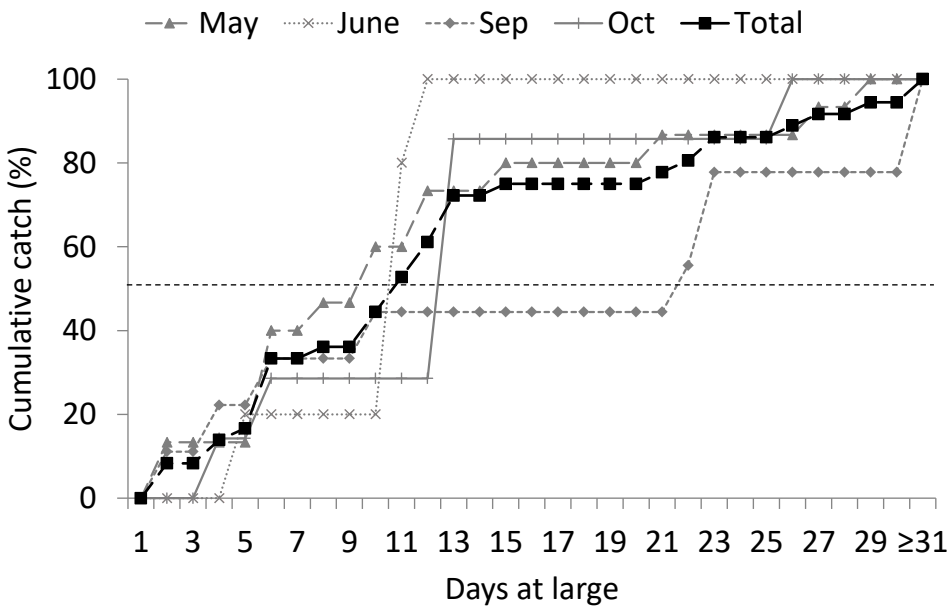

Figure 14. Days-at-large for catchables stocked in Filer Pond in 2015.

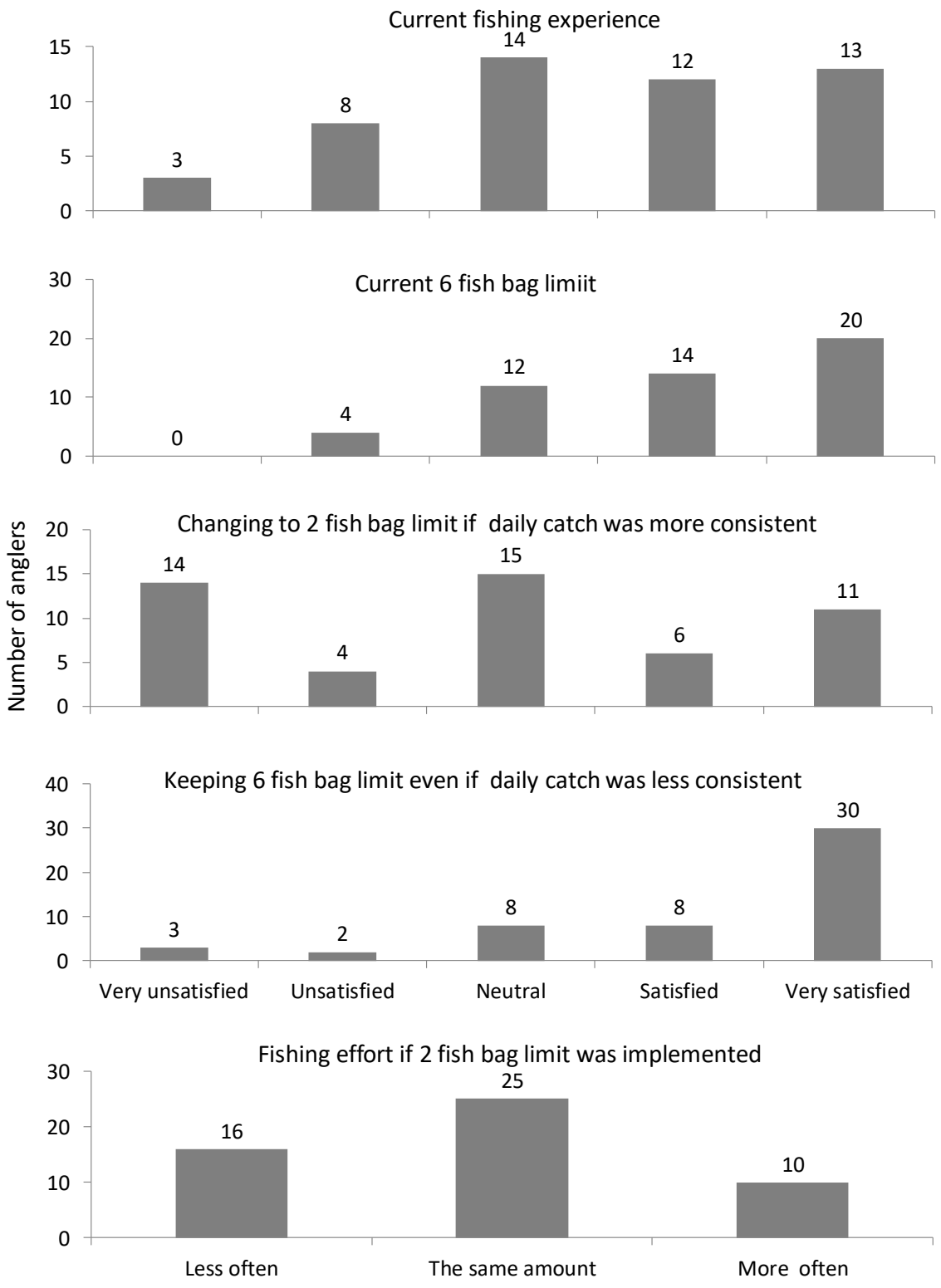

Figure 15. Responses to angler questionnaire administered to Filer Pond anglers in 2015. Numbers above each bar represent the number of anglers with that particular response.

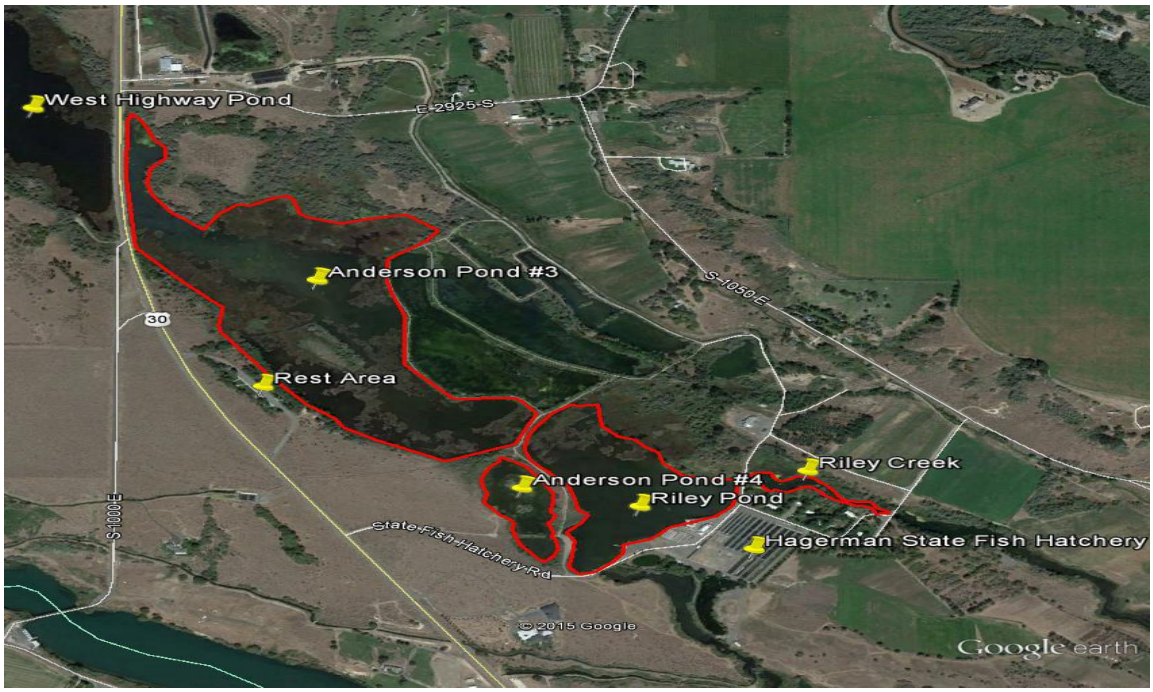

Figure 16. Satellite image of Hagerman wildlife management area (Google Earth). Top of map is north.

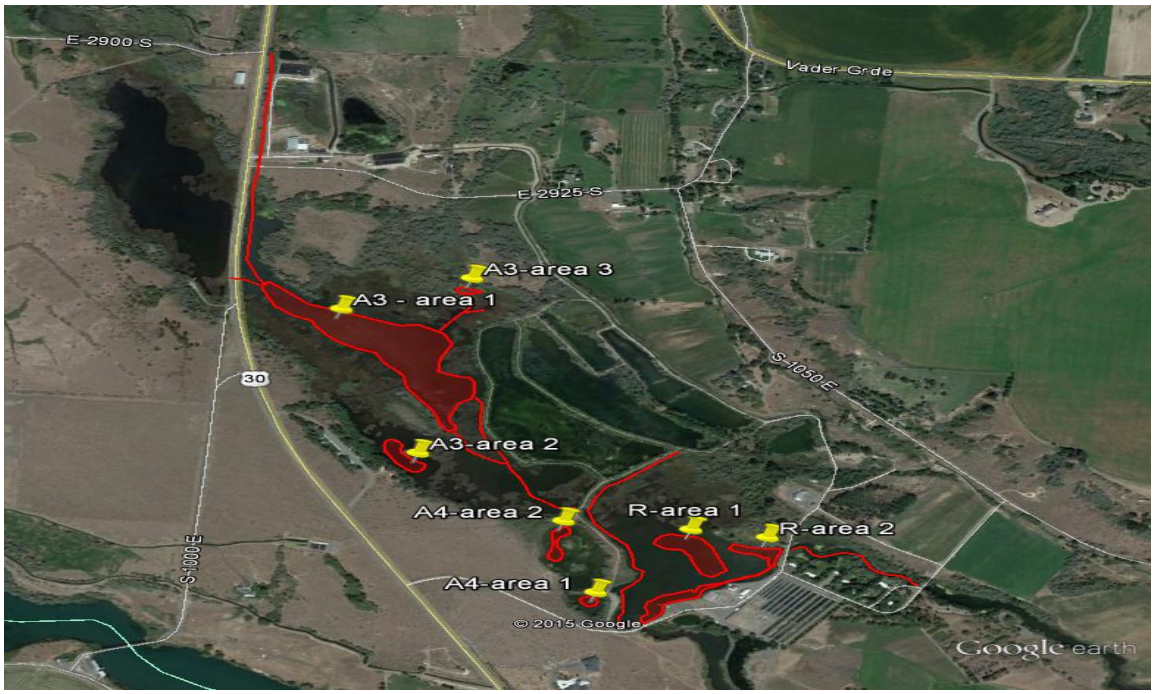

Figure 17. Red areas depict pools after drawdown as of September 1, 2015.

TABLES

Table 1. Summary of Largemouth Bass population characteristics from Dierkes Lake. Samples were collected with boat electrofishing during 2009, 2011, and 2015.

Largemouth Bass Population Metric	2003	2011	2015
Catch (#)	96	186	92
Effort (h)	0.83	1.5	1.5
Catch per hour	116	124	61
Mean Length (mm)	221	249	248
Length at age-5 (mm)	300	260	307
PSD	33	12	38
RSD-Q		88	34

Table 2. The number of catchable-sized hatchery Rainbow Trout tagged (with T-bar anchor tags) and stocked in Filer Pond in 2015, the number reported by anglers, and resulting estimates of harvest and total catch (i.e., harvested and released fish combined).

Tagging	Tagged fish	Tags reported by anglers as:		Adjusted harvest		Adjusted total catch	
date	stocked	Harvested	Released	Estimate	90% C.I.	Estimate	90% C.I.
19-May-15	35	13	1	0.66	0.33	0.76	0.35
15-Jun-15	32	4	1	0.22	0.22	0.28	0.24
29-Sep-15	35	6	2	0.31	0.24	0.46	0.29
26-Oct-15	35	4	3	0.20	0.20	0.36	0.26

Table 3. Applications rates selected as determined by product label guidelines for lakes and reservoirs to eradicate carp in organic rich habitat. Lower table demonstrates range of product needed based on changing pool dimensions. Treatment at 4 ppm with 5% rotenone product where 1 gallon of rotenone treats 0.75 acft of water.

Water	Water type	Station / area	Delivery method	Volume (acft)	Discharge (ft^3/sec)	Treatment Duration (hrs)[b]	Estimated product (l)[c]
				Rotenone			
	Lotic	A3-1 (Canal Outlet)	Drip 1	NA	9.93	4	7.8
			Drip 2	NA		4	7.8
		A3-2 (West)	Drip	NA	0.25	4	0.42
		A3-3 (Private North)	Drip		1.75	4	3.01
		A3-4 (Private South)	Drip		1.75	4	3.01
Anderson Pond #3	Lentic	A3-area 1	Boat	25.56	NA	NA	129
		A3-area 2	Backpack	3.67	NA	NA	18.5
		A3-area 3	Backpack	0.17	NA	NA	0.9
		Misc	Backpack	0.7	NA	NA	3.5
						Total	173.9
	Lentic	A4-area 1	Backpack	3.07	NA	NA	15.5
Anderson Pond #4		A4-area 2	Backpack	5.65	NA	NA	28.5
						Total	44
	Lotic	R#1 (Riley Cr)	Drip	- NA -	1.01	4	1.67
		R#2 (And 2 outlet)	Drip	- NA -	3.33	4	5.52
		R#3 (Canal bypass)	Drip	- NA -	0.21	4	0.35
Riley Pond		Misc	Backpack	- NA -	- NA -	- NA -	1.9
	Lentic	R-area 1	Backpack	3.51	- NA -	- NA -	17.7
		R-area 2	Boat	2.44	- NA -	- NA -	12.3
						Total	39.5
						Grand Total	257.4
				Potassium Permangenate			
Riley Pond outlet	Lotic	Detox [d]	Hopper	- NA -	1.0 - 13.5	72	84 - 89 lb
Canal		Backup station	Drip	- NA -	37.3	1.5	10 lb
						Total	94 - 99 lb

[a] Product amount determined using label where 0.75 acre-fee are covered by one gallon

[b] Rotenone label recommends a treatment time of 4 h or more; each drip station was calibrated and treatment time varied

[c] Product needed to achieve four ppm

[d] Detoxification occurred at six ppm

LITERATURE CITED

American Fisheries Society. 1987. Carp in North America. Pages 10-12 *in* Edwin L. Cooper, editors. American Fisheries Society, Bethesda, Maryland.

Anderson, R. O. and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 *in* B. R. Murphy and D. W. Willis, editors. Fisheries Techniques. 2nd edition. American Fisheries Society, Bethesda, Maryland.

Cohen, J. 1988. Statistical power analysis for the behavioral sciences. Second edition. Lawrence Erlbaum Associates, publishers. Hillsdale, New Jersey.

Finlayson, B.J.,R.A. Schnick, R.L. Cailteau, L. DeMong, W.D. Horton, W. McClay, C.W. Thompson, and G.J. Tichacek. 2000. Rotenone use in Fisheries Management: administrative and technical guidelines manual. American Fisheries Society, Bethesda, Maryland

Grunder S. A. 1986. Regional Fishery Management Investigations. Idaho Department of Fish and Game. Job Completion Report, IV-C. Project F-71-R-9.

Idaho Department of Fish and Game. 2013. Fisheries Management Plan 2013-2018. Boise.

Meyer, K. A., F. S. Elle, T. Lamansky, E. R. J. M. Mamer, and A. E. Butts. 2012. A reward-recovery study to estimate tagged-fish reporting rates by Idaho anglers. North American Journal of Fisheries Management 32: 696-703.

Meyer, K. A., and D. J. Schill. 2014. Use of statewide angler tag reporting system to estimate rates of exploitation and total mortality for Idaho sport fisheries. Transactions of the American Fisheries Society 34:1145-1158.

Partridge, F. E. and C. D. Warren. 1994. Regional fisheries management investigations. Idaho Department of Fish and Game. Job Completion Report, Project F-71-R-18. Boise.

Partridge, F. E. and C. D. Warren. 1995. Regional fisheries management investigations. Idaho Department of Fish and Game. Job completion report, project F-71-R-18, Boise.

Patterson, W. F., and M. G. Sullivan. 2013. Testing and refining the assumptions of put-and-take Rainbow Trout fisheries in Alberta. Human Dimensions of Wildlife 18:340-354.

Pollock, K. H., C. M. Jones, and T. L. Brown. 1994. Angler survey methods and their application to fisheries management. American Fisheries Society, Special Publication 25, Bethesda, Maryland.

Soderberg, R.W. and Bryan R. Swistock. 1995. Management of Fish Ponds in Pennsylvania. Penn State Cooperative Extension, College of Natural Resources, State College.

United States Bureau of Reclamation. 2015. http://www.usbr.gov/pn/hydromet/ramps/anderson/anderson.html

U.S.G.S. (U.S. Geological Survey). 1996. Water Resources Data – Idaho, Water Year 1995, Vol. 2. Upper Columbia River Basin and Snake River Basin below King Hill. USGS, Boise, ID.

Warren, C. D. and D. J. Megargle. 2009. Regional Fisheries Management Investigations - 2003 Annual Performance Report. Number F-71-R-28. Boise.

APPENDICES

Appendix A. Georeferenced locations for sampling and management efforts. Datum was WGS84.

Water	Site	Gear	Easting	Northing	Zone
Anderson Ranch Reservoir	1		626546	4801544	11
	2		625483	4802592	11
	3		627417	4803796	11
	4	Gill Net	627382	4803802	11
	5		630399	4805643	11
	6		630465	4806522	11
	7		634318	4807823	11
Castle Rocks State Park Pond	1	Exploitation	657324	4578970	11
	2		657324	4578970	11
Dierkes Lake	1	Efish	714676	4719288	11
	2		714695	4719274	11
	3		714403	4719283	11
	4		714523	4714328	11
	5		714088	4719198	11
	6		714461	4719203	11
Hagerman Wildlife Management Area	1	Rotenone	673561	4736871	11
	2		673579	4739087	11
	3		673604	4737931	11

Appendix B.

Fishery type	Equipment	Description
Lakes & Reservoirs	25 gallon Boom Sprayer	Rotenone application with 12 Crestliner Johnboat
	Scale	Pesola © : , 0-300 g, 0-1 kg, 0-2.5 kg scales
	Conductivity meter	Yellow Springs Instrument (YSI) model 30
	Depth sounder	Hondex© portable depth sounder
	Secchi disc	Standard; decimeter graduation
	pH meter	Oakton © hand held pH meter - Model 35624.2
	Power boat electrofisher	Smith-root © model SR-18 w/ model 5.0 pulsator
	Boom	Aluminum (2.6 m-long)
	Anode	Octopus-style steel danglers (1 m-long)
	Cathode	Boat and cathode array danglers - simultaneous
	Live well	Fresh flow aerated; 0.65 m^3
	Oxygen stone	35.6 X 3.8 cm (135 m^2); fine pore
	Generator	Honda © ; model EG5000x; 5,000 watt
	Electrofishing control box	Coffelt © ; model 15 VVP
	Sinking gillnet	6 panels (19, 25, 32, 38, 51, 64 mm bar-mesh); 38 x 1.8 m; monofilament
	Floating gillnet	6 panels (19, 25, 32, 38, 51, 64 mm bar-mesh); 38 x 1.8 m; monofilament
	Walleye Gillnet (FWIN)	8 panel (25, 38, 51, 64, 76, 102, 127, 152 mm bar-mesh); 61 x 1.8 m, monofilament
	Trap net	1.8 x 0.9 m box, 5 - 76 cm hoops, 15.2 m lead, 2 cm bar mesh
	Seine	18 m x 1 m, 6 mm mesh
	Seine	18 m x 1 m, 3 mm mesh
	Conductivity meter	Yellow Springs Instruments © (YSI); model 30
	Plankton nets	250, 500, 750 *u* mesh; 0.5 m diameter mouth; 2.5 m depth
	Temperature / D.O. meter	Yellow Springs Instruments © (YSI); model 550A
	Dip nets	2.4 m-long handles ; trapezoid heads (0.6 m^2); 9.5 mm bar-mesh
	Secci disc	Standard; decimeter graduation
	Thermograph	Onset-Tidbit© v2 temp logger.
	Field PDA	Juniper Systems ©, model Allegro handheld; waterproof, WinCE/DOS compatible
Rivers and Streams	Scales	AND© 5000g electronic, OHAUS© 3000g, electronic
	Power boat electrofisher	Smith-root © model SR-18 w/ model 5.0 pulsator - see above for specs.
	Raft	4.9 m-long rubber
	Anode	13.7 m-long power cord; 2.4 m-long fiberglass handle; 0.4 m diameter steel hoop
	Cathode	Boat
	Live well	208 L plastic garbage can; O_2 supplemented
	Drift boat	4.5 m-long aluminum
	Boom	4.3 m-long fiberglass
	Anode	Octopus-style steel danglers (1 m-long)
	Cathode	Boat
	Live well	208 L rubber stock watering tub; O_2 supplemented
	Scale	AND© 5000g,electronic, OHAUS© 3000g,electronic
	Scales	Pesola © : , 300 g, 1 kg, 2.5 kg, 5.0 kg scales
	Oxygen stone	35.6 X 3.8 cm (135 m^2); fine pore
	Generator	Honda © ; model EG5000x; 5,000 watt
	Electrofishing control box	Midwest lakes ©
	Oxygen stone	35.6 X 3.8 cm (135 m^2); fine pore
	Dip nets	2.4 m-long handles ; trapezoid heads (0.6 m^2); 9.5 mm bar-mesh
	Backpack electrofisher	Smith-root © model 15-D; single anode
	Conductivity meter	Yellow Springs Instrument © (YSI) model 30
	Thermograph	Onset-Tidbit© v2 temp logger.

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