State of California
The Resources Agency
California State Department of Fish and Wildlife
North Central Region

Rollins Reservoir, Nevada County

2013 Creel Survey Analysis

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Scientific Aid
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Introduction:

In order to evaluate the success of the fishery and associated angler satisfaction, the California Department of Fish and Wildlife (CDFW) conducted a creel survey at Rollins Reservoir during the 2013 fishing season. Rollins Reservoir receives regular allotments of rainbow trout (RT) on an annual basis. In the past it has also received plants of catchable size brown trout (BN) and kokanee salmon (KOK) fingerlings (Appendix A). In 2013, four stocking events of RT took place (Table 1). Prior to the March 2013 stocking event, T-Bar Anchor reward tags were inserted just below the dorsal fin of 400 RT (Figure 1).

Rollins Reservoir is part of the Bear River Watershed and is located in Nevada County just off Highway 174 near Colfax, Ca. Sitting at an altitude of 2,171 feet above mean sea level, Rollins Dam was built in 1965 and allows for a maximum storage capacity of 65,988 acre-feet and has a surface area of approximately 825 acres with nearly 26 miles of shoreline (NID 2014). At full capacity depths can reach up to 280 feet (CDFW 2002). Rollins Reservoir is managed by the Nevada Irrigation District for hydroelectric power, agricultural use and recreational activities.

Rollins Reservoir offers many recreational opportunities, providing visitors with four campgrounds located around the lake, all with boat launching facilities including two public marinas. Rollins is a well-known diverse fishery boasting populations of brown trout (*Salmo trutta*, BN), rainbow trout (*Oncorhynchus mykiss*, RT), smallmouth bass (*Micropterus dolomieu*, SMB) largemouth bass (*Micropterus salmoides*, LMB), spotted bass, (*Micropterus punctulatus*, SPB), black crappie (*Pomoxis nigromaculatus*, BCR), bluegill (*Lepomis macrochirus,* BG), redear sunfish (*Lepomis microlophus,* RSF), common carp (*Cyprinus carpio*, CAR), channel catfish (*Ictalurus punctatus*, CCF), brown bullhead (*Ameiurus nebulosus,* BBH*),* and Sacramento pikeminnow (*Ptychocheilus grandis,* SPK*)*. While all of these species can be caught by anglers, seasonal environmental changes make fishing more productive for individual species during certain times of the year.

Table 1. 2013 Rollins Reservoir Stocking Numbers

Date	Number	Weight (lb)	Size	Species	Tagged
3/15/2013	1300	1000	Catchable	RT-TL	400
5/23/2013	2400	1000	Catchable	RT-C	0
9/27/2013	4400	2000	Catchable	RT-S	0
10/10/2013	3360	1600	Catchable	RT-S	0

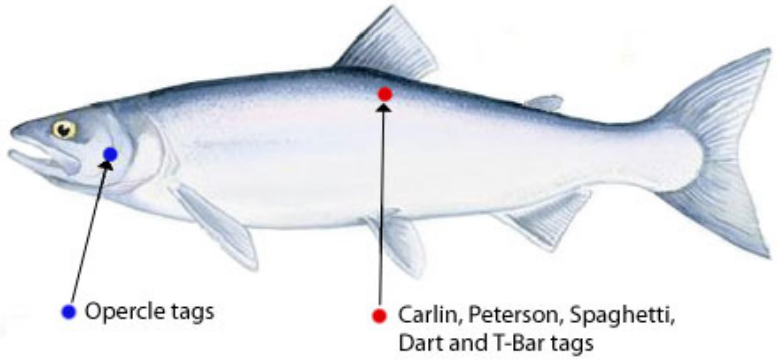

Figure 1. Reward T-Bar Tag Placement

Methods:

This creel survey was conducted by CDFW staff using a modified version of the stratified random sampling technique described by Malvestuto (1996). Changes to the random sampling design were made throughout the sample period as necessary to accommodate staffing, weather and to reflect angler use during high and low use times of year. For the 2013 Rollins Reservoir creel census, 43 days (35 weekdays and 8 weekends) in total were randomly selected from early March through the beginning of November. The number of days surveyed varied from month to month as staffing would allow while survey start times were randomly stratified into either an AM or PM sampling period. CDFW staff used a roving technique, where each day multiple locations around the reservoir were surveyed (Figure 2).

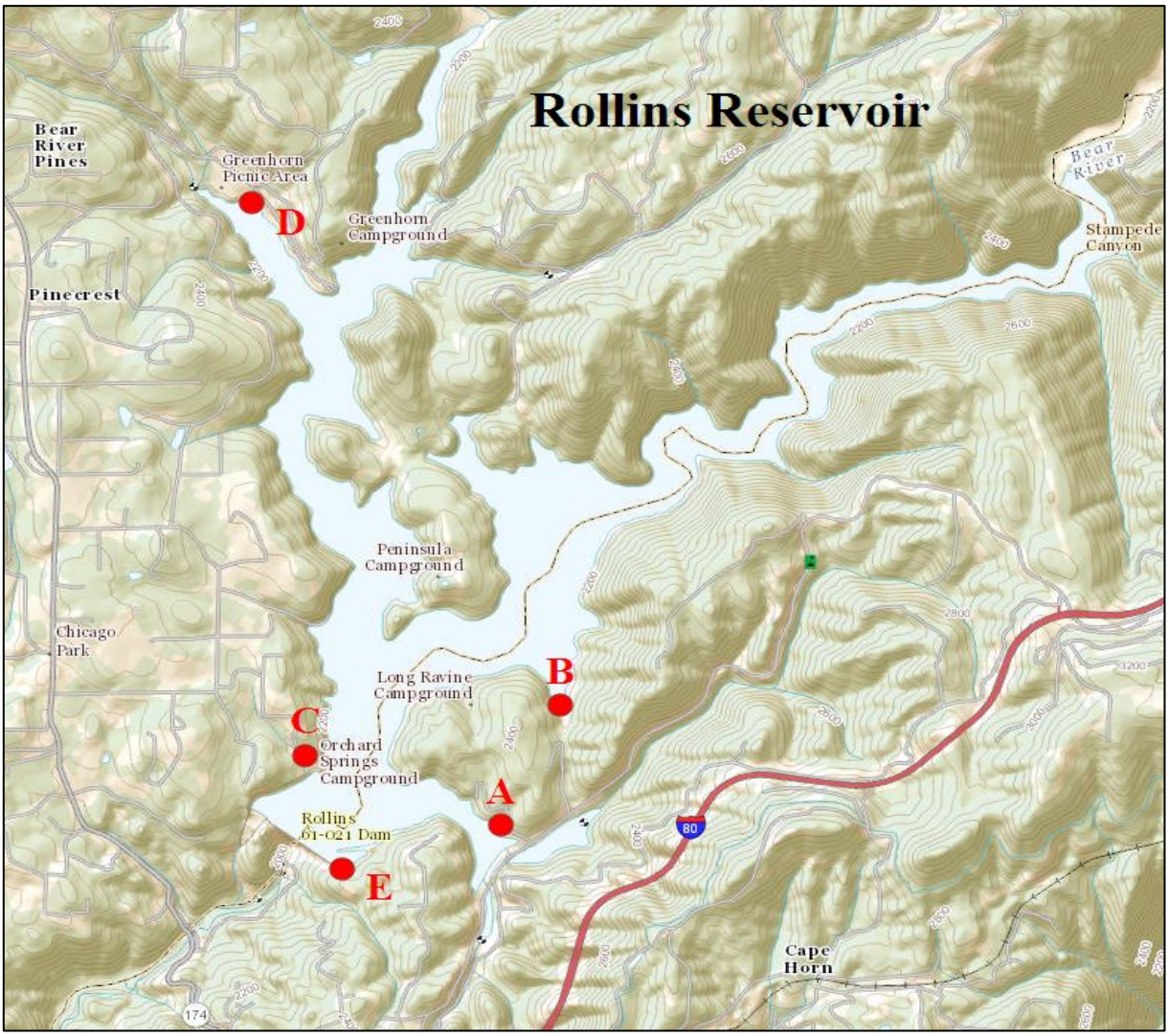

Figure 2. Topographic map showing survey locations at Rollins Reservoir 2013

Anglers were interviewed by CDFW staff and were asked a standard series of survey questions to determine angling effort, species composition and size class, angler satisfaction, and a calculated catch rate. Using the number of fish caught and the total hours fished, a catch per unit effort (CPUE) was determined to better assess the fishery.

Anglers were asked which gear type (bait, lure, fly or multiple) and technique (boat or shore) were used during their angling day as well as the number of fish landed, species type and whether the fish was kept or released. For the fish kept by anglers, each species was identified and total length was measured in millimeters (mm). For the fish released by anglers, the species and the total number landed were recorded; no size ranges were taken.

Each angler was asked between one and three standard “yes or no” questions to determine angling satisfaction. Every angler interviewed was asked: “Were you satisfied with your angling experience today?” If an angler reported catching one or more fish, they were asked two follow-up questions: “Were you satisfied with the number of fish caught?” and “Were you satisfied with the size of fish caught?” Anglers were also asked for their zip code to determine the origin of people fishing the reservoir.

Anglers who caught fish with the T-Bar anchor $10.00 reward tags were asked to fill out a standard fish reward tag submission form. They were asked the date and time and a short description of where on the Reservoir they caught the fish as well as which technique and gear were used.

Results:

During the 2013 Rollins Reservoir creel census, a total of 333 anglers were interviewed by CDFW staff resulting in a total of 812.7 hours of angling effort. A total of 344 fish were reported caught which equates to a Catch Per Unit Effort (CPUE) of 0.42 fish per hour. A breakdown of catch statistics are presented showing number of anglers, total hours fished, fish landed, catch per angler and CPUE (Table 2). Catch statistics were calculated for anglers targeting specific species, Bass (SMB, SPB, or LMB) or Trout (BN or RT) (Table 3). The number of days surveyed each month of the survey (March-November) is presented with the total number of anglers and a CPUE (Table 4).

Table 2. Catch Statistics for Rollins Reservoir (2013)

Number of Anglers	333
Total Fish Caught	344
Number of Fish per Angler	0.97
Total Hours Fished	812.7
Average CPUE	**0.42**

Table 3. CPUE for Specific Target Species (2013)

Target Species	# of Anglers	Hours Fished	CPUE
Bass	72	229	0.99
Trout	94	222.45	0.10

Table 4. Number of Days Surveyed per Month with CPUE (2013)

Month	Days Surveyed	# of Anglers	CPUE
March	2	8	0.8
April	3	36	0.3
May	6	48	0.61
June	9	79	0.3
July	7	69	0.59
August	7	63	0.28
September	7	24	0.45
October	1	5	0.31
November	1	1	0

Angling technique is categorized by boat, shore or unknown and is presented with fish caught, total hours fished and CPUE for each technique type. Of the 333 anglers surveyed, 32.6% fished from a boat for a total of 348.3 hours fished. Boat anglers caught 258 fish equating to a CPUE of 0.74. Shore fishing made up 66.8% of anglers for a total of 455.4 hours fished. Shore anglers caught 87 fish equating to a CPUE of 0.19 (Table 5). Terminal gear used by anglers was categorized into four types; bait, lure, both or fly and is presented with fish caught, total hours fished and CPUE for each type used. Anglers using only bait (41.6% of anglers) had a CPUE of 0.16 whereas the anglers using only lures (29.3 % of anglers) had a CPUE of 0.93 (Table 6). Anglers fishing from a boat using lures had a CPUE of 1.17 compared to anglers fishing from shore using lures with a CPUE of 0.37 (Table 7).

Table 5. Angling Technique and Fish Landed at Rollins Reservoir (2013)

Technique	Anglers	Fish Caught	Hours Fished	CPUE
Boat	109	257	348.3	0.74
Shore	222	87	455.4	0.19
Unknown	2	0	9	0

Table 6. Gear Used and Fish Landed at Rollins Reservoir (2013)

Gear	Anglers	Fish Caught	Hours Fished	CPUE
Bait	154	52	357.2	0.16
Lure	98	223	241.6	0.93
Bait/Lure	80	69	211.4	0.33
Fly	1	0	2.5	0

Table 7. CPUE Compared with Gear and Technique Used (2013)

Technique	Gear	Anglers	Fish Caught	Hours Fished	CPUE
Boat	Bait	19	11	71.2	0.15
	Lure	57	196	168.1	1.17
	Bait/Lure	33	50	109.1	0.46
Shore	Bait	132	41	277.1	0.15
	Lure	41	27	73.6	0.37
	Bait/Lure	48	19	102.3	0.19
	Fly	1	0	2.5	0.00

The species composition of the 344 fish caught was dominated by SPB (45.35%), followed by SMB (18.60 %), LMB (9.30%), BG (9.30%) and RT (8.14%). Anglers reported that 80.2% of the fish caught in 2013 were released (Table 8). Size ranges for all kept SPB, SMB and RT are shown in the histograms below (Figure 3 and 4).

Of the 400 reward tagged RT's planted on March 15, 2013, 48 (12 %) fish tag forms were turned in to CDFW. Out of the 48 recovered reward tags only 36 were turned in with corresponding catch dates. Figure 5 shows the number of tags recovered per month. 34 of the 36 recovered tags with correlating catch dates were said to be caught in March.

Table 8. Fish Species Disposition and Percent of Fish Caught at Rollins Reservoir 2013

Species	Kept	Released	% Caught
Brown bullhead	1	0	0.29%
Black crappie	2	3	1.45%
Bluegill	9	23	9.30%
Brown trout	2	0	0.58%
Catfish	0	3	0.87%
Bass (General)	0	5	1.45%
Largemouth bass	0	32	9.30%
Smallmouth bass	10	54	18.60%
Spotted bass	23	133	45.35%
Sacramento pikeminnow	1	2	0.87%
Rainbow trout	20	8	8.14%
Unknown	0	13	3.78%
Total	**68**	**276**	**100.0%**

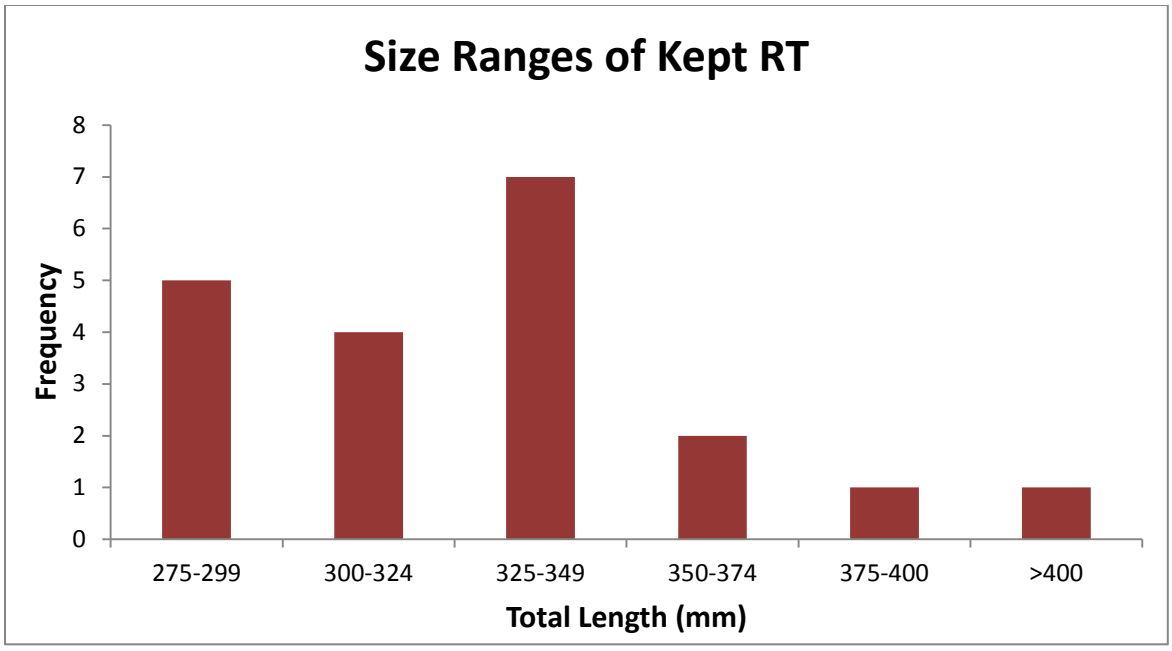

Figure 3. Length frequency histogram for all kept rainbow trout at Rollins Reservoir 2013

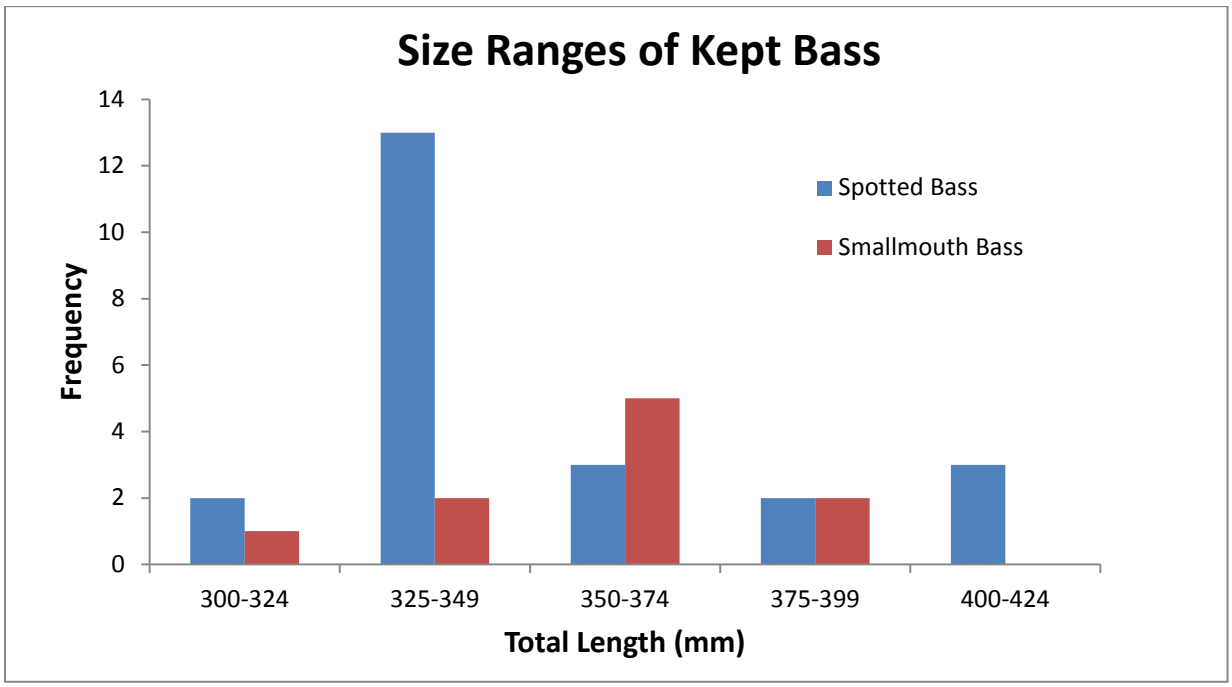

Figure 4. Length frequency histogram for all kept bass at Rollins Reservoir (2013)

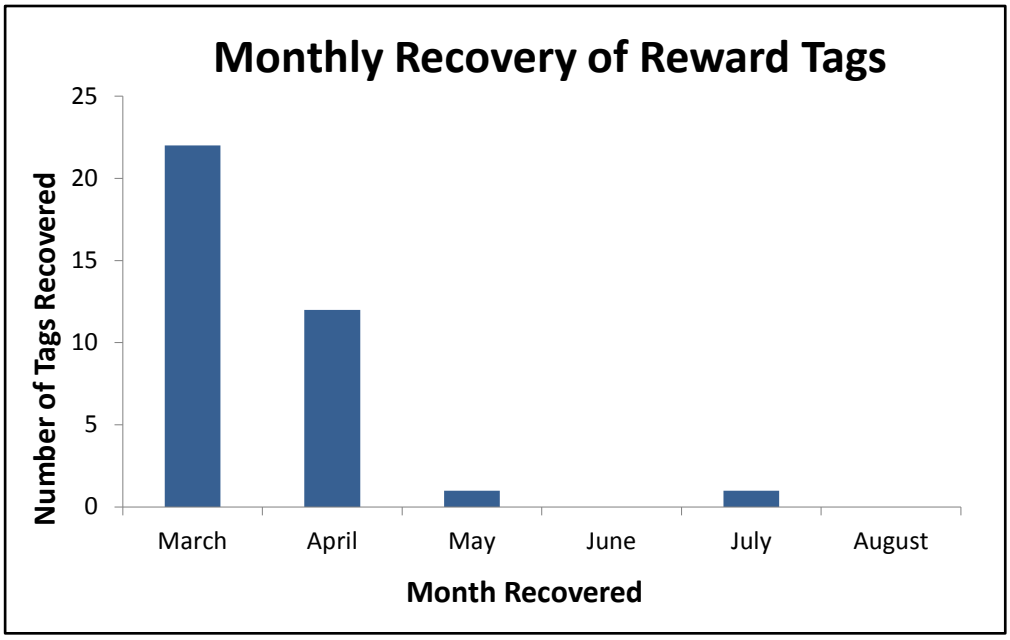

Figure 5. Number of reward tags recovered per month at Rollins Reservoir (2013)

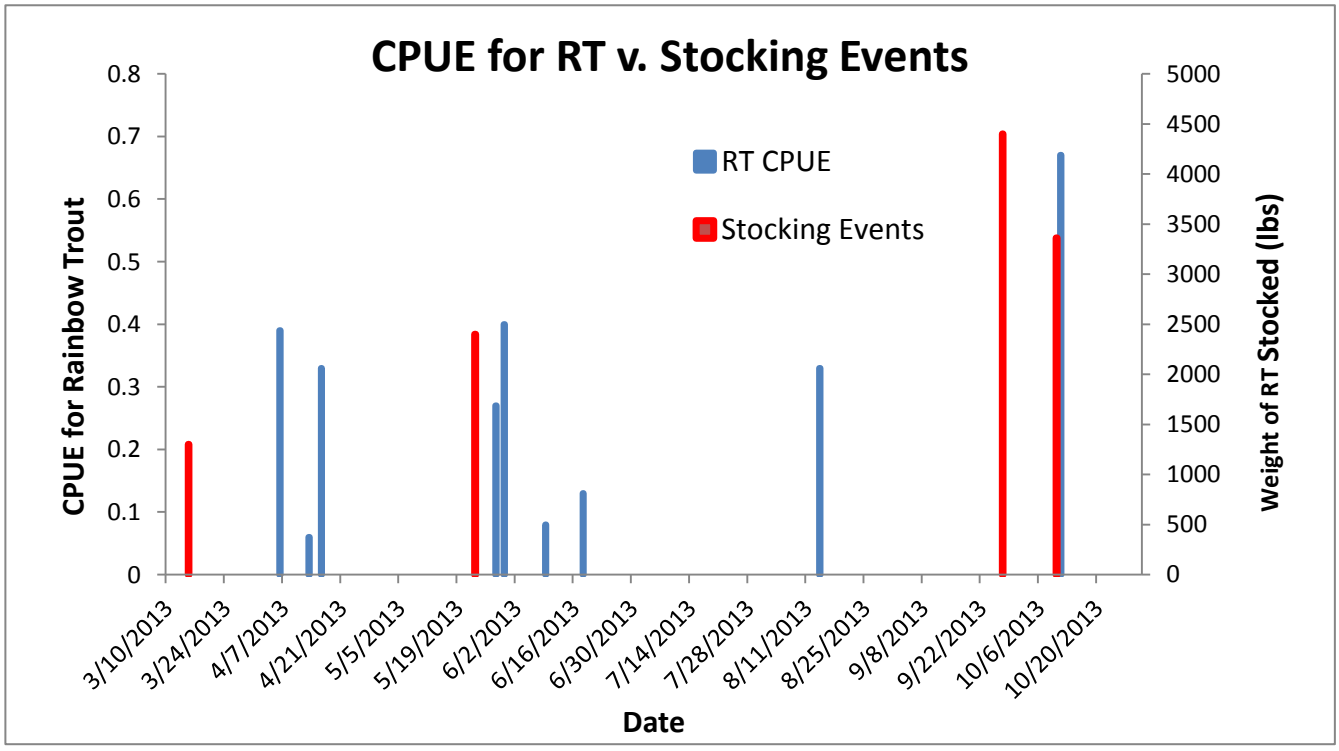

Figure 6. CPUE for RT compared to stocking events at Rollins Reservoir (2013)

Greater than 65% of all anglers who responded to the Y/N satisfaction questions were satisfied with their overall fishing experience, number of fish caught as well as the size of their fish caught. Anglers had a 68.6% satisfaction rate with their fishing experience (Table 8). Angler satisfaction results are then broken down based on the species they were targeting during their angling experience, Bass (SMB, SPB, and LMB) or Trout (BN and RT) (Table 9 and 10).

Angler origins categorized by California counties are presented in the Map below (Figure 5), showing the majority of anglers were from 3 counties. There were 138 anglers were from Placer County, 79 anglers from Sacramento County and 43 from Nevada County.

Table 8. Overall Angler Satisfaction Results for Rollins Reservoir 2013

Question	Yes	No	Unsure	Percent Satisfied
Satisfaction With Overall Fishing Experience	225	103	0	68.6%
Satisfaction With Number of Fish Caught	79	23	3	75.2%
Satisfaction With Fish Size	67	31	2	67%

Table 9. Angler Satisfaction When Targeting Bass

Question	Yes	No	Unsure	Percent Satisfied
Satisfaction With Overall Fishing Experience	48	23	0	67.61%
Satisfaction With Number of Fish Caught	30	11	1	71.43%
Satisfaction With Fish Size	28	12	1	68%

Table 10. Angler Satisfaction When Targeting Trout

Question	Yes	No	Unsure	Percent Satisfied
Satisfaction With Overall Fishing Experience	64	28	0	69.57%
Satisfaction With Number of Fish Caught	16	6	0	72.73%
Satisfaction With Fish Size	12	10	0	55%

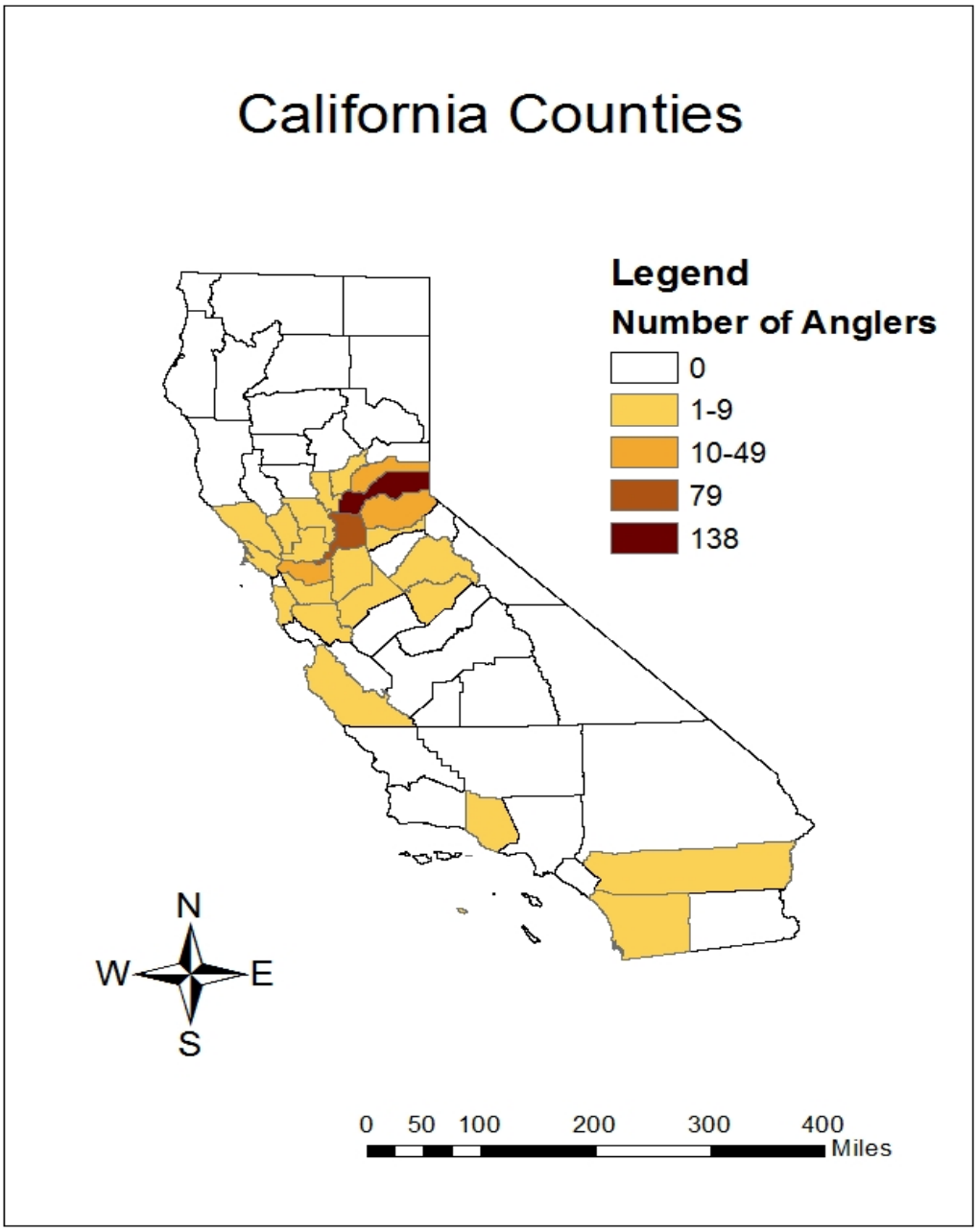

Figure 5. Map depicting angler origin which represents the number of anglers from each California County present at Rollins Reservoir (2013)

Discussion and Recommendations:

During the 2013 census, Rollins Reservoir had an average CPUE of 0.43. A CPUE of 0.50 fish per hour or greater is considered an acceptable number if fish size is considered satisfactory (Hanson, personal communication 2013). Anglers were generally satisfied with their overall fishing experience as well as the number of fish landed and the size of those fish. Anglers targeting bass versus trout only differed in satisfaction results when asked about the size of their catch; anglers targeting bass were generally more satisfied than trout anglers. It should be noted that anglers who did not catch a fish were not asked if they were satisfied with the number of fish caught. This is likely causing a bias inflating the satisfaction of the number of fish caught. When comparing angling technique and gear usage, anglers fishing from boats using lures had the highest catch rates.

The majority of fish were caught between May and July correlating with a higher number of anglers present. This may have resulted because of some inconsistencies in the methods where the number of days surveyed per month was higher in the spring and summer months. Therefore, we are unable to determine if the high number of fish caught and increase in angling pressure on the Reservoir was because of more anglers present or a greater number or surveys conducted. In future studies, it is recommended that the number of days surveyed each month be standardized, or with less variation, in order to determine the angling pressure.

There have been no previous creel censuses conducted for this body of water so no comparison can be made to previous years. The bulk of the returned tags showed up in the creel surveys in early March and April shortly after the stocking event on March 15, 2013 (Figure 5). There was a higher CPUE for RT the closer the surveys were to stocking events. CPUE was also affected by the amount of RT planted in each stocking event (Figure 6). To maintain a stocking schedule that provides the reservoir with allotments that can withstand the angling pressure, CDFW would need to stock more frequently with a consistent number of RT during the peak usage months (March-September).

During these peak usage months, the fish caught consisted mainly of warm water species, specifically, SPB, LMB, SMB and BG. Most of the fish caught were released (80.2 %); therefore, no lengths were recorded. This resulted in a small sample size used to determine size ranges of fish caught.

With the roving creel method, multiple locations around the reservoir were surveyed during one day. These locations varied depending on which CDFW staff was performing the surveys rather than a set standard for specific survey locations. However, location A consistently proved to have the greatest amount of angling presence compared to the other locations surveyed (Figure 2).

Appendix A. Rollins Reservoir Stocking Numbers (2003-2012)

Year	Species- Strain	Size	Weight (lb)	Number
2003	RT-H	Catchable	4000	6000
2003	RT-W	Catchable	4000	5100
2003	BN-S	Catchable	2000	5400
2004	RT-C	Catchable	2000	9200
2004	RT-H	Catchable	3000	5400
2004	RT-S	Sub-Catchable	4000	36000
2004	RT-W	Catchable	1000	2000
2004	BN-S	Catchable	1000	3100
2005	RT-H	Catchable	3000	5300
2005	RT-W	Catchable	1000	1900
2005	BN-S	Catchable	1000	3200
2005	KOK-WA	Fingerling	63	40005
2006	KOK-SR	Fingerling	140.98	13080
2006	KOK-TC	Fingerling	19.88	3320
2006	RT-S	Catchable	3000	5100
2006	RT-W	Catchable	1000	1700
2006	BN-S	Catchable	1000	3600
2007	KOK-SR	Fingerling	139	24186
2007	RT-C	Catchable	1000	1800
2007	RT-S	Catchable	3000	5300
2007	RT-W	Catchable	1000	1800
2007	BN-S	Catchable	600	3000
2008	KOK-SR	Fingerling	125	40125
2008	RT-C	Catchable	2000	4000
2008	RT-CO	Catchable	2000	3800
2008	RT-S	Catchable	2000	4100
2008	BN-S	Catchable	1350	3780
2010	ELT-H	Catchable	1000	2000
2010	RT-S	Catchable	3000	5500
2010	BN-S	Catchable	2000	5400
2011	ELT-TS	Catchable	1000	1500
2011	RT-C	Catchable	1000	1700
2011	RT-H	Catchable	1000	2000
2011	RT-H	Catchable	1000	1500
2011	RT-S	Catchable	1000	2000
2012	RT-C	Catchable	2000	4200
2012	RT-S	Catchable	1000	1700
2012	RT-TL	Catchable	3000	5800

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