Upper Truckee River Lahontan Cutthroat Trout Restoration Project

Final Report – 2010 Field Season

Lahontan cutthroat trout living in the Upper Truckee River expansion area showing phenotypic variation.

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Introduction

The Upper Truckee River Lahontan Cutthroat Trout (LCT) (*Oncorhynchus clarki henshawi*) Restoration Project is located approximately 3,000 feet above the South Upper Truckee Road, extends to the bottom of Meiss Meadows and includes perennial tributaries within the Upper Truckee River watershed. The project is in California (El Dorado County) on National Forest System land within the Lake Tahoe Basin Management Unit (LTBMU) and is entirely in the Meiss Management Area (USDA Forest Service 1988).

The purpose of the project is to reclaim 10 miles of stream habitat for federally threatened LCT in the Upper Truckee River. There is a need to assist with the natural range expansion from the Meiss Meadow source population by removing undesired competition and genetic introgression from introduced brook trout (*Salvelinus fontinalis*) and rainbow trout (*Oncorhynchus mykiss).* Cutthroat trout have been out competed by non-native trout throughout the western United States, and there is a dire need to preserve and expand existing populations. The Meiss Meadows population is the only self-sustaining population of LCT in the Lake Tahoe Basin, and successful implementation of this project will insure its future viability. In order to meet this need a combination of electrofishing and gill netting will be used to remove introduced brook trout.

LCT were listed as endangered by the US Fish and Wildlife Service (FWS) in 1970 and subsequently reclassified as threatened in 1975, under the Endangered Species Act, to facilitate management and allow regulated angling. The species is native to the Lake Tahoe basin and historically occupied most of the perennial stream systems, including interconnected lakes. By the 1950's, LCT were locally extirpated from Lake Tahoe as a result of wide-spread salmonid introductions, over-harvest and habitat modification.

The species was reintroduced to the headwaters of the Upper Truckee River in Meiss Meadows in 1989 and 1990 by reclaiming a total of 5 stream miles and 15 lake acres. These efforts were primarily lead by the California Dept. of Fish and Game (CDFG). Reclamation activities involved conducting non-native brook trout removal from the Upper Truckee River prior to LCT introduction. Since the initial reclamation activities, annual maintenance removal efforts occurred in Meiss Meadows utilizing electrofishing up until 2009 when it was found to be the third year in a row that no brook trout were found. The plan after 2009 is to let the LCT population rest from the electro-shocking, and to periodically monitor Meiss Meadows to ensure the removals were successful. The LCT population in Meiss Meadows is currently one of the only high-elevation populations found in meadow habitat in the Sierra Nevada Mountain Range.

Reclaiming aquatic habitats in the Upper Truckee River watershed is consistent with CDFG goals and objectives for recovering and developing waters for native salmonid fisheries. The CDFG currently works under the interagency Fishery Management Plan for Lahontan Cutthroat Trout in California and Western Nevada Waters (1986), which identifies the Upper Truckee River as a priority area in Lake Tahoe to reclaim aquatic habitats for LCT.

The restoration of LCT was concurred with by the FWS in 2008 in the original Biological Opinion (BO; File #: 2008-F-0434-BO) for the project. During the 2010 field season, re-initiation of consultation with the FWS was conducted and an amended BO (file #: 2008-F-0434-

R001) was received in October 2010. The amended BO was needed in order to address concerns found by field crews (as discussed in this report) of an unknown population of nonnative rainbow trout and possible rainbow-LCT hybrids downstream of one of the many natural fish barriers (Barrier 34) located within the treatment area. Restoration efforts which have occurred over the past 2 years were conducted upstream of Barrier 34 on the mainstem of the Upper Truckee River. Due to the known hybridization potential of rainbow trout and LCT and the inability to determine genetic purity in the field (as an example - refer to the photos on the cover page of this report), the LTBMU requested to remove all salmonids from the treatment area downstream of Barrier 34 and from all future treatment areas within the proposed project area where rainbow trout are found.

Methods

Working in cooperation with CDFG, the LTBMU crew performed removal of salmonids by electrofishing methodology. Protocols used were the "Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act" (NMFS 2000).

A three-pass depletion method was used to minimize the impact of electrofishing on LCT but requires multiple treatments per year for one to three years (Thompson and Rahel 1996). This enabled tracking of the progress of brook trout removal on a site-specific basis and ensures that each stream reach is treated multiple times in each year. Throughout implementation all species of fish sampled were measured and documented. Above Barrier 34 (Figure 1), LCT and speckled dace (*Rhinichthys osculus*) were relocated upstream to previously treated reaches and brook trout were removed. Below Barrier 34, speckled dace were relocated upstream to previously treated reaches and brook trout, rainbow trout, and LCT were removed (see explanation in Introduction section).

One backpack electrofisher was used for each pass as water levels were low and manageable with one electrofisher. The electrofisher was set to 400 Volts and 50 Hertz for all reaches. This setting is not a standard but worked well with the observed Electric Conductivity and turbidity, and fish recovered quickly in most instances. Electrofisher settings were determined and adjusted as needed and recorded when changed. We used two types of backpack electrofishers, a Smith-Root LR-24 and Halltech HT-2000.

The use of fish barriers greater than one meter became the standard to delineate river portions in 2010 due to higher water levels during the treatment time. Low water barriers were simply used to break longer portions into shorter sections for treatment. To compare barrier data from this year to previous years refer to Table 1. Reach numbers 1 – 12, which were designated and used in 2008 and 2009 were abandoned in 2010, and barrier numbers were used to divide river sections instead.

In order to meet expectations for project funding timelines, the LTBMU contracted out approximately 2.5 miles of the Upper Truckee River and approximately 0.6 miles of a primary tributary to the Upper Truckee River, the Round Lake tributary. Round Lake, primarily in El Dorado County, is upstream from this tributary. The contract included specifications to follow LTBMU protocol for three-pass depletion under the National Marine Fisheries Service (NMFS)

guidelines for electrofishing waters containing Endangered Species Act (ESA) listed salmonids. The contract was awarded to 2nd Nature and began on August 28, 2010 and was completed by September 24, 2010. In addition to the contract, the LTBMU aquatics field crew treated approximately an additional 0.7 miles of stream on the Upper Truckee River and 1.0 miles of stream in the Round Lake tributary. The LTBMU aquatic crew re-treated 0.7 miles of the Upper Truckee River from barrier B40 to B37 to ensure multiple years of treatment and continue to remove remaining non-native fish. The contractor re-treated 0.33 miles of the Upper Truckee River from barrier B37 to B36B.

Care was taken to decontaminate field gear prior to entering treatment streams in the project area to avoid possible introduction of aquatic invasive species and/or diseases. We followed Leave No Trace guidelines when camping and avoided campsites in meadows or areas that exhibit wetland herbaceous vegetation and hydrated soils. A conscious effort was made to avoid indirectly creating trails when accessing the project site by utilizing multiple points of entry and using hardened entry points. Electrofishing reaches were delineated by natural barriers (low water barriers, falls, and beaver dams) to allow for manageable relocation of LCT and to utilize 3-pass depletion methodology.

Results

In 2010 we accomplished brook trout removal treatment of approximately 5.77 miles of stream in the Lahontan cutthroat trout (LCT) expansion area including the Round Lake tributary (Figure 1). In stream water levels or base flows were significantly higher than previous years, but fish capture rates were in line with lower flow events in previous years. As a result of higher flow rates, the use of previous low water barriers to delineate reaches was no longer acceptable.

The upper 0.7 miles within the expansion area were treated in 2008 and 2009. An additional 0.3 miles of stream was treated for the first time in 2009 and re-treated in 2010 (reaches 13-16). A total of 9,343 brook trout were removed from the expansion area this season (Table 2). There were a total of 509 LCT sampled with 441 returned to the expansion area. There were 68 LCT removed due to the possibility of genetic introgression from rainbow trout found below barrier B34 on the Upper Truckee River and below barrier T1BA5 on the Round Lake tributary. In the Upper Truckee River, 78 rainbow trout were found below barrier B34, and two rainbow trout were found in the Round Lake tributary for a total of 80 rainbow trout removed in the expansion area. There were 211 speckled dace sampled and all returned to the expansion area. Mortality due to electrofishing included 14 LCT in the 0-5 cm size class (Appendix C Table C1).

Brook trout were the most common fish found in 2010 (Table 2 & Fig. A1), particularly in the lower portions of the expansion area that were treated for the first time this year (Fig. A2). Between barrier B41 and B37 nine brook trout were found in the 0.7 miles which were treated in 2008 and 2009 (Fig. A2). Treatment occurred in 2009 for the portion of stream between barrier B37 and approximately 100 meters downstream of B36B (approximately 0.3 miles). Brook trout are found in this section but at a much lower rate than in untreated areas downstream (Fig. A2). Reaches are not the same length and therefore statistically cannot be evaluated on a 1:1 basis (Table 2 and Fig. A2 & A3). The shortest reach was 112 m, the longest reach was 750 m, and the average reach length was 320 m.

LCT were present in fifteen of eighteen reaches treated in the Upper Truckee River expansion area this season (Fig. A2). More LCT were present in the upper reaches than the lower reaches. This is assumed attributable to proximity to the Meiss Meadow reclamation area where a self-sustaining population of LCT are naturally expanding their range. It is also assumed there is less competition from brook trout in the treated upper reaches, also contributing to higher LCT numbers. Fewer than three LCT were found in the lower 1.34 miles of the Upper Truckee River portion of the expansion area. No LCT were found in the last 0.38 miles of the lower section of the Upper Truckee River sampled in 2010.

LCT were present in all six reaches of the Round Lake tributary (Fig A3). More LCT were present in upper reaches than lower reaches of the tributary. This is assumed attributable to proximity to Round Lake, which has been stocked with LCT by CDFG.

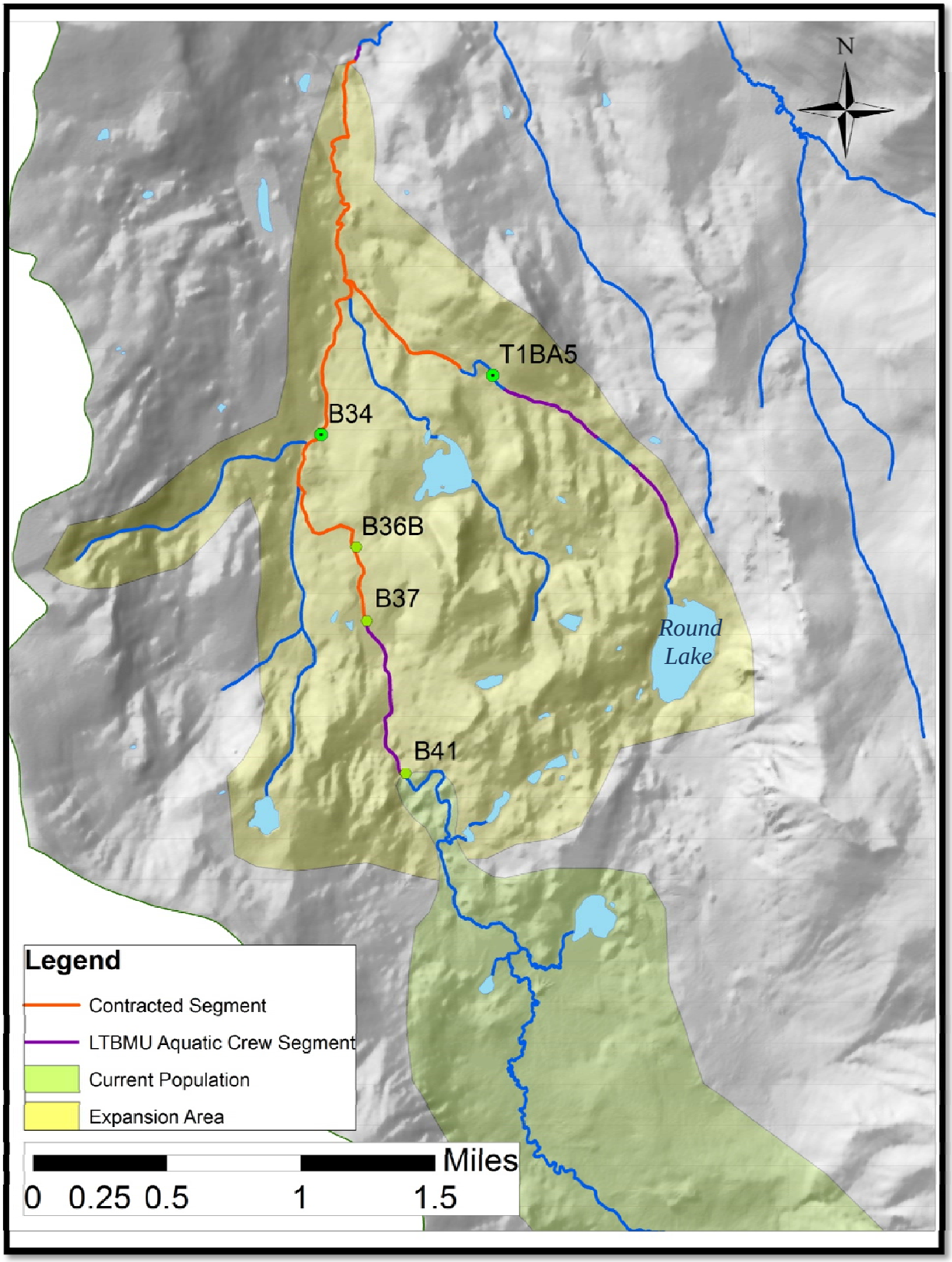

Figure 1. Map of the Upper Truckee River LCT Restoration area.

Table 1. Barrier and reach locations in the Upper Truckee River LCT Expansion area for year to year comparison of data due to reaches not being permanent fish barriers.

Reach # (2008 - 2009)	Barrier # (2010)	Easting	Northing	Comments
1	FS	4291906	758817	
2	B43	4292365	758799	
3	B42	4292504	758759	
4	B42A	4292531	758671	* Low water hydraulic control
5	B41	4292514	758520	
6	B41A	4292679	758424	* Low water hydraulic control
7	B41B	4292839	758435	* Low water hydraulic control
8	B40	4292897	758408	
9	B40A	4293043	758450	* Low water hydraulic control
10	B39	4293102	758446	
11	B38	4293231	758415	
12	B38A	4293272	758315	* Low water hydraulic control
13	B37	4293494	758270	
14	B37A	4293719	758234	* Low water hydraulic control
15	B36A	4293787	758270	
16	B36B	4293909	758205	
17	B36C	4293997	758157	* Low water hydraulic control
	B35	4294239	757914	
	B34	4294585	758017	
	B33	4294822	758049	
	B33A	4295046	758032	* Low water hydraulic control
	B33B	4295243	758122	* Low water hydraulic control
	B33C	4295440	758203	* Low water hydraulic control
	B33D	4295617	758146	* Low water hydraulic control
	B33E	4295748	758110	* Low water hydraulic control
	B33F	4295915	758131	* Low water hydraulic control

Reach # (2008 - 2009)	Barrier # (2010)	Easting	Northing	Comments
	B32	4296251	758076	
	B32A	4296553	758131	
	B31A	4296827	758214	
	B31B	4296834	758179	
	B30	4296864	758234	Barrier does not exist
	B29	4296885	758236	Barrier does not exist
	B28	4296922	758244	Bottom of Expansion Area
	T1BA1	4295442	758247	
	T1BA2	4295191	758467	
	T1BA3	4295089	758590	
	T1BA3A	4295073	758525	
	T1BA3B	4295095	758509	
	T1BA3C	4295134	758505	
	T1BA4	4294986	758849	
	T1BA4A	4295055	758712	
	T1BA5	4294942	759052	
	T1BA6A	4294861	759118	* Low water hydraulic control
	T1BA6	4294576	759686	
	T1BA7A	4294416	759881	* Low water hydraulic control
	T1BA7	4294312	759980	
	T1BA8	4294259	760019	
	T1BA9	4293713	760112	

Table 2. Fish sampled in Lahontan cutthroat trout Expansion area in 2010.

Reach #	Length in Meters	LCT	Dace	Brook	Rainbow	Total
B41 to B40	444	123	8	3		**134**
B40 to B39	226	8	32	1		**41**
B39 to B38	148	6	1	2		**9**
B38 to B37	305	26	49	3		**78**
B37 to B36B	468	12	3	46		**61**
B36b to B35	619	7		39	2	**48**
B35 to B34	425	8	1	592	28	**629**
B34 to B33	257	1		535	24	**560**
B33 to B33A	242		1	237	18	**256**
B33A to B33B	254			278	1	**279**
B33B to B33C	277	2	10	1079	2	**1093**
B33C to B33D	203	3	6	1817		**1826**
B33D to B33E	144	2		470	1	**473**
B33E to B33F	253		1	567		**568**
B33F to B32	452	2	4	1151		**1157**
B32 to B32A	410	1	1	811		**813**
B32A to B31	312	2		169	2	**173**
B31 to B28	122	1		129		**130**
T1BA9-T1BA8	605	103	88			**191**
T1BA8-T1BA7A	215	46				**46**
T1BA6-T1BA6A	750	130	1	16		**147**
T1BA4-T1BA3	296	18	3	324	1	**346**
T1BA3-T1BA2	185	3		94	1	**98**
T1BA2-T1BA1	337	5	2	980		**987**
TOTAL 7	**949**	**509**	**211**	**9343**	**80**	**10143**

Discussion

Major progress was made this year with the contractors working in addition to the LTBMU aquatic crews allowing overall more effort than the previous two years. Rainbow trout were found in the expansion area between barriers B35 and B34 (Fig 1 & 2). Due to the presence of rainbow trout and the possibility of genetic introgression with LCT, re-initiation of Formal Consultation was scheduled with the US Fish and Wildlife Service (FWS). On September 2, 2010 Richard Vacirca, LTBMU Forest Aquatics Biologist, spoke with Chad Mellison of the FWS and it was determined to remove all trout from the expansion area below barrier B34, including LCT, due to the potential for hybridization.

Genetic samples were taken from LCT and rainbow trout to determine if introgression had already taken place. Samples were sent to Dr. Mary Peacock (University of Nevada, Reno) for genetic analysis and to further inform managers of the LCT population status in the Upper Truckee River. It is not known how or when rainbow trout arrived in the expansion area and until genetic analysis is completed, it is unknown as to the purity of LCT.

Figure 2. Example of Oncorhynchus mykiss spp sampled in the Upper Truckee River. This individual was found between barrier B35 and B34.

Due to the remote location, weather, and time constraints the LTBMU crew was not able to treat the Round Lake tributary completely. Alder and willow were thick enough to slow progress in treatment reaches. This reduced time available so that only one pass with the electrofisher could be completed, rather than the standard three passes specifically in the Round Lake tributary between T1BA9 and T1BA7A.

Figure 3. Example of deformed LCT in Round Lake Tributary.

Below T1BA7A spot shocking was used as access was limited again by dense vegetation between T1BA6 and T1BA6A. Two sections of stream were not treated due to thick vegetation and time constraints. These were the 258 meters between T1BA7A and T1BA6 and the 112 meters between T1BA6A and T1BA5. It is assumed the 258 meters between T1BA7A and T1BA6 contain only LCT and speckled dace. Upstream distribution of rainbow trout is assumed to be in the lower portion of T1BA4, however full treatment from T1BA4 to T1BA6A is necessary to determine this. It is recommended that treatment in 2011 allow time for continued access issues in the Round Lake tributary requiring approximately 160 to 200 man hours prior to electrofishing.

The Round Lake tributary hosts good numbers of LCT showing extensive phenotypic variation (cover photo). There was a variety of age classes indicating the population is self sustaining (Figs. B19 thru B24). Approximately 10 LCT were deformed (Fig 3). The first deformed fish sampled was considered damaged by previous electrofishing, however more fish in the same size class (approximately 10-15cm) were sampled displaying the same deformity. To date we are not aware of any previous electrofishing effort on this tributary. Although deformed these fish seemed healthy and were released.

Throughout the expansion area LCT were found in all size classes (Appendix B), particularly in the Round Lake tributary where LCT have not been displaced by brook trout or any efforts to remove introduced fish. The upper sections of Round Lake tributary from T1BA9 to T1BA6A exhibit a self sustaining population of LCT indicated by the presence of all size classes (Fig B19-B21). Throughout the expansion area salmonids are represented in all size classes indicating successful reproduction is occurring (Appendix B). This suggests suitable spawning habitat is available and LCT can thrive in the expansion area when competition from other salmonids is removed.

Fish removal in 2011 will continue in the expansion area. Upstream reaches in the expansion area have been sampled for multiple years and are proving to contain few to zero brook trout. In

2011 electrofishing will be implemented to further expand habitat for LCT. Due to the presence of rainbow trout, continued removal of all trout will continue in the future.

Figure 4. Brook trout removed from expansion area.

Considerations for Future Field Seasons

The three-pass depletion method is used to remove non-native trout with minimal impact on LCT. This may not be the most effective methodology for eradicating brook trout from the expansion area based on field crew experience in cascade/falls areas where water (and likely fish) are below boulders and electrofishing is not possible. More passes per reach are required to receive a zero brook trout final pass. As LCT and speckled dace are relocated upstream after each pass the impacts on fish is minimized enough to warrant additional passes. Evaluation of depletion methodology must continue in future implementation. Conducting brook trout removal during August, September and October will more effectively and efficiently result in LCT habitat reclamation by targeting low flow and brook trout spawning periods. This strategy will continue to be utilized in future implementation in the LCT expansion area.

References

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Appendix A – Total Fish Sampled and Fish Community Composition

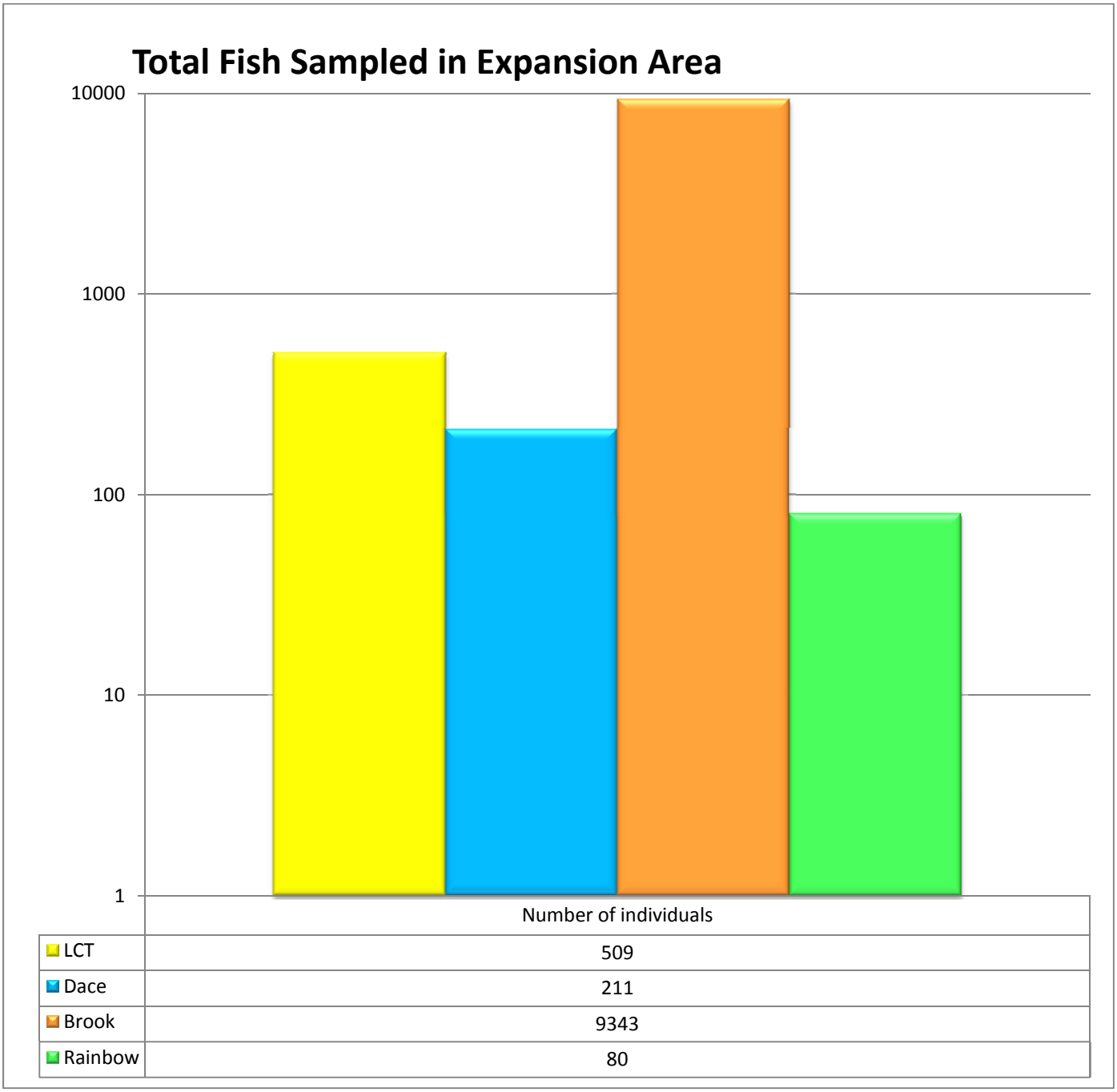
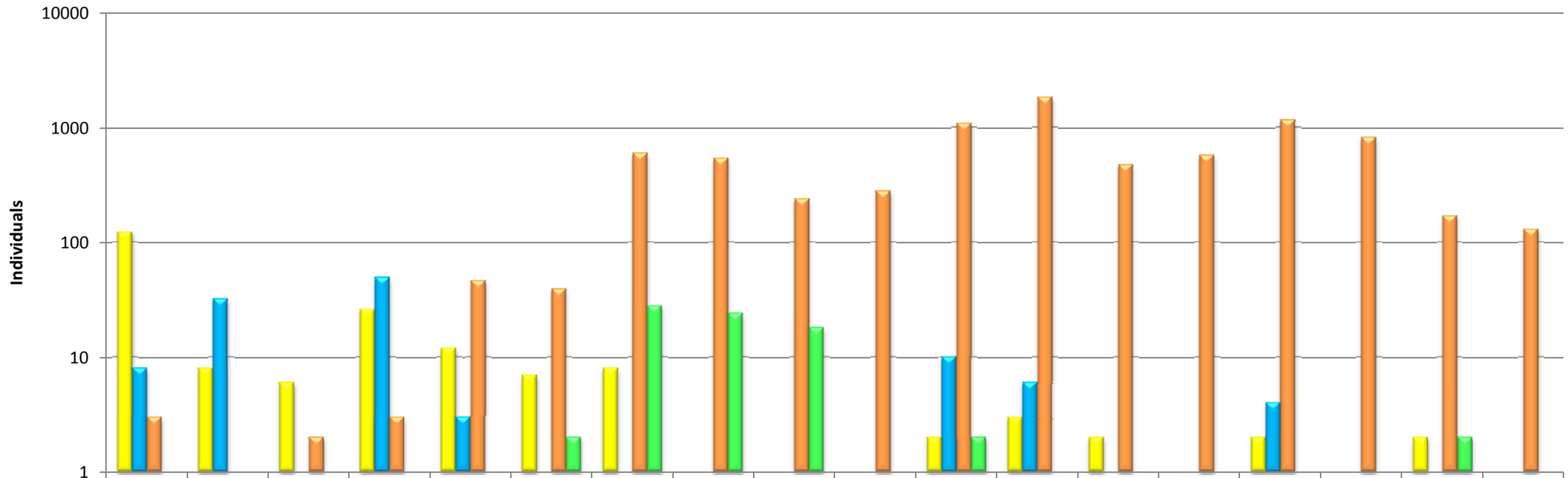
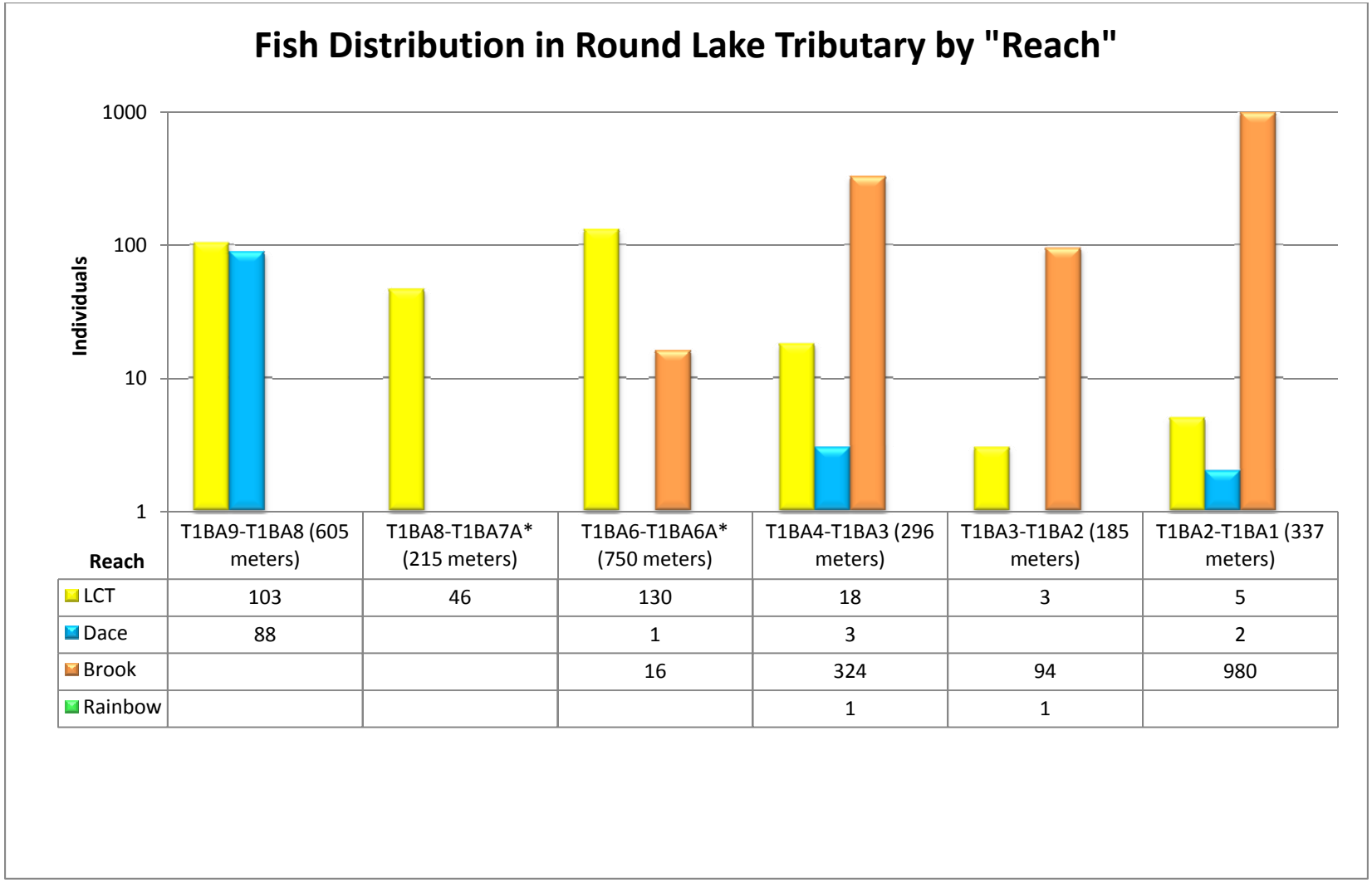


Figure A1. Total fish sampled from expansion area.



Reach	B41 to B40 (444m)	B40 to B39 (226m)	B39 to B38 (148m)	B38 to B37 (305m)	B37 to B36B (468m)	B36b to B35 (619m)	B35 to B34 (425m)	B34 to B33 (257m)	B33 to B33A (242m)	B33A to B33B (254m)	B33B to B33C (277m)	B33C to B33D (203m)	B33D to B33E (144m)	B33E to B33F (253m)	B33F to B32 (452m)	B32 to B32A (410m)	B32A to B31 (312m)	B31 to B28 (122m)
LCT	123	8	6	26	12	7	8	1			2	3	2		2	1	2	1
Dace	8	32	1	49	3		1		1		10	6		1	4	1		
Brook	3	1	2	3	46	39	592	535	237	278	1079	1817	470	567	1151	811	169	129
Rainbow						2	28	24	18	1	2		1				2	

Figure A2. Fish distribution in the Upper Truckee River portion of the expansion area by reach ***Note:** Reaches are not the same length (refer to Table A1).



Reach	T1BA9-T1BA8 (605 meters)	T1BA8-T1BA7A* (215 meters)	T1BA6-T1BA6A* (750 meters)	T1BA4-T1BA3 (296 meters)	T1BA3-T1BA2 (185 meters)	T1BA2-T1BA1 (337 meters)
LCT	103	46	130	18	3	5
Dace	88		1	3		2
Brook			16	324	94	980
Rainbow				1	1	

Figure A3. Fish distribution in expansion area by reach ***Note:** Reaches are not the same length (refer to Table A1).

Appendix B – Brook Trout Depletions and Associated Capture Efficiency per Pass in Each Reach.

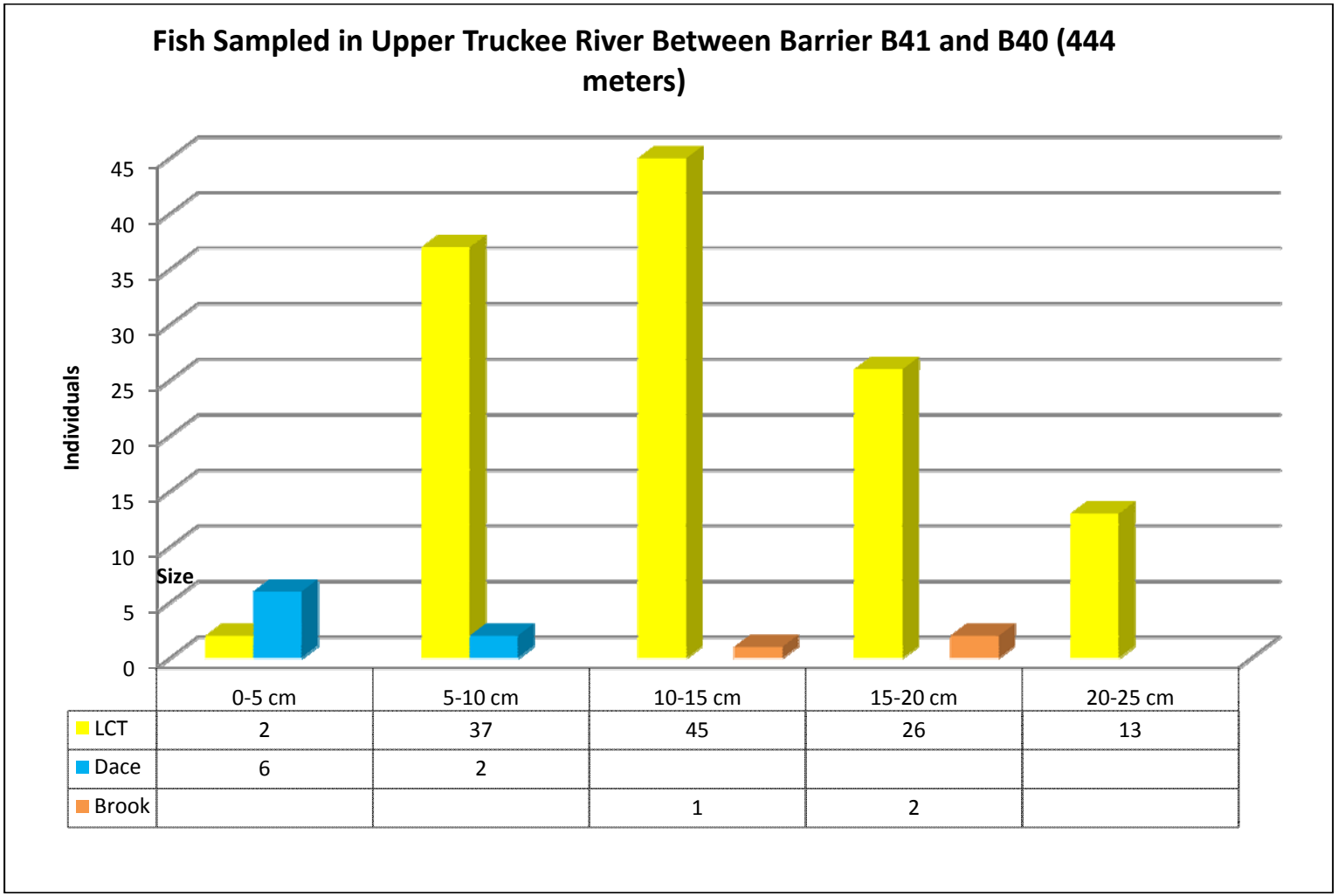


Figure B1. Species sampled in Upper Truckee River between barrier B41 and B40.

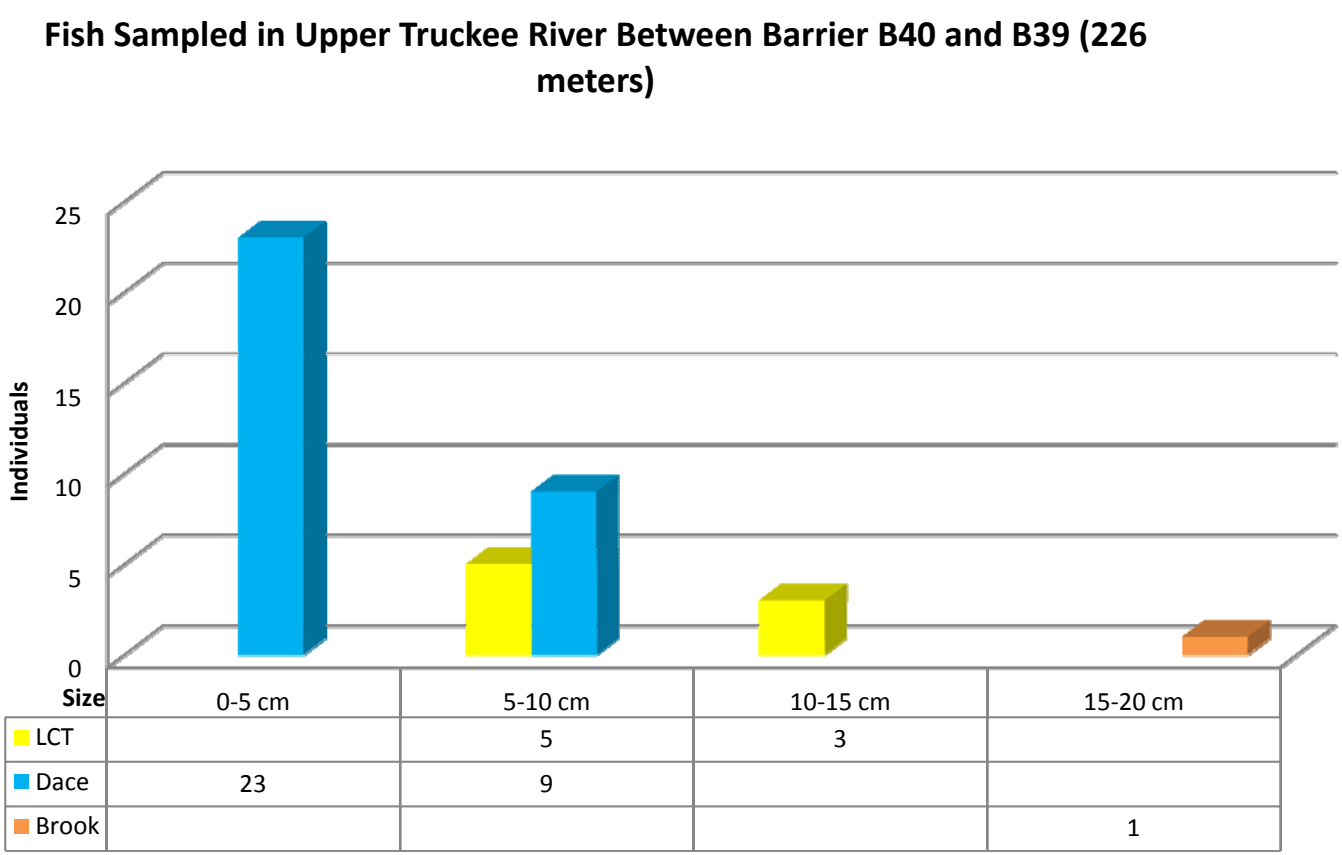
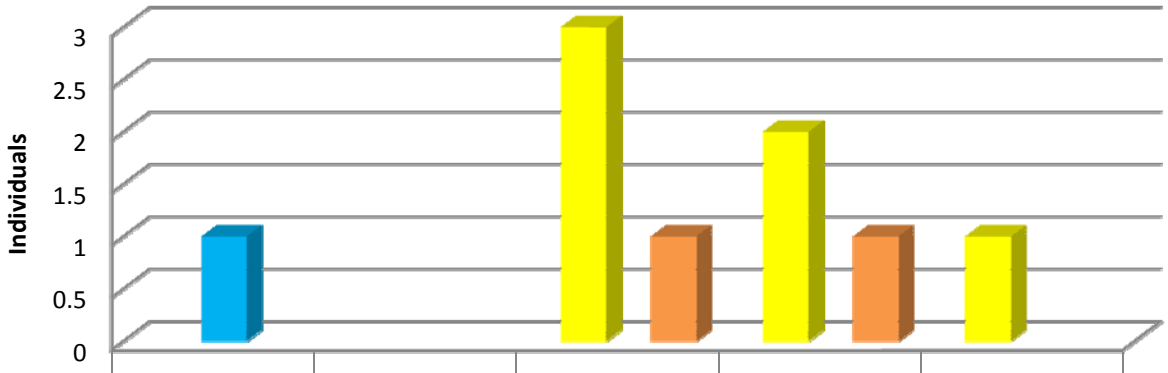
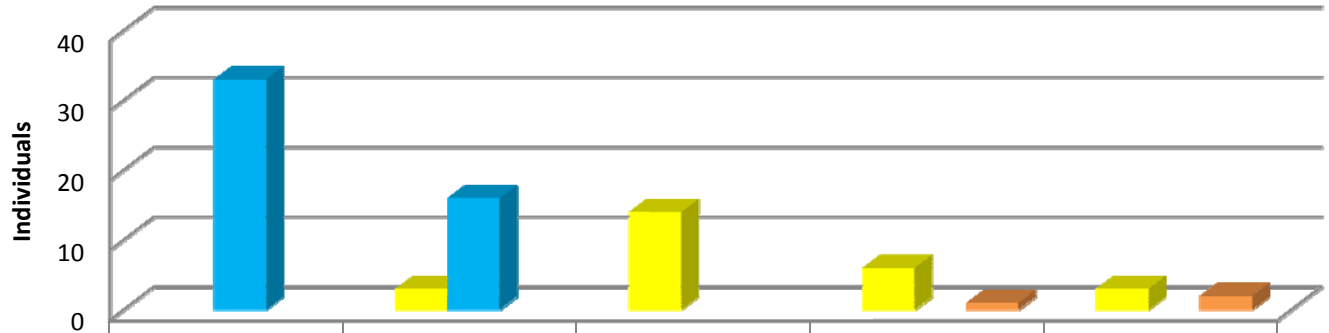


Figure B2. Species sampled in Upper Truckee River between barrier B40 and B39.



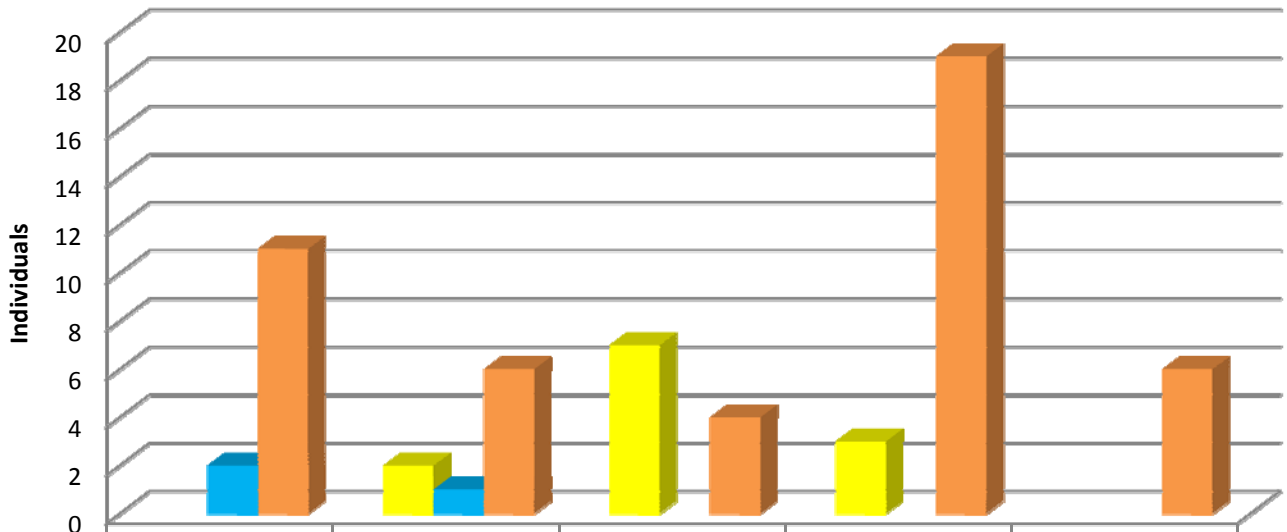
Size	0-5 cm	5-10 cm	10-15 cm	15-20 cm	20-25 cm
LCT			3	2	1
Dace	1				
Brook			1	1	

Figure B3. Species sampled in Upper Truckee River between barrier B39 and B38.



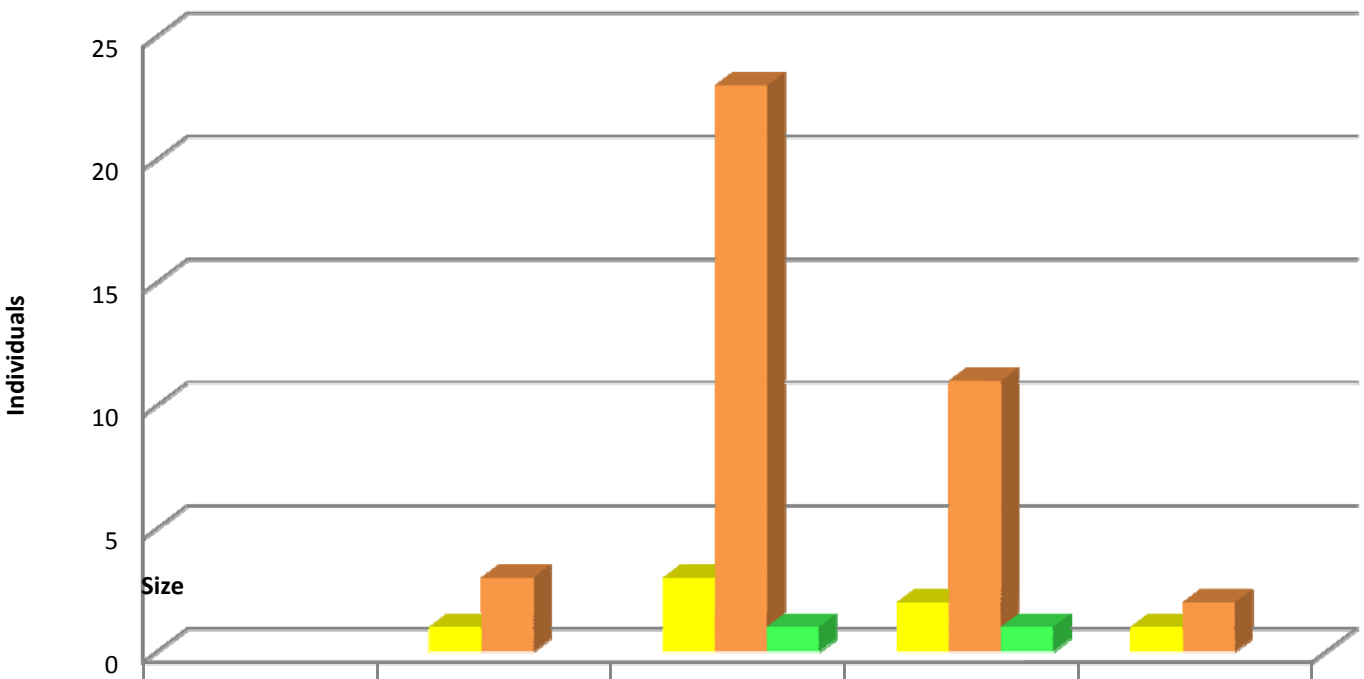
Size	0-5 cm	5-10 cm	10-15 cm	15-20 cm	20-25 cm
LCT		3	14	6	3
Dace	33	16			
Brook				1	2

Figure B4. Species sampled in Upper Truckee River between barrier B38 and B37.



Size	0-5 cm	5-10 cm	10-15 cm	15-20 cm	20-25 cm
LCT		2	7	3	
Dace	2	1			
Brook	11	6	4	19	6

Figure B5. Species sampled in Upper Truckee River between barrier B37 and B36B.



	0-5 cm	5-10 cm	10-15 cm	15-20 cm	20-25 cm
LCT		1	3	2	1
Brook		3	23	11	2
Rainbow			1	1	

Figure B6. Species sampled in Upper Truckee River between barrier B36B and B35.

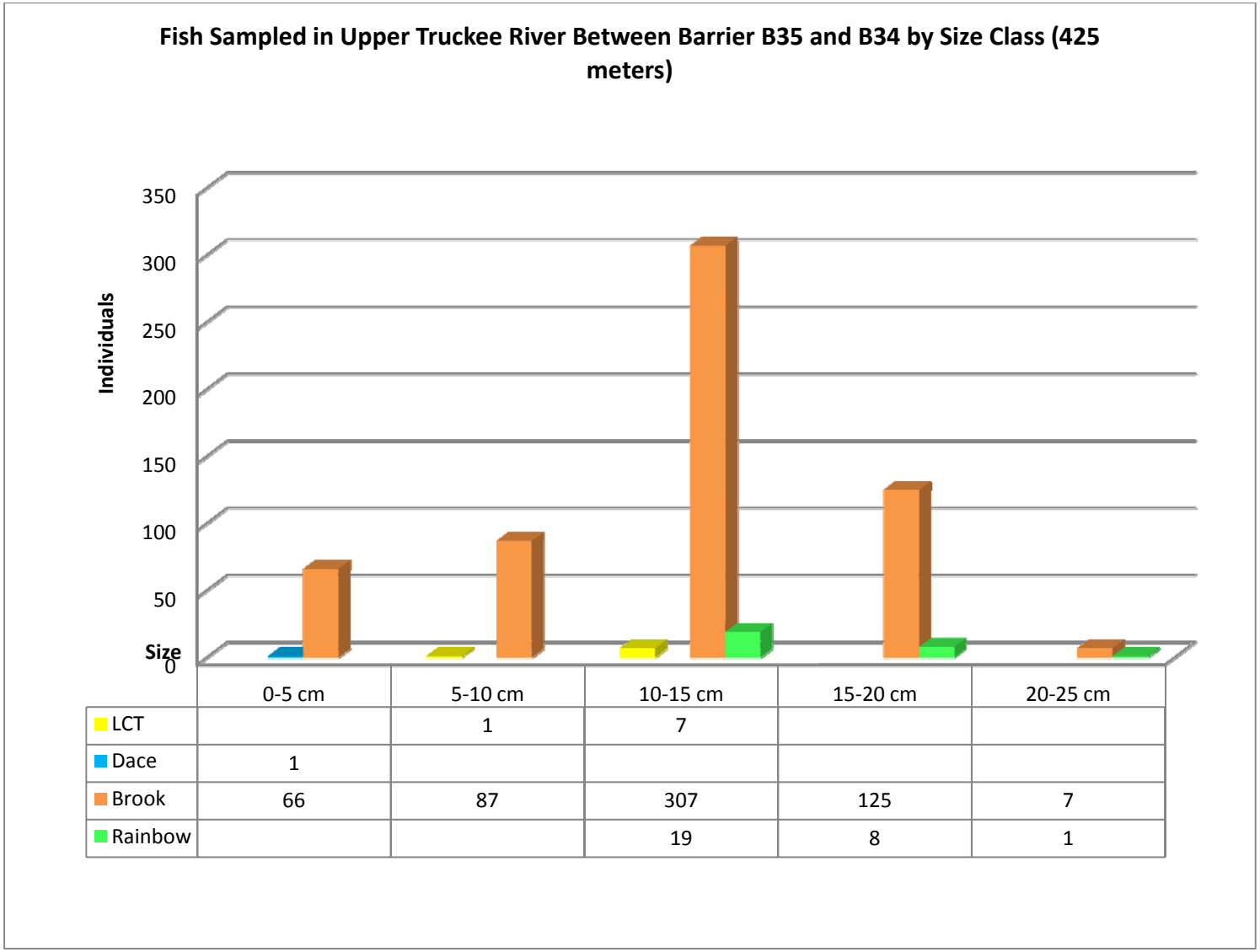


Figure B7. Species sampled in Upper Truckee River between barrier B35 and B34.

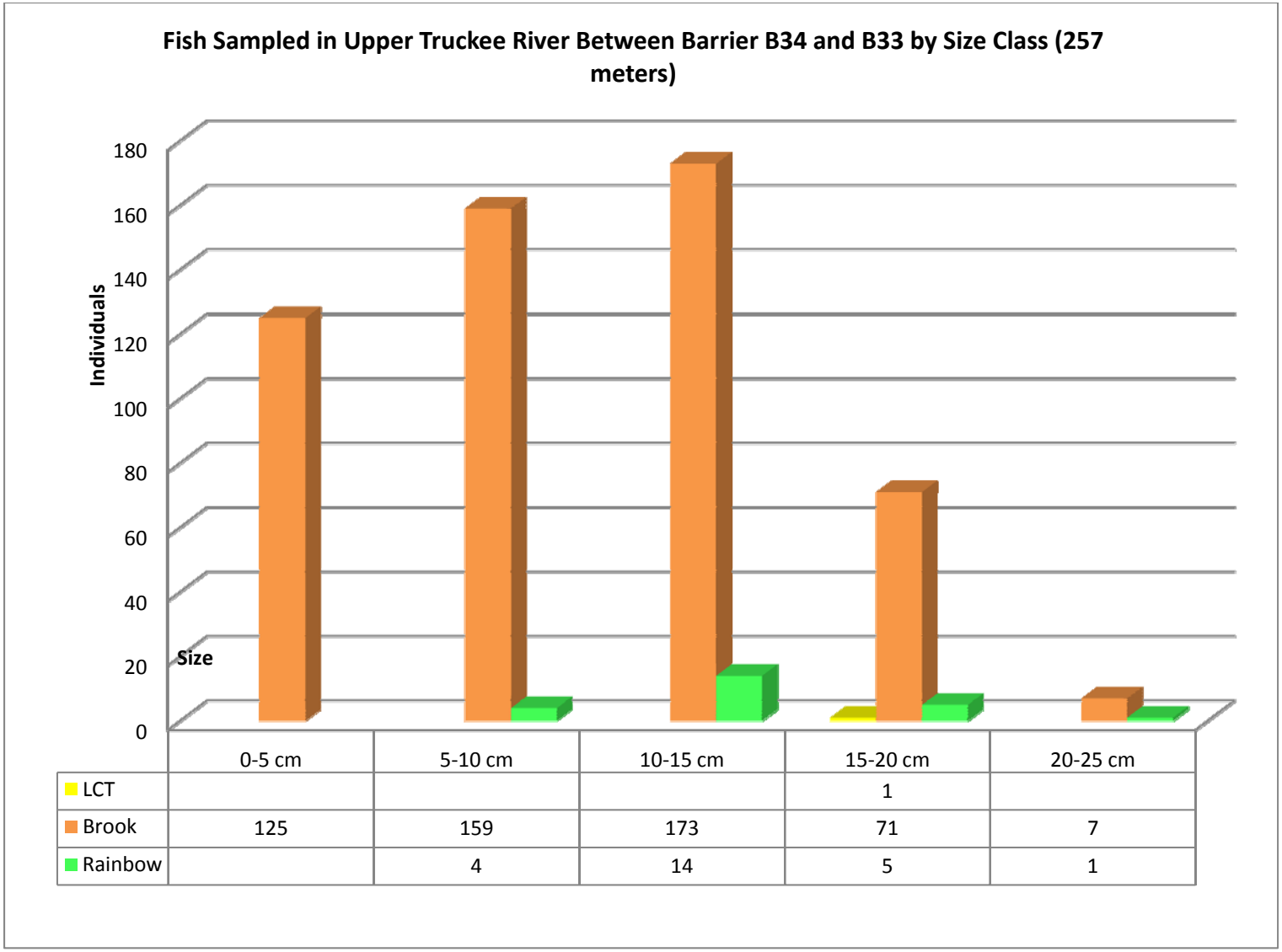
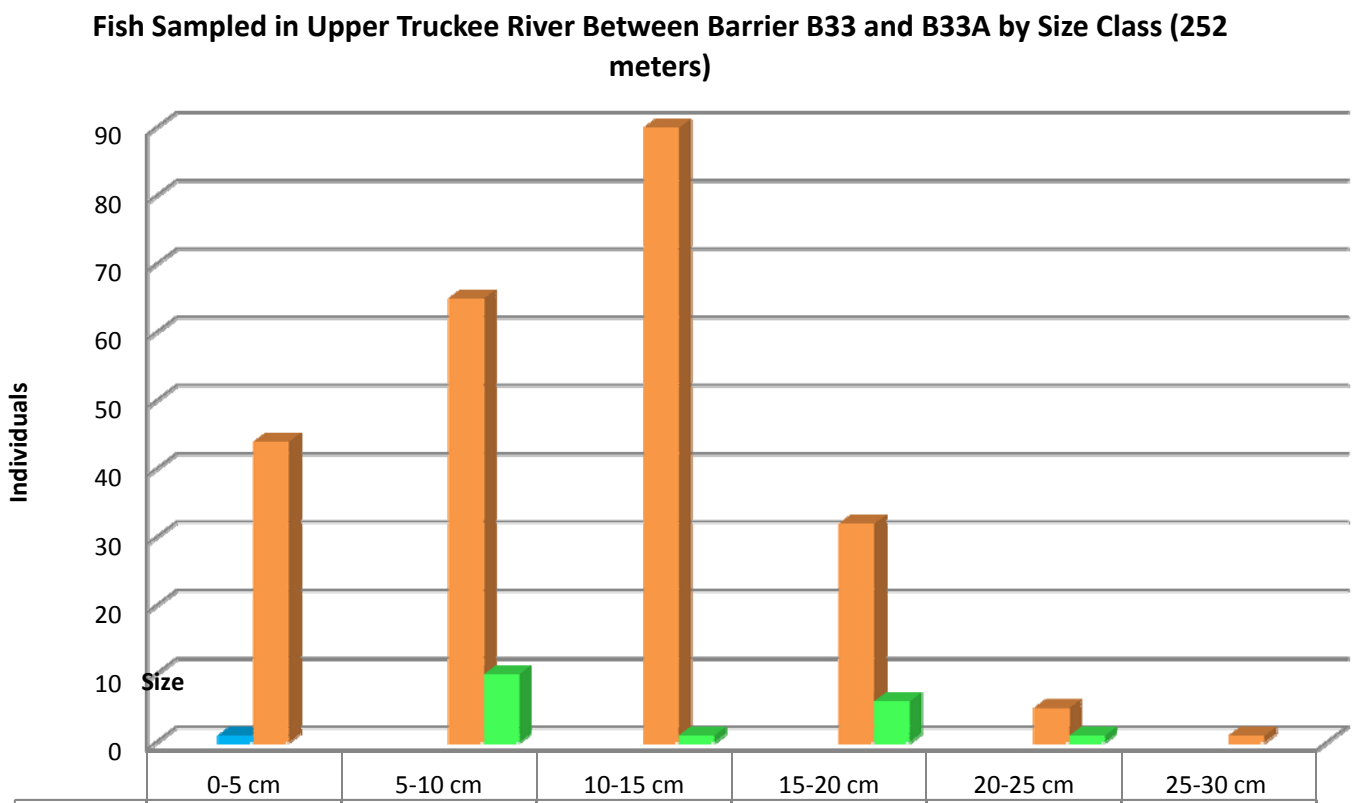


Figure B8. Species sampled in Upper Truckee River between barrier B34 and B33.



	0-5 cm	5-10 cm	10-15 cm	15-20 cm	20-25 cm	25-30 cm
LCT						
Dace	1					
Brook	44	65	90	32	5	1
Rainbow		10	1	6	1	

Figure B9. Species sampled in Upper Truckee River between barrier B33 and B3A.

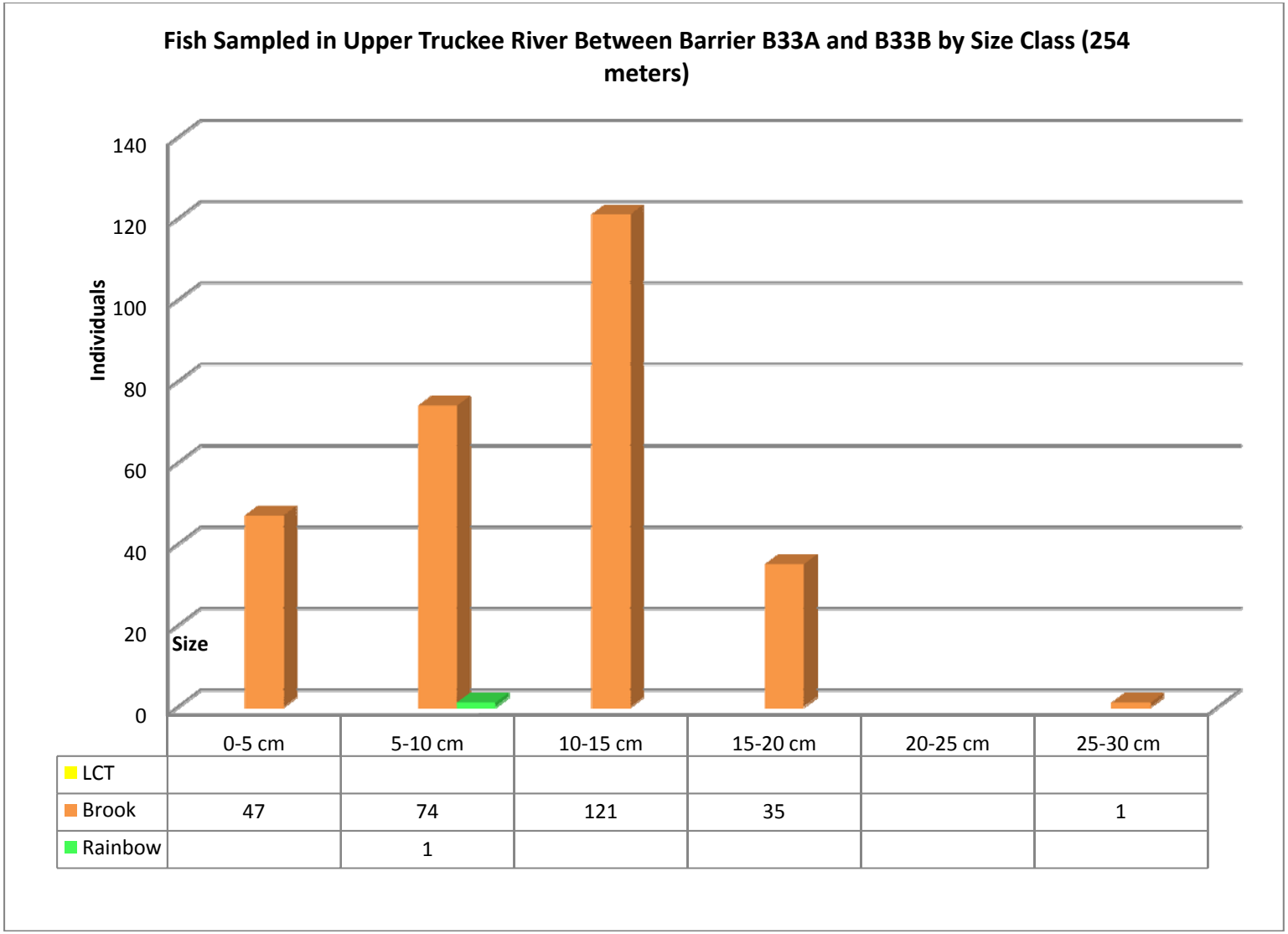
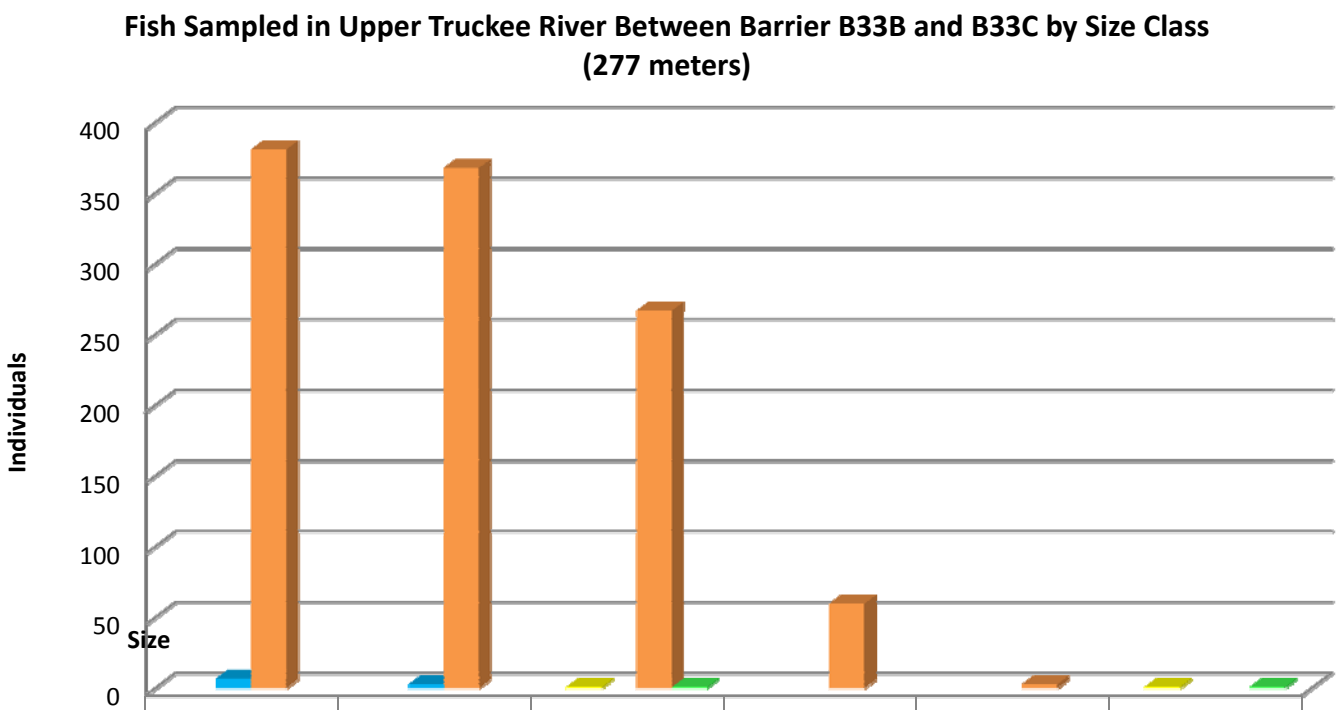
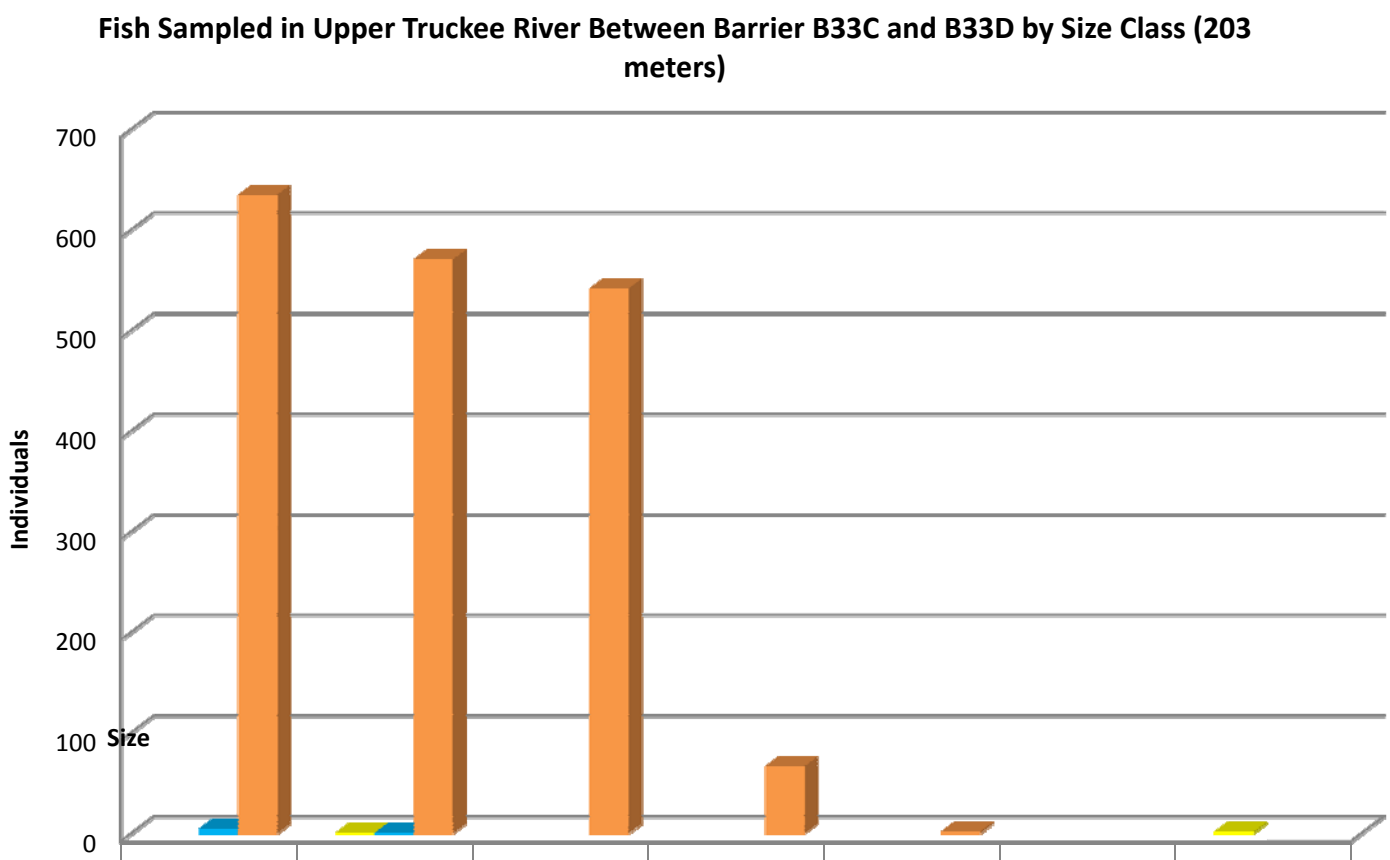


Figure B10. Species sampled in Upper Truckee River between barrier B33A and B33B.



	0-5 cm	5-10 cm	10-15 cm	15-20 cm	20-25 cm	25-30 cm
LCT			1			1
Dace	7	3				
Brook	381	368	267	60	3	
Rainbow			1			1

Figure B11. Species sampled in Upper Truckee River between barrier B33B and B33C.



	0-5 cm	5-10 cm	10-15 cm	15-20 cm	20-25 cm	25-30 cm	30+ cm
LCT		1					2
Dace	5	1					
Brook	635	571	542	67	2		

Figure B12. Species sampled in Upper Truckee River between barrier B33C and B33D.

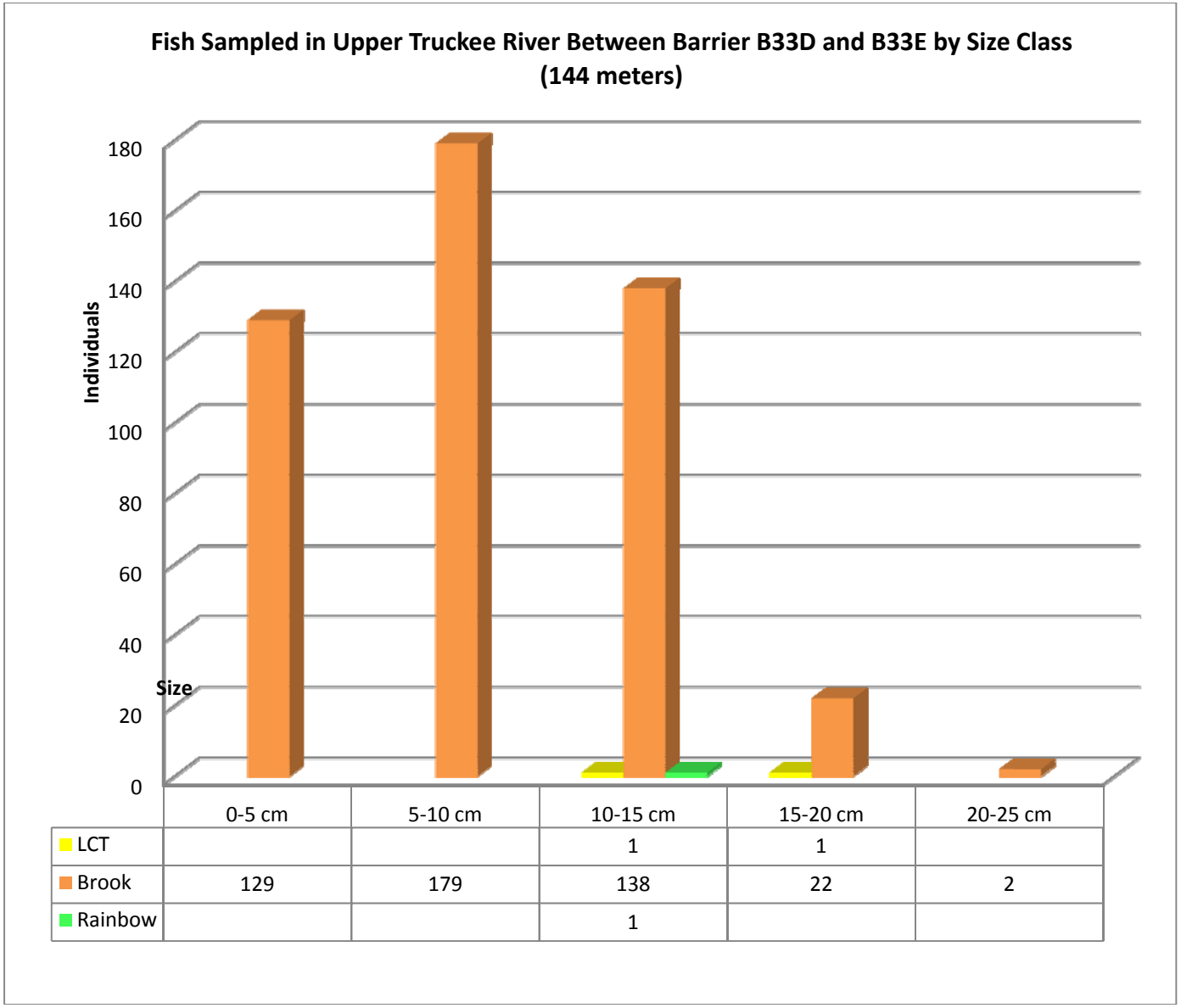


Figure B13. Species sampled in Upper Truckee River between barrier B33D and B33E.

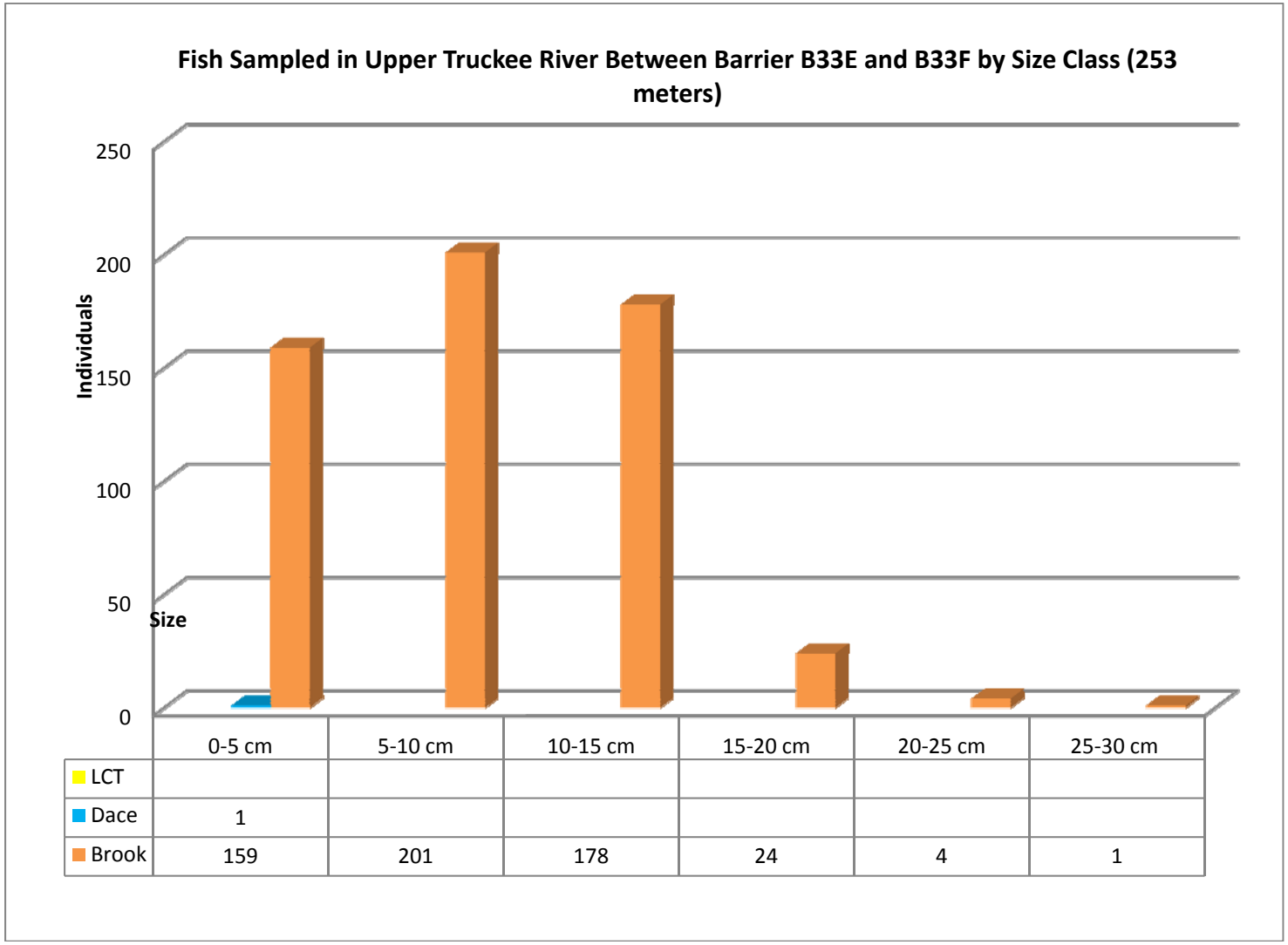
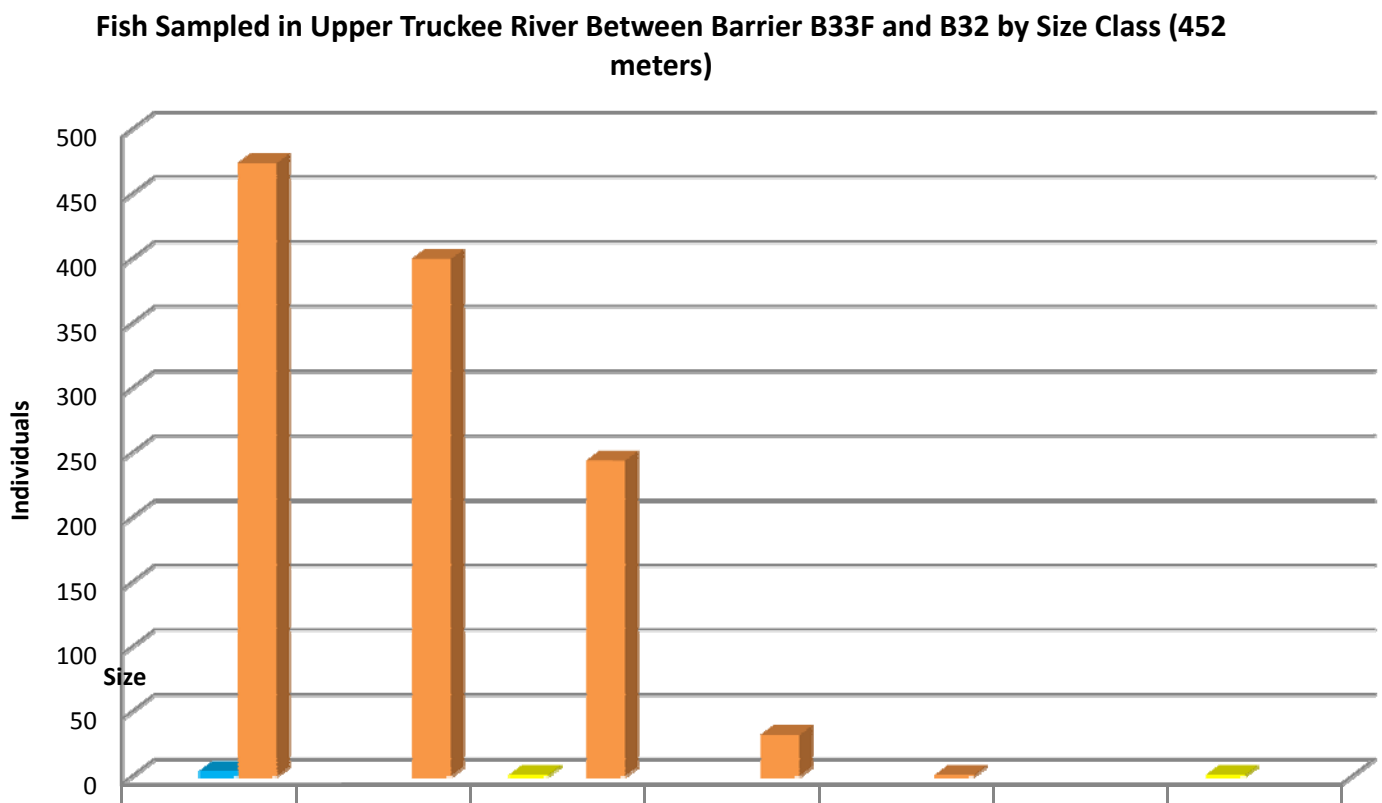


Figure B14. Species sampled in Upper Truckee River between barrier B33E and B33F.



	0-5 cm	5-10 cm	10-15 cm	15-20 cm	20-25 cm	25-30 cm	30+ cm
LCT			1				1
Dace	4						
Brook	474	400	244	32	1		

Figure B15. Species sampled in Upper Truckee River between barrier B33F and B32.

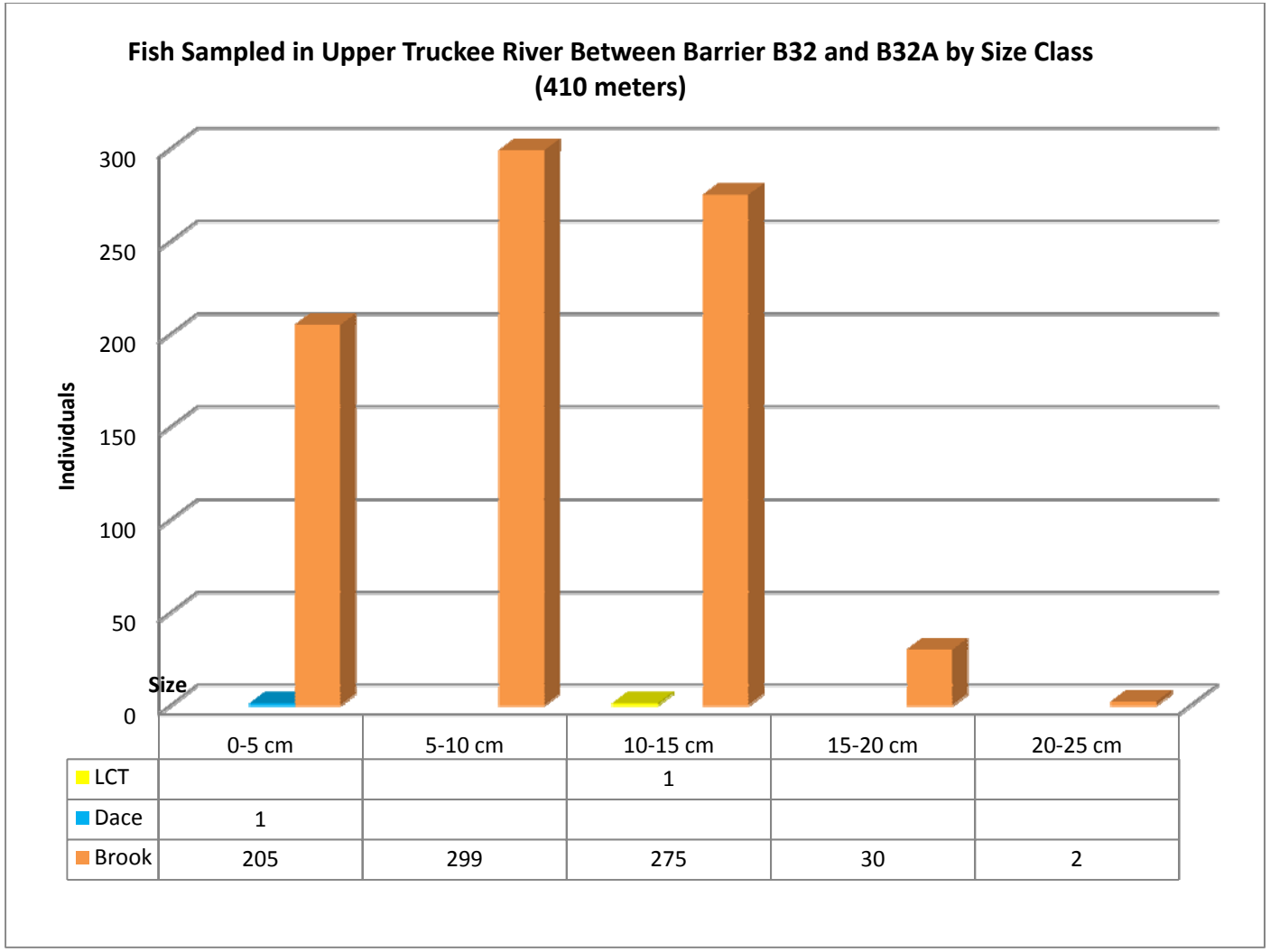
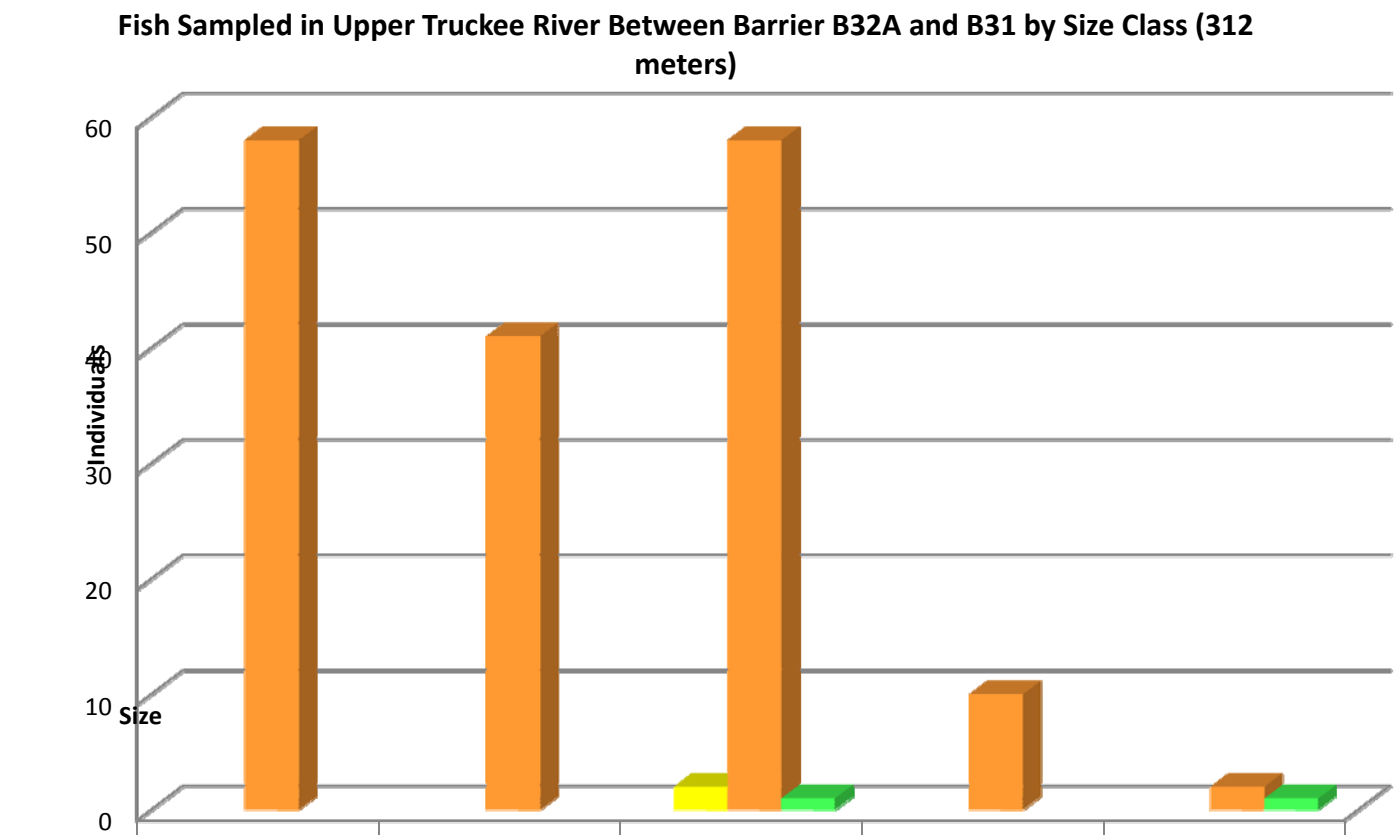


Figure B16. Species sampled in Upper Truckee River between barrier B32 and B32A.



	0-5 cm	5-10 cm	10-15 cm	15-20 cm	20-25 cm
LCT			2		
Brook	58	41	58	10	2
Rainbow			1		1

Figure B17. Species sampled in Upper Truckee River between barrier B32A and B31.

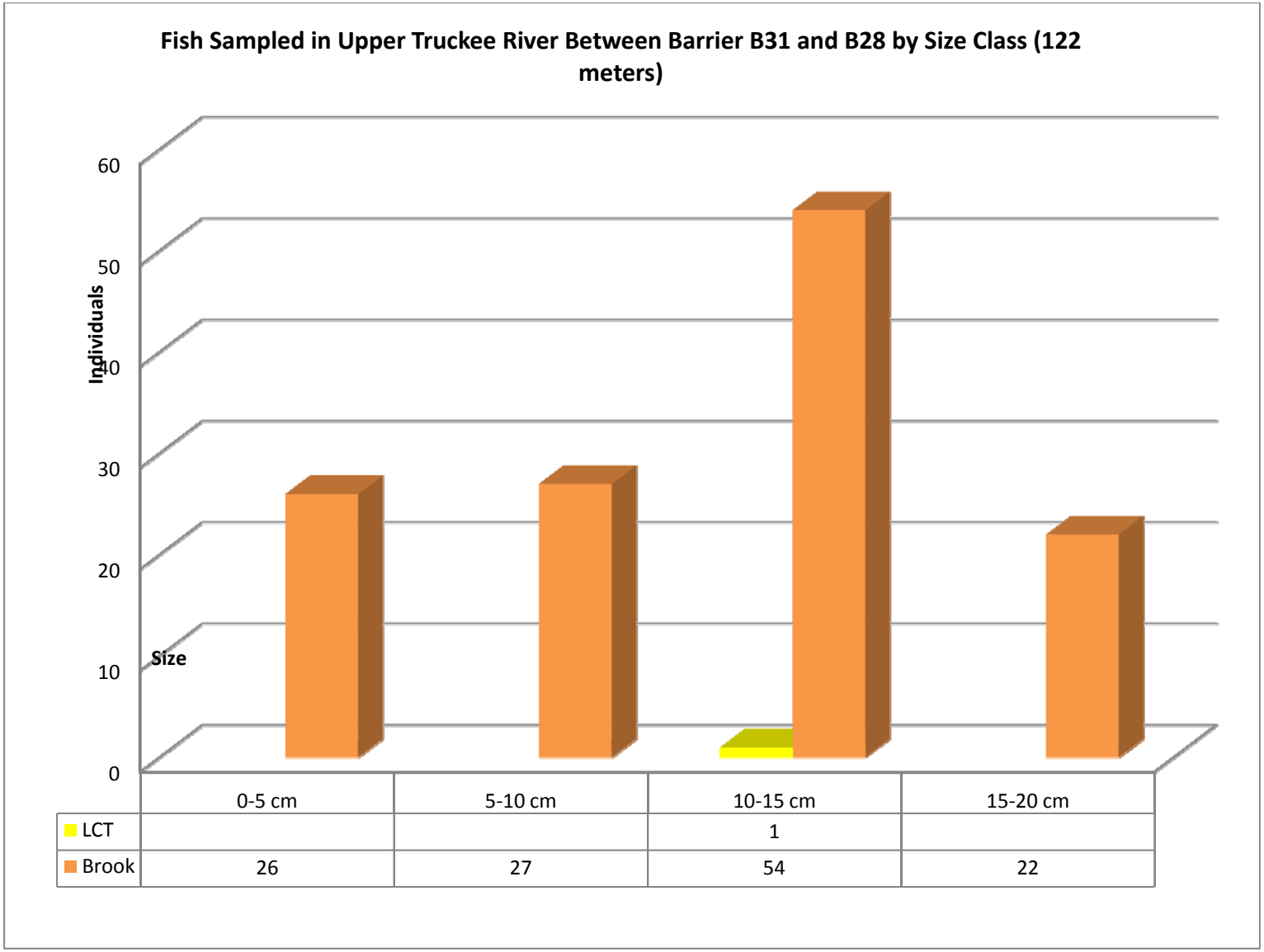
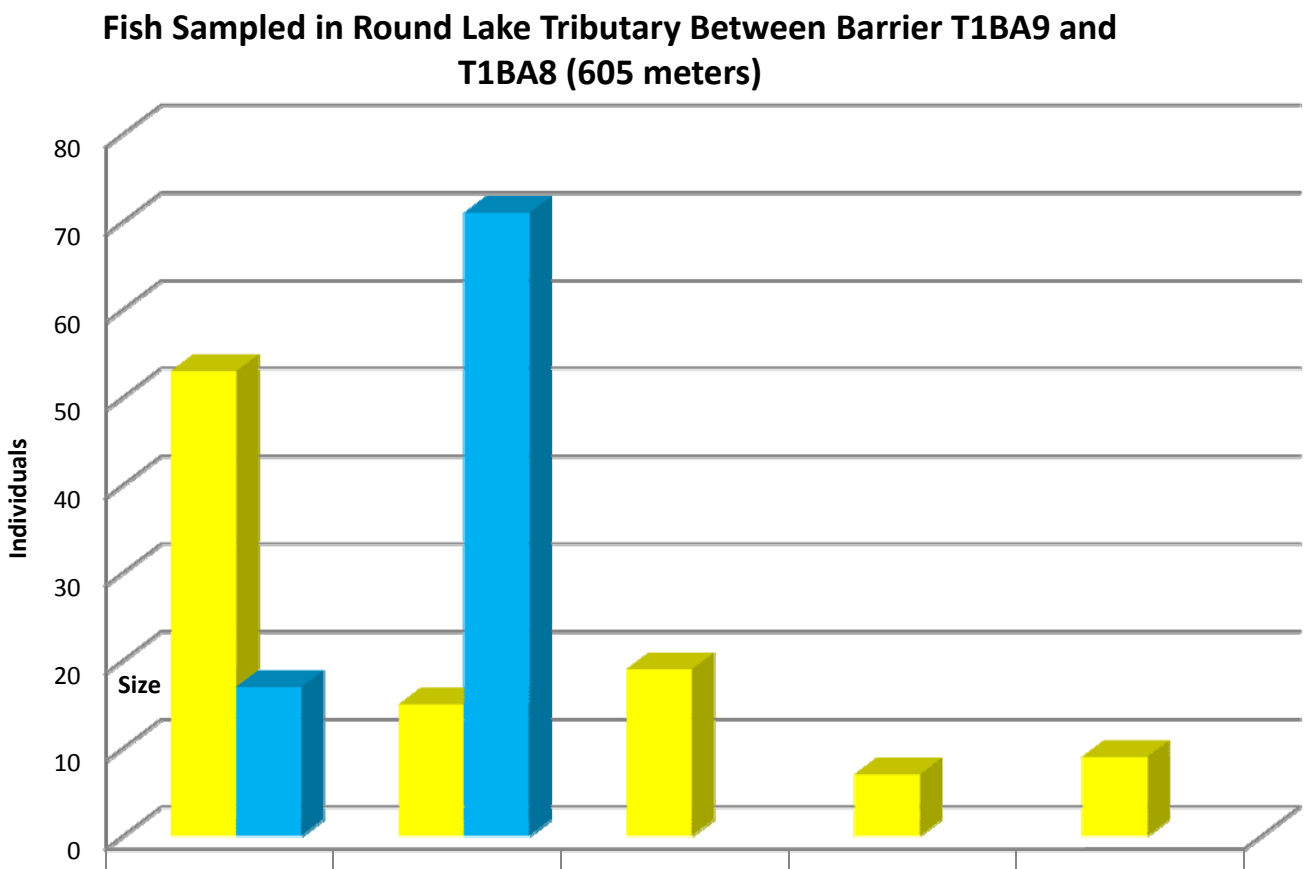


Figure B18. Species sampled in Upper Truckee River between barrier B31 and B28.



	0-5 cm	5-10 cm	10-15 cm	15-20 cm	20-25 cm
LCT	53	15	19	7	9
Dace	17	71			

Figure B19. Species sampled in Round Lake Tributary between barrier T1BA9 and T1BA8.

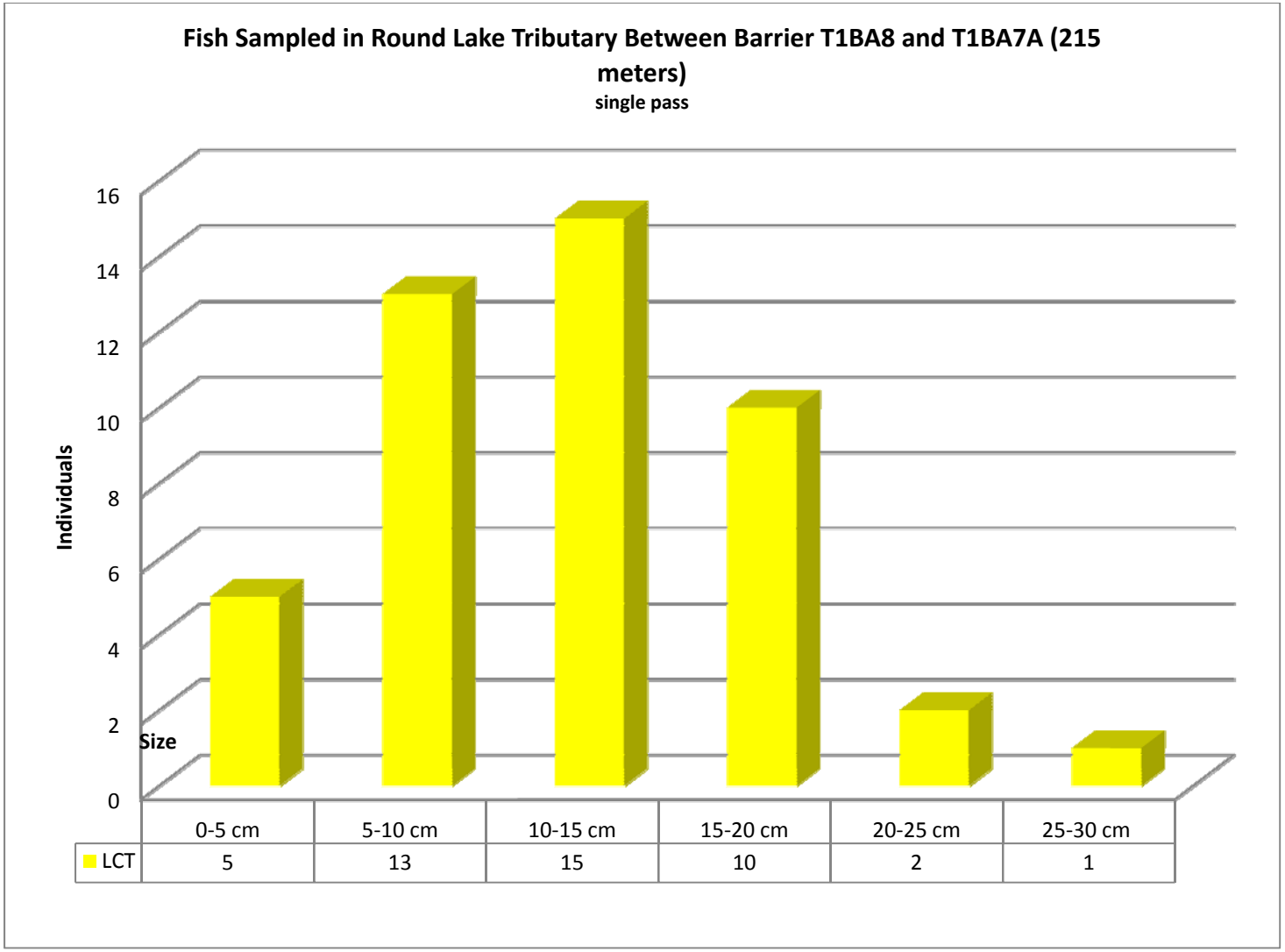


Figure B20. Species sampled in Round Lake Tributary between barrier T1BA8 and T1BA7A.

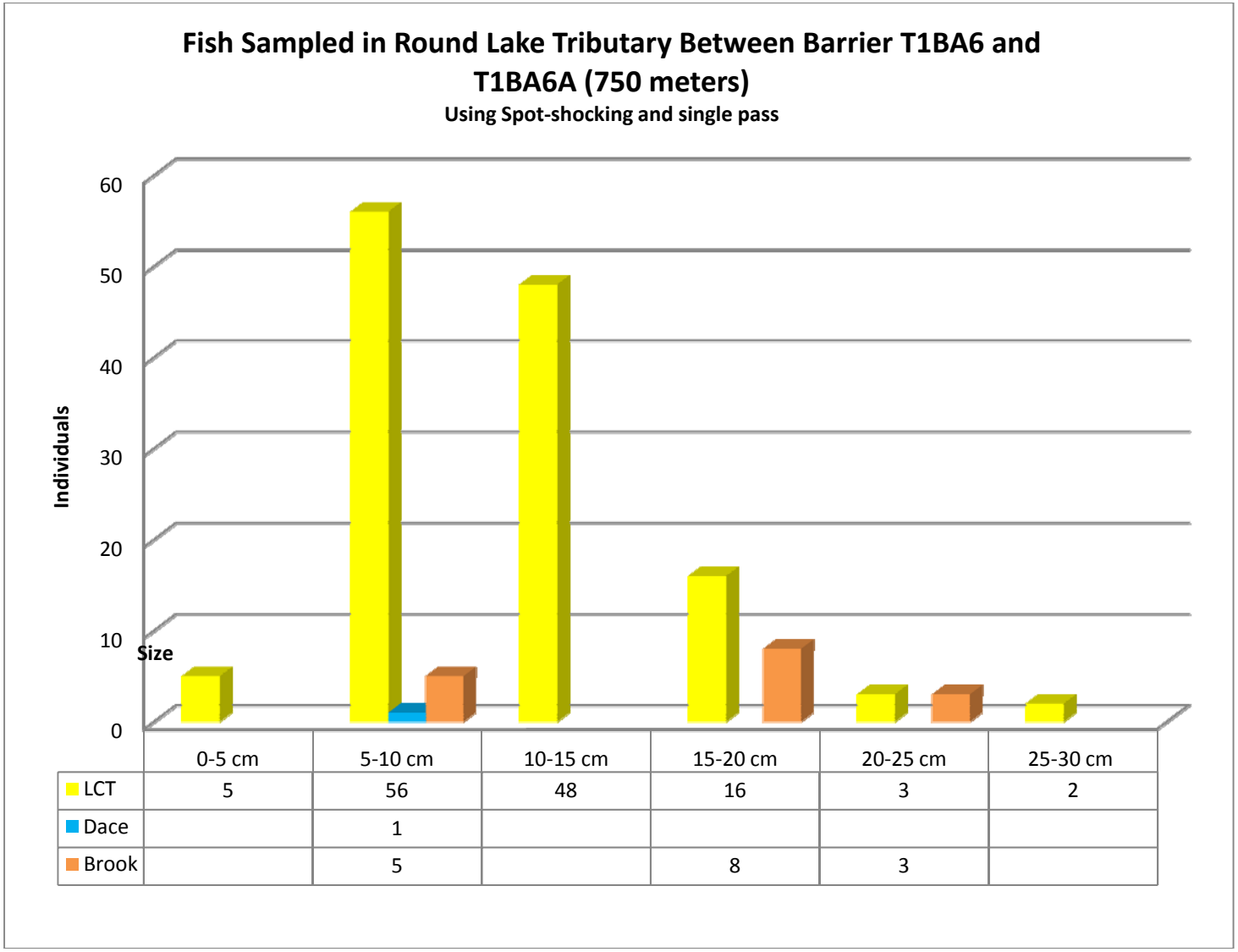
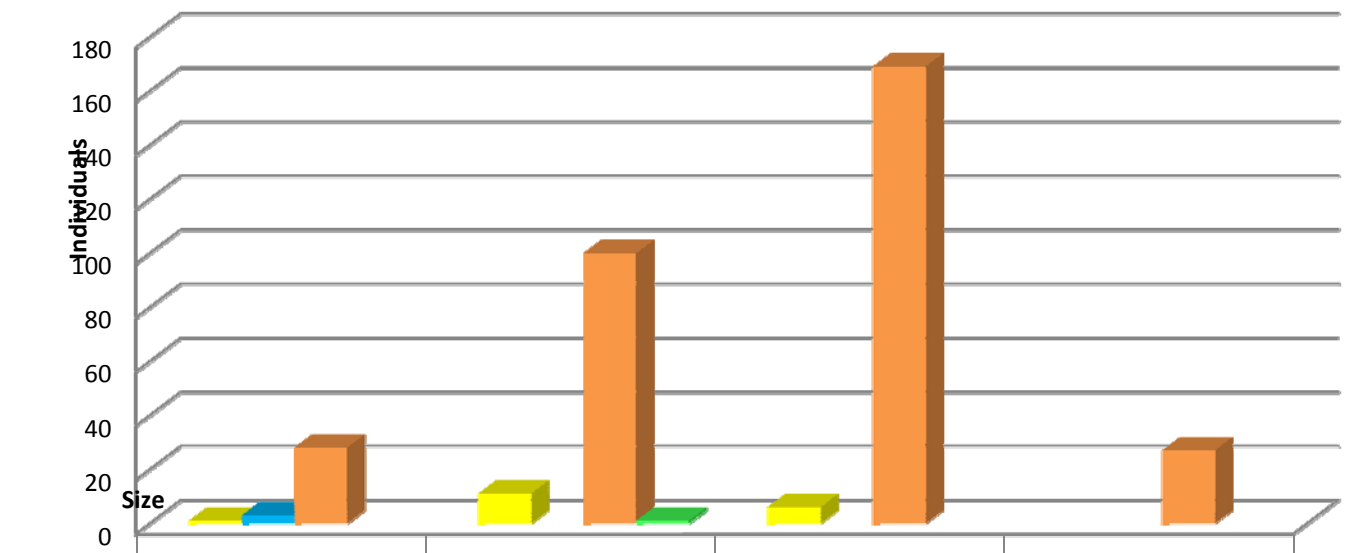
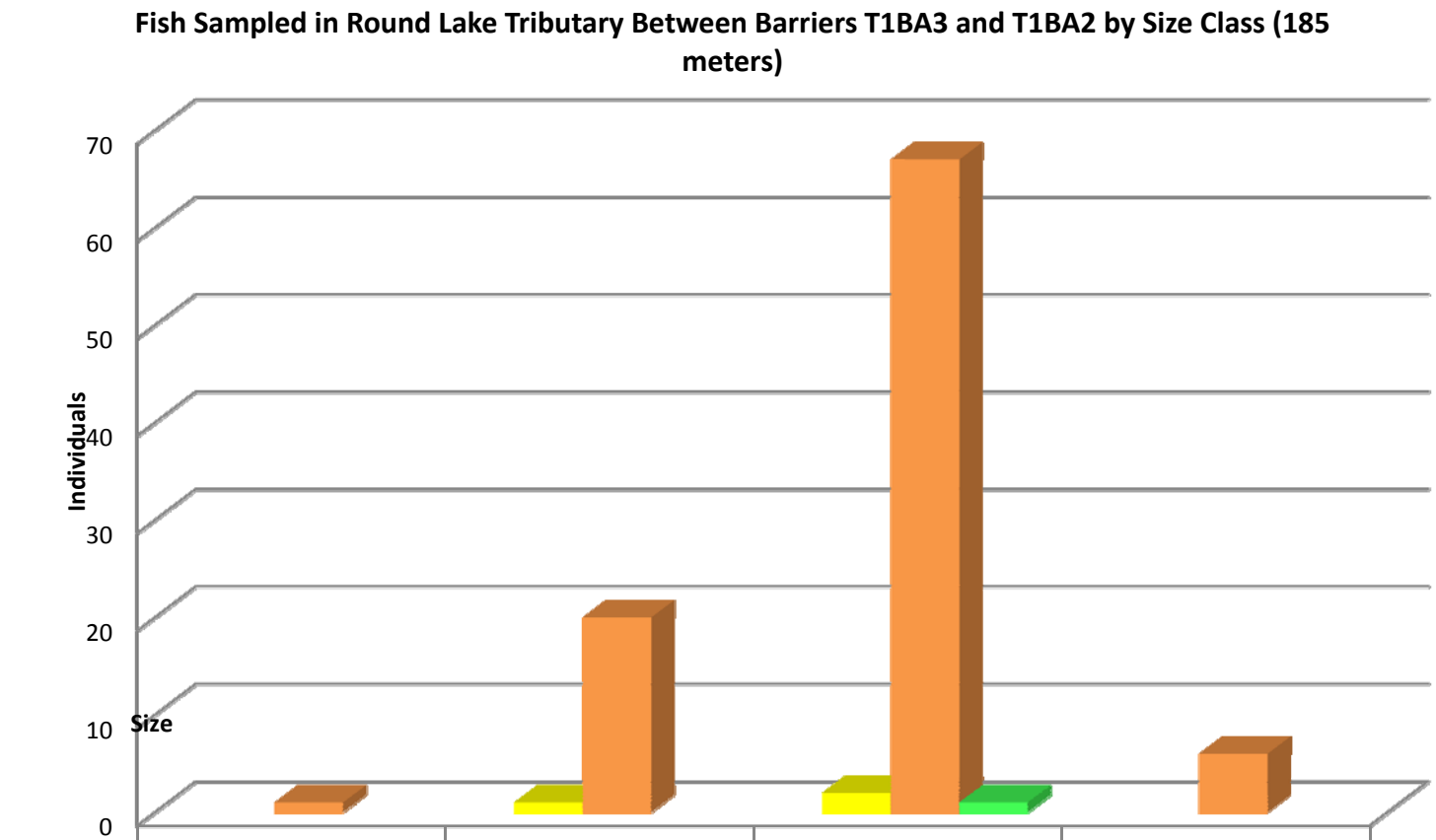


Figure B21. Species sampled in Round Lake Tributary between barrier T1BA6 and T1BA6A.



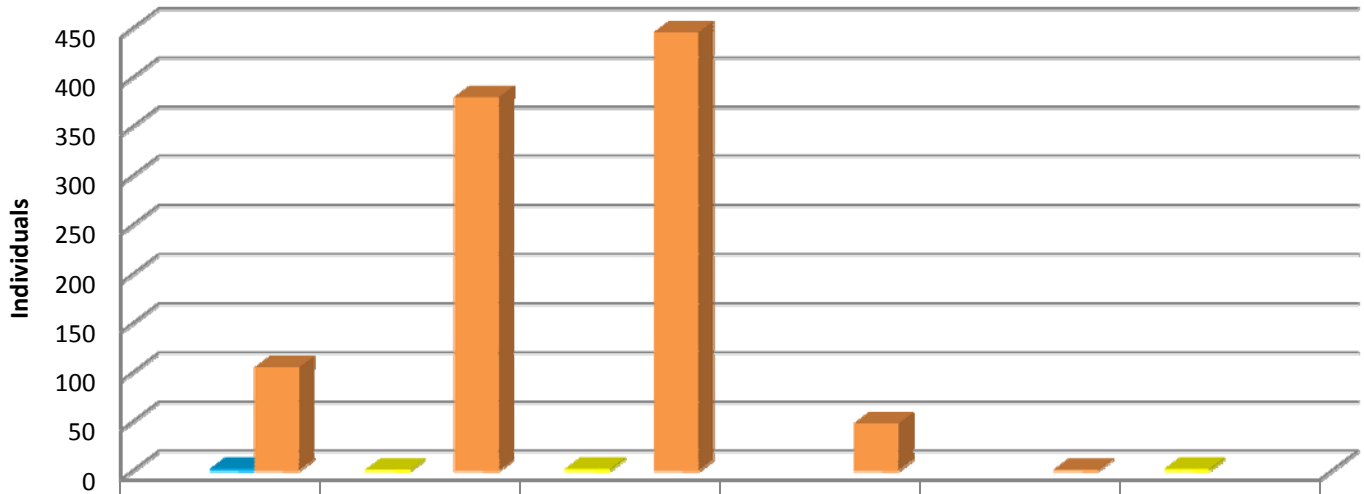
	0-5 cm	5-10 cm	10-15 cm	15-20 cm
LCT	1	11	6	
Dace	3			
Brook	28	100	169	27
Rainbow		1		

Figure B22. Species sampled in Round Lake Tributary between barrier T1BA4 and T1BA3.



	0-5 cm	5-10 cm	10-15 cm	15-20 cm
LCT		1	2	
Brook	1	20	67	6
Rainbow			1	

Figure B23. Species sampled in Round Lake Tributary between barrier T1BA3 and T1BA2.



Size	0-5 cm	5-10 cm	10-15 cm	15-20 cm	20-25 cm	25-30 cm
LCT		1	2			2
Dace	2					
Brook	105	380	446	48	1	

Figure B24. Species sampled in Round Lake Tributary between barrier T1BA2 and T1BA1.

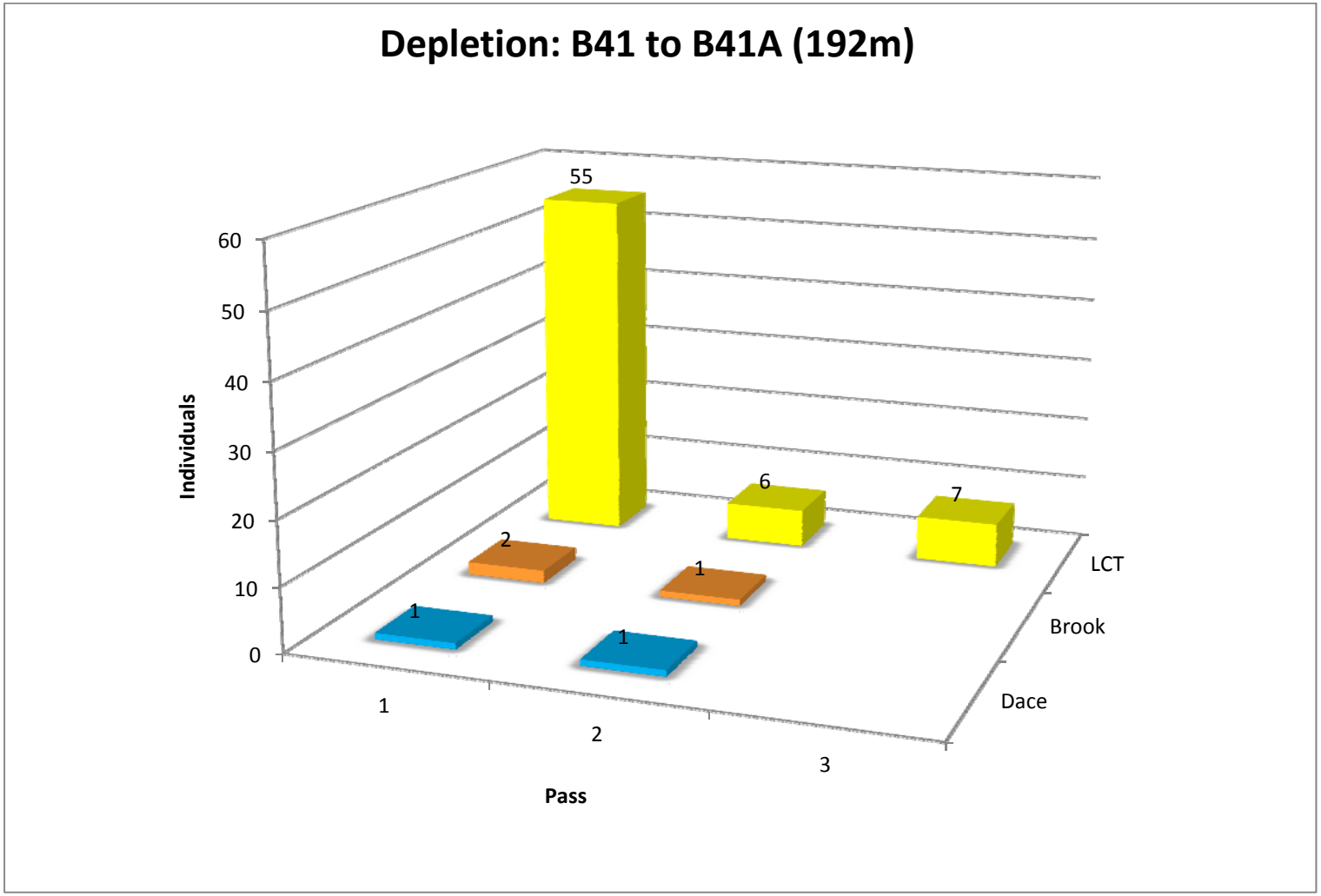


Figure B25. Depletion over three passes on Upper Truckee River between barrier B41 and B41A (a low water hydraulic control).

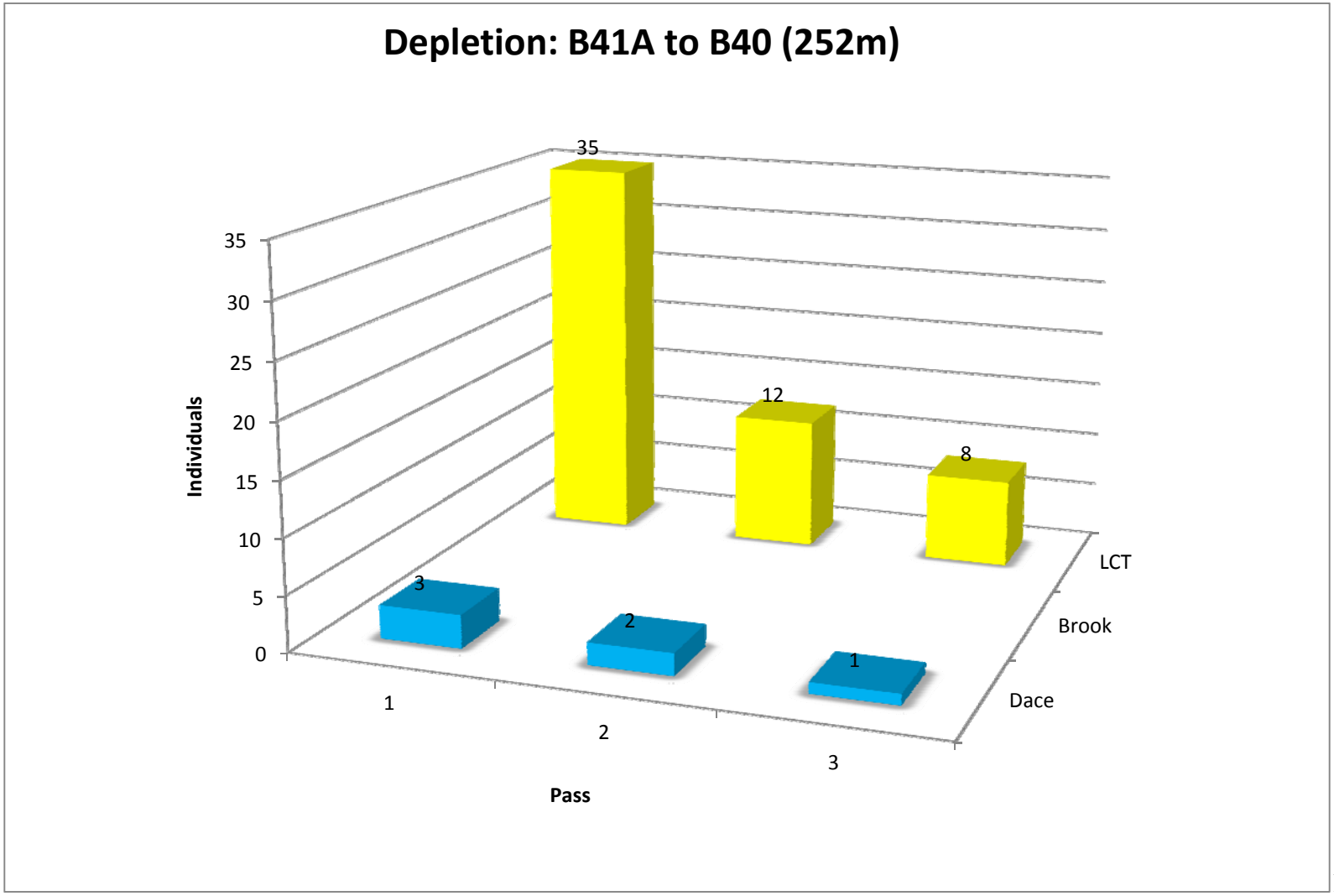


Figure B26. Depletion over three passes on Upper Truckee River between barrier B41A and B40.

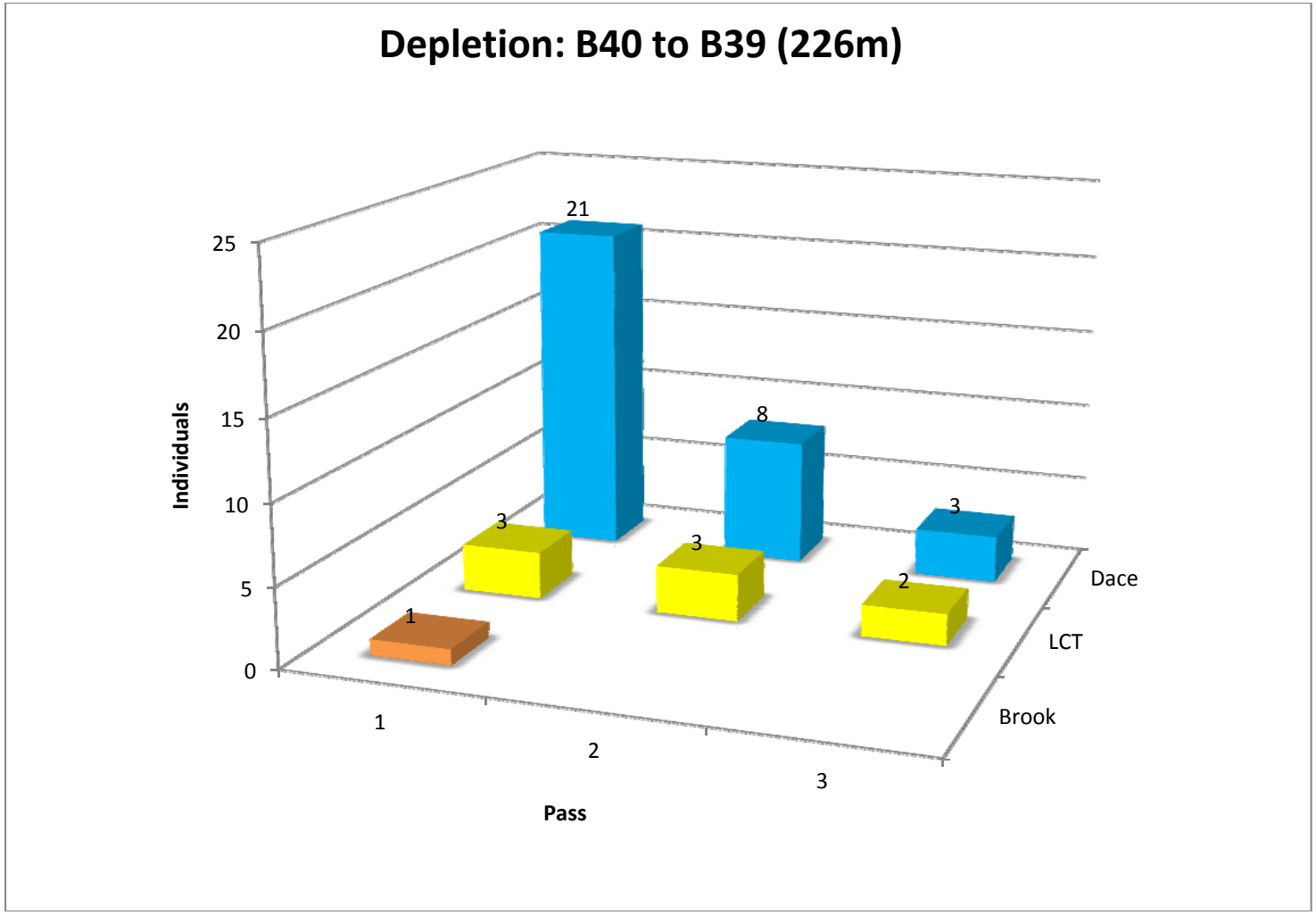


Figure B27. Depletion over three passes on Upper Truckee River between barrier B40 and B39.

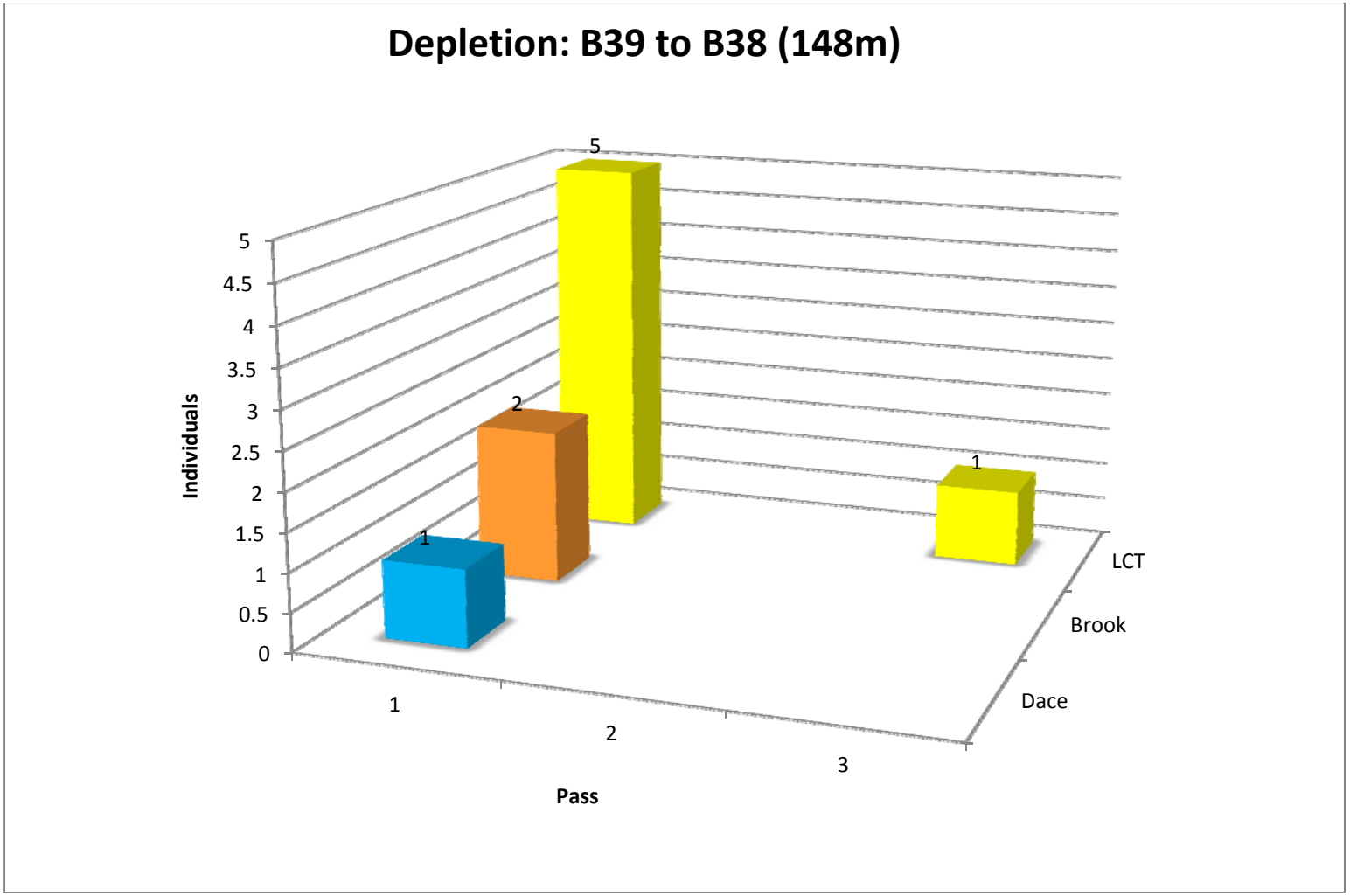


Figure B28. Depletion over three passes on Upper Truckee River between barrier B39 and B38.

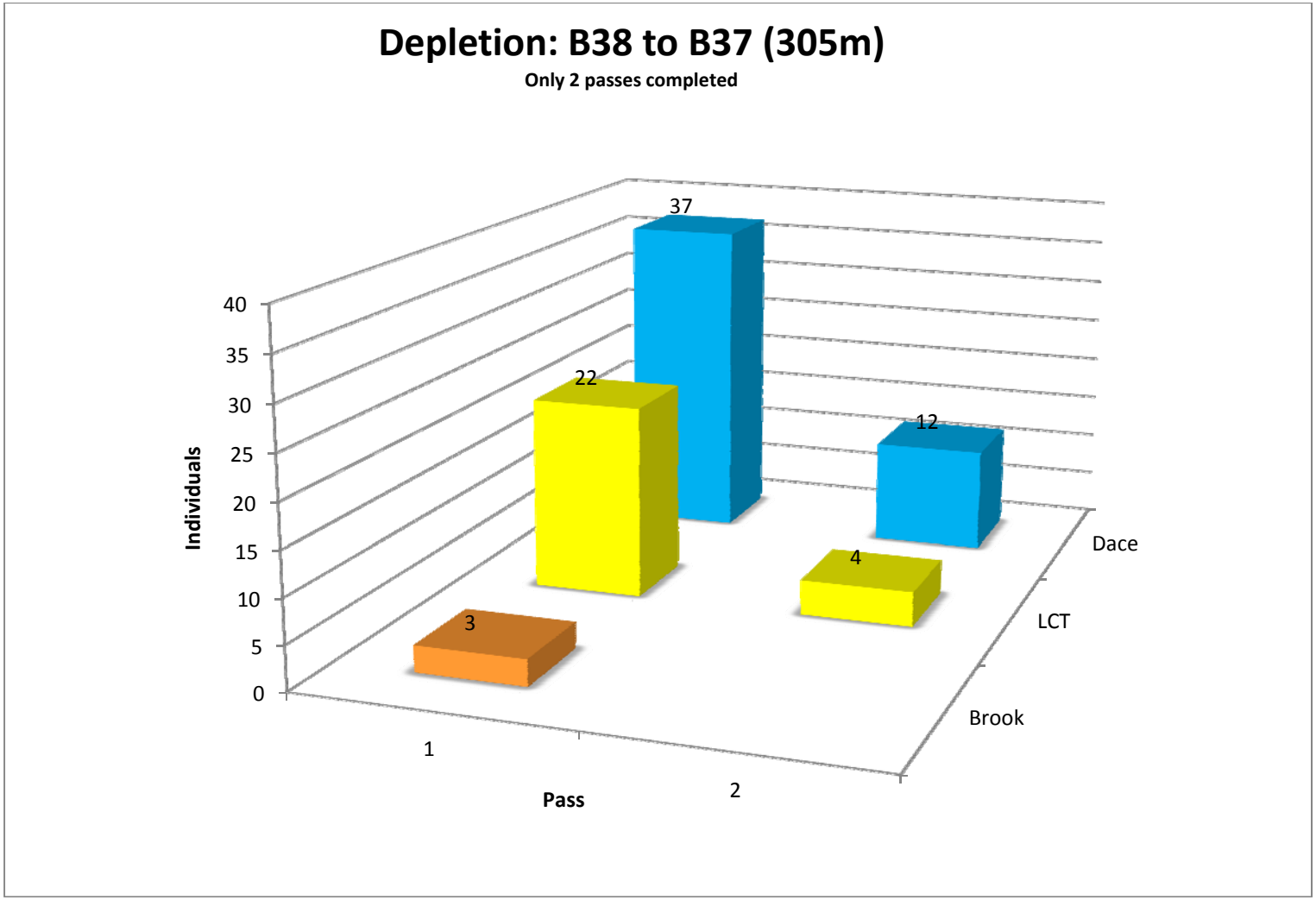


Figure B29. Depletion over three passes on Upper Truckee River between barrier B38 and B37. Third pass not completed due to time constraints.

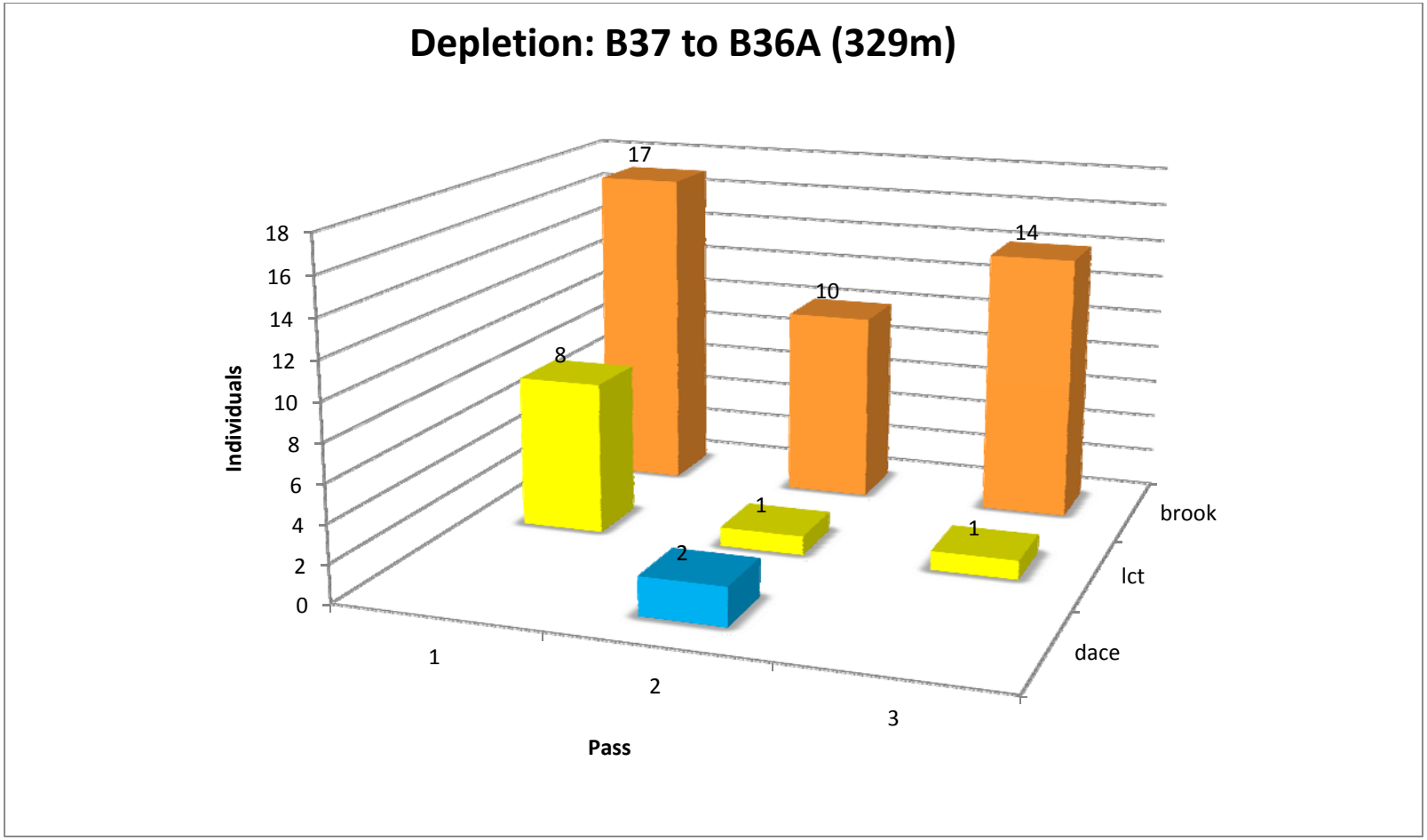


Figure B30. Depletion over three passes on Upper Truckee River between barrier B37 and B36A.

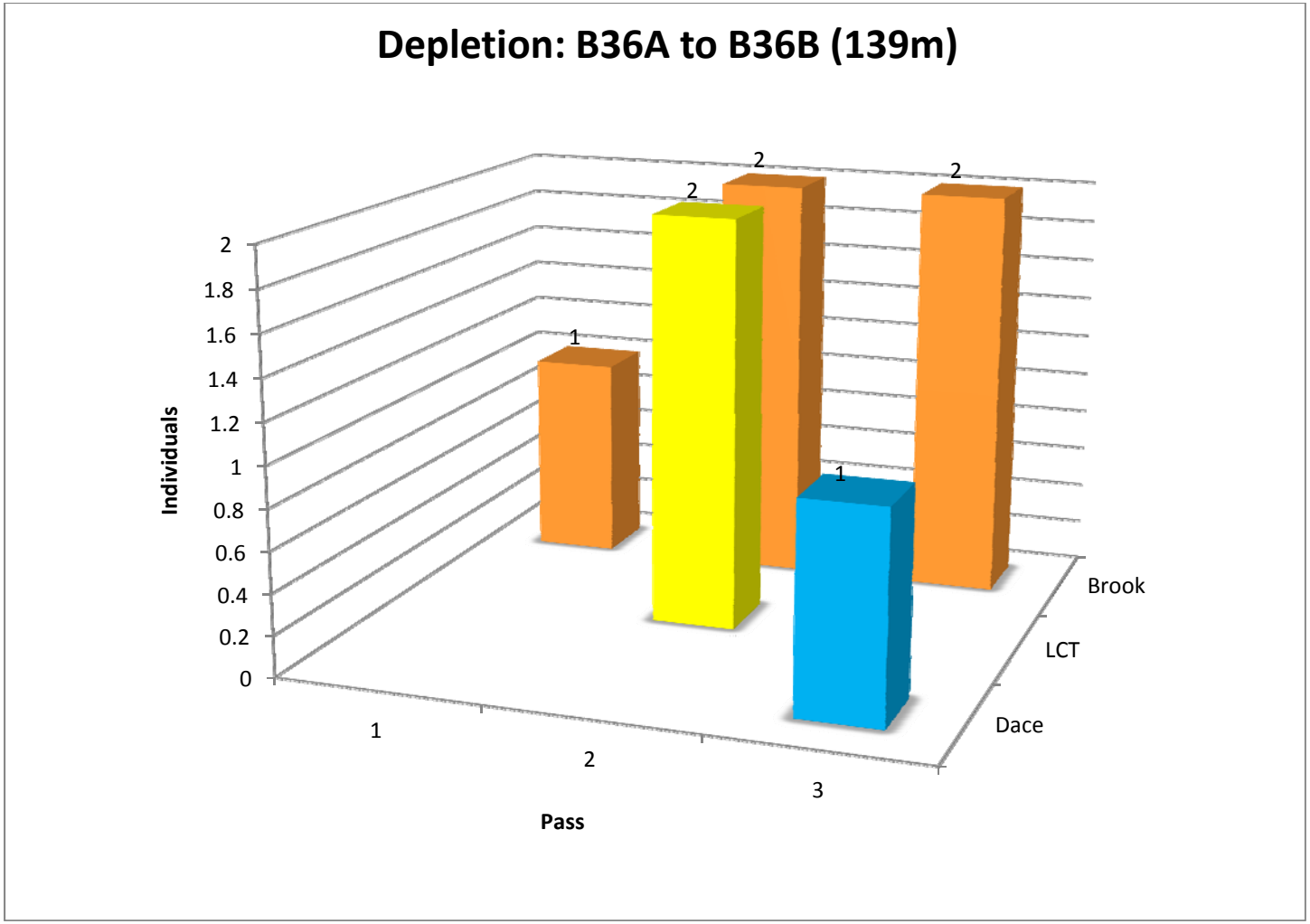


Figure B31. Depletion over three passes on Upper Truckee River between barrier B36A and B36B.

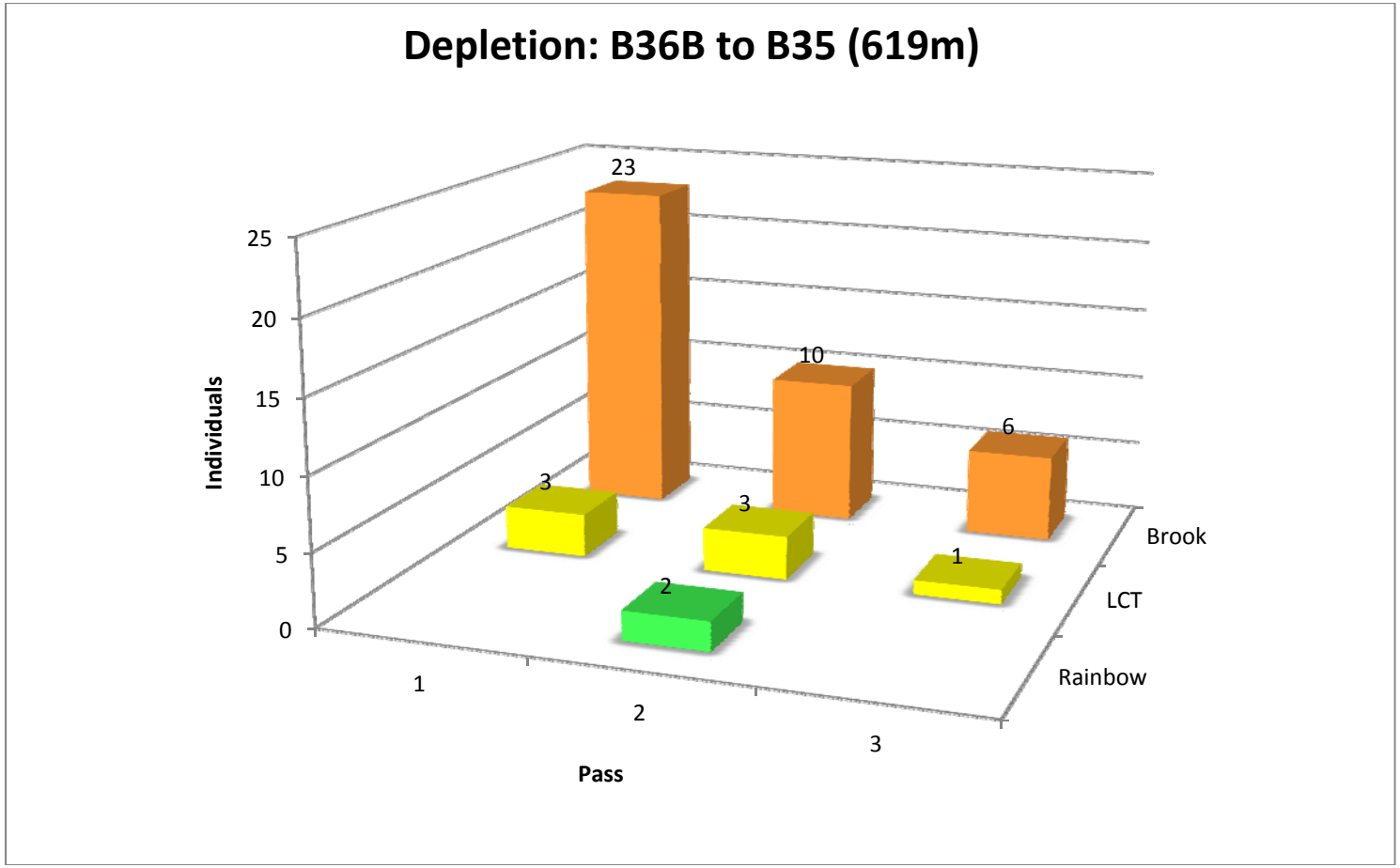


Figure B32. Depletion over three passes on Upper Truckee River between barrier B36B and B35.

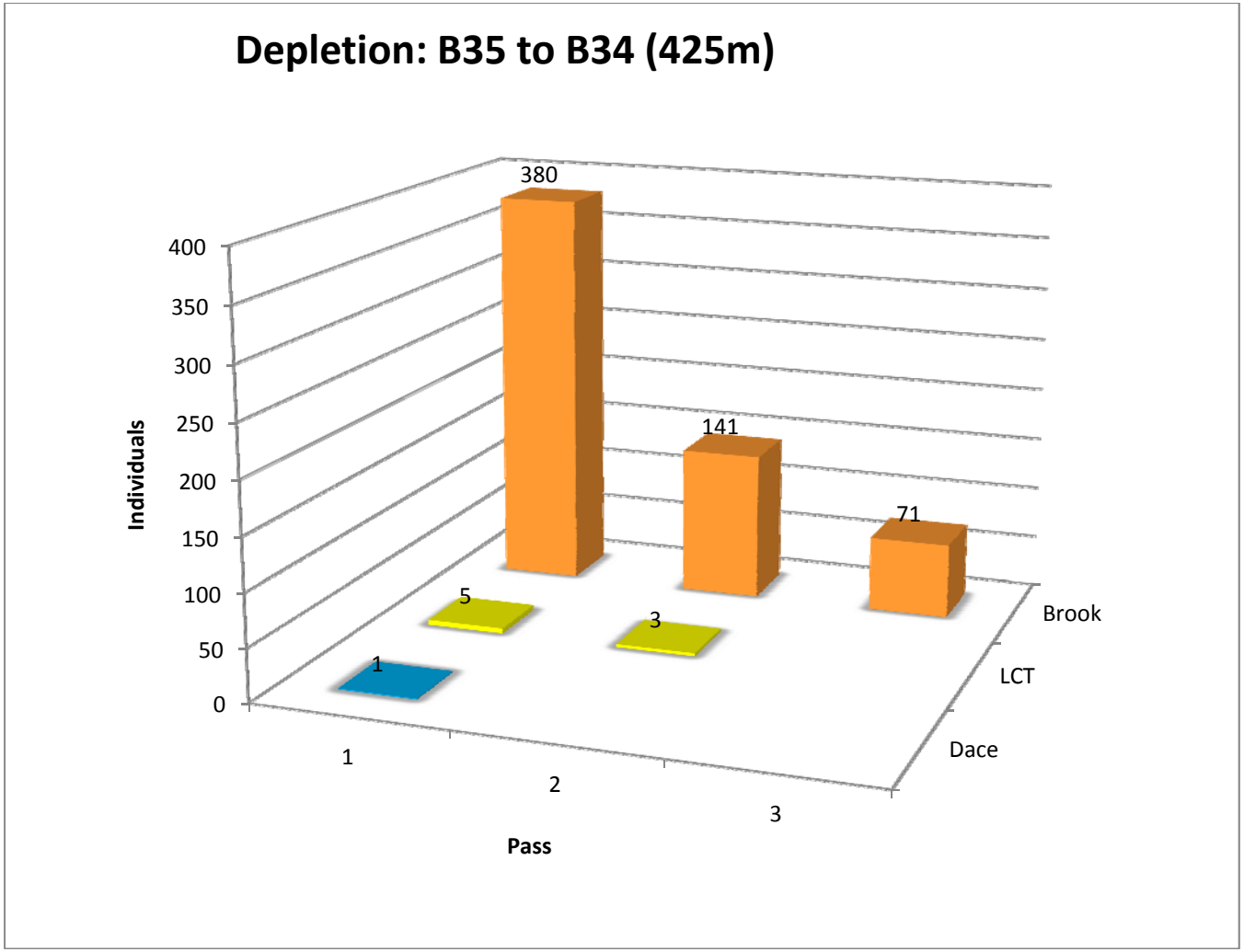


Figure B33. Depletion over three passes on Upper Truckee River between barrier B35 and B34.

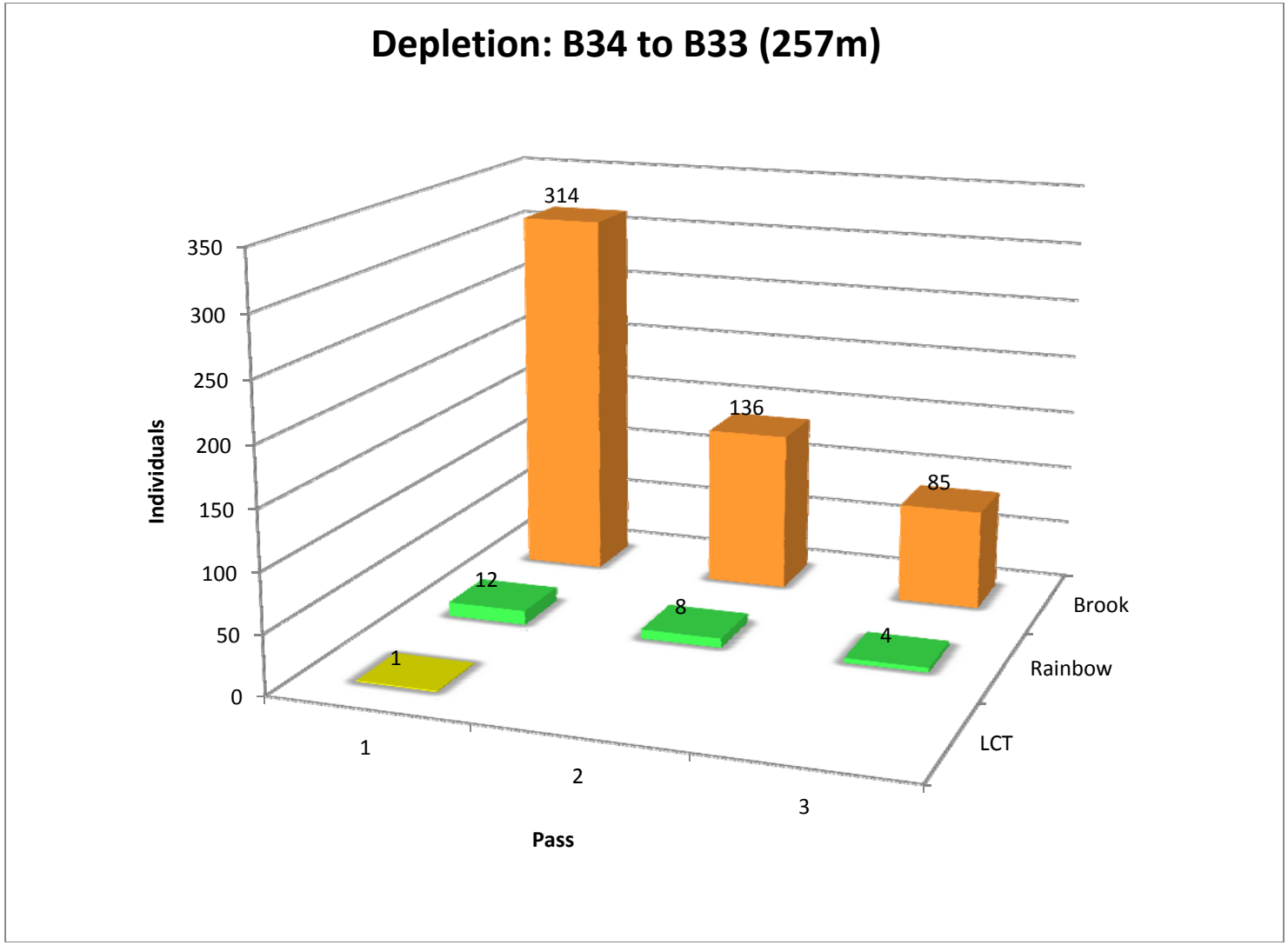


Figure B34. Depletion over three passes on Upper Truckee River between barrier B34 and B33.

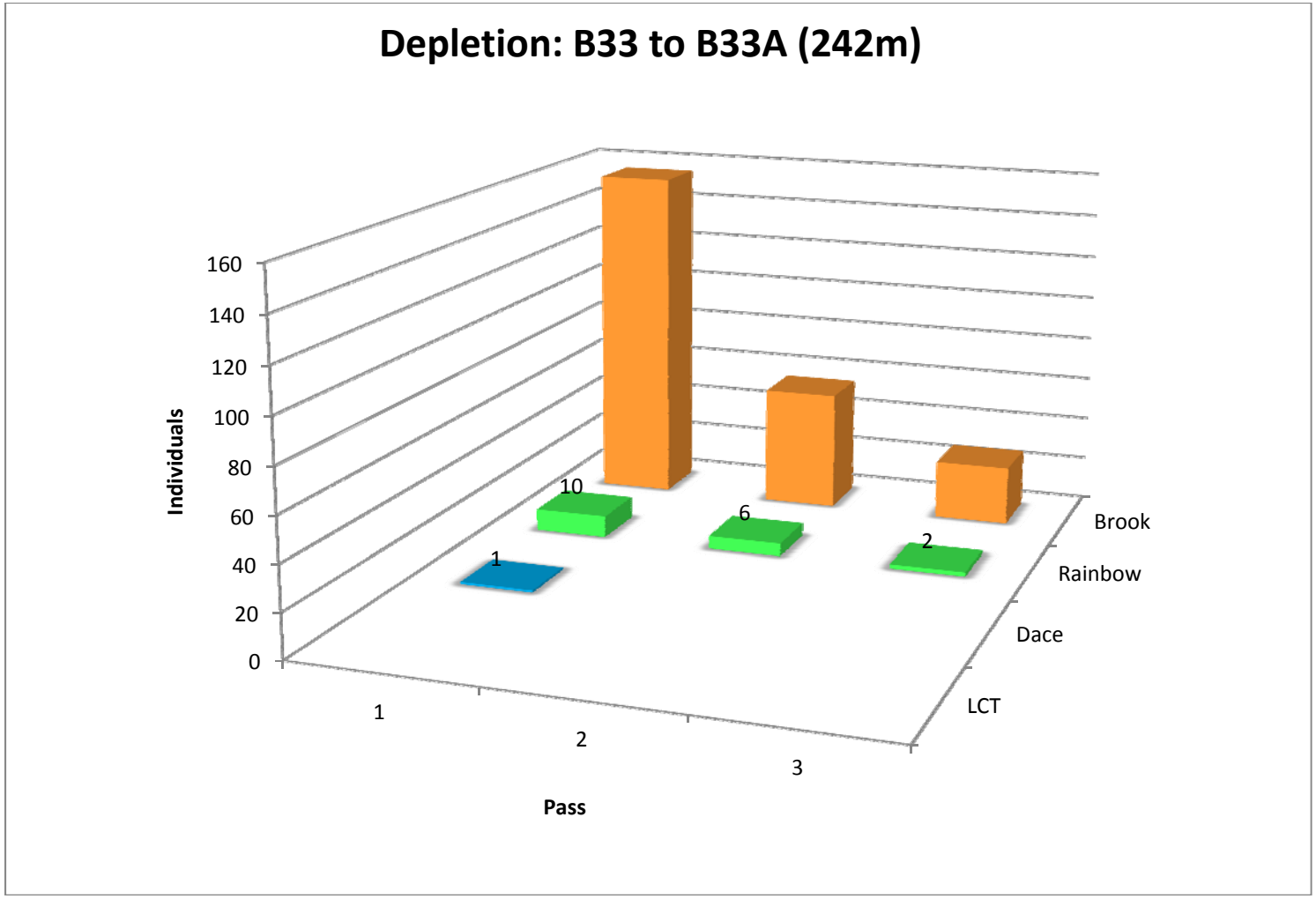


Figure B35. Depletion over three passes on Upper Truckee River between barrier B33 and B33A.

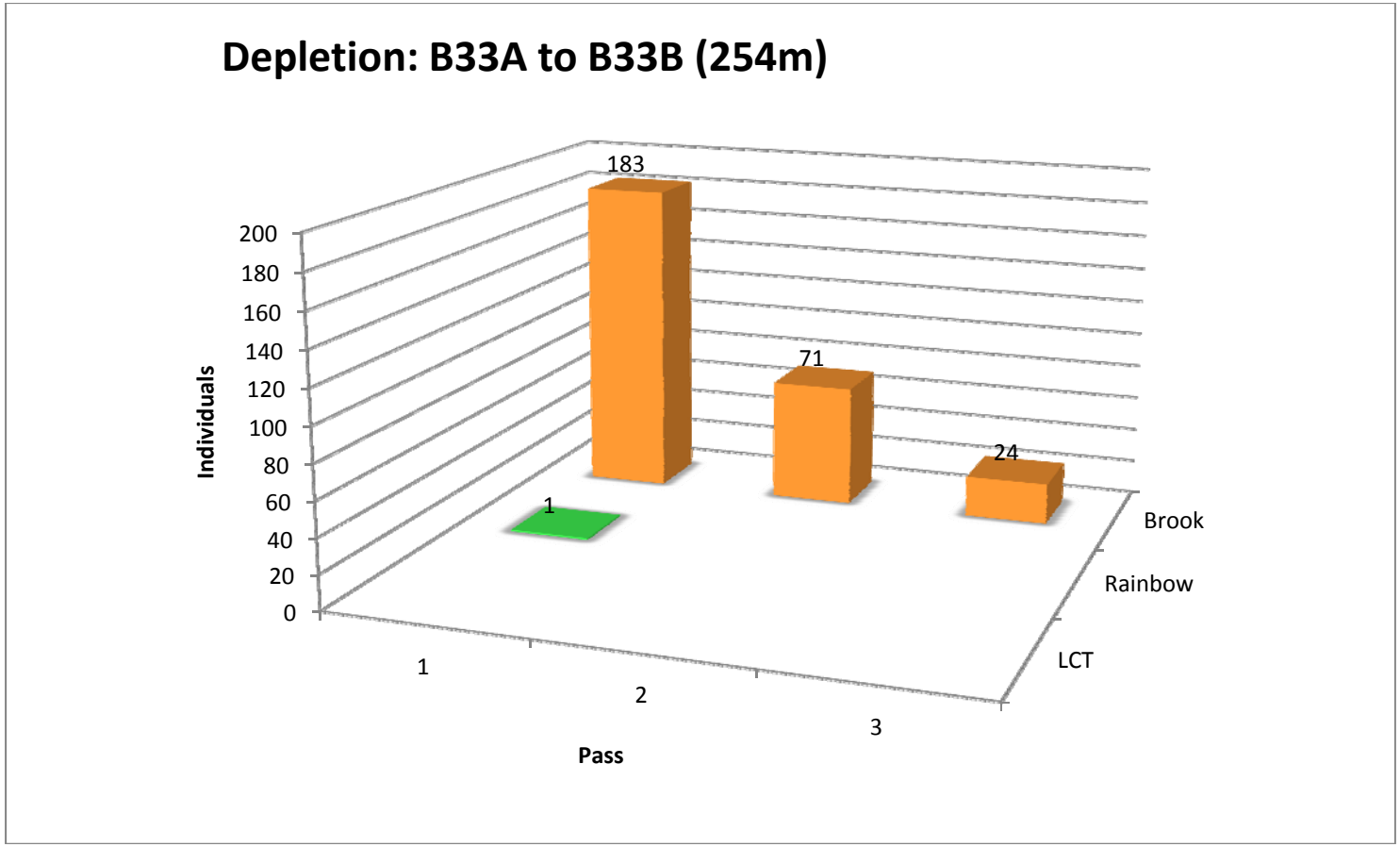


Figure B36. Depletion over three passes on Upper Truckee River between barrier B33A and B33B.

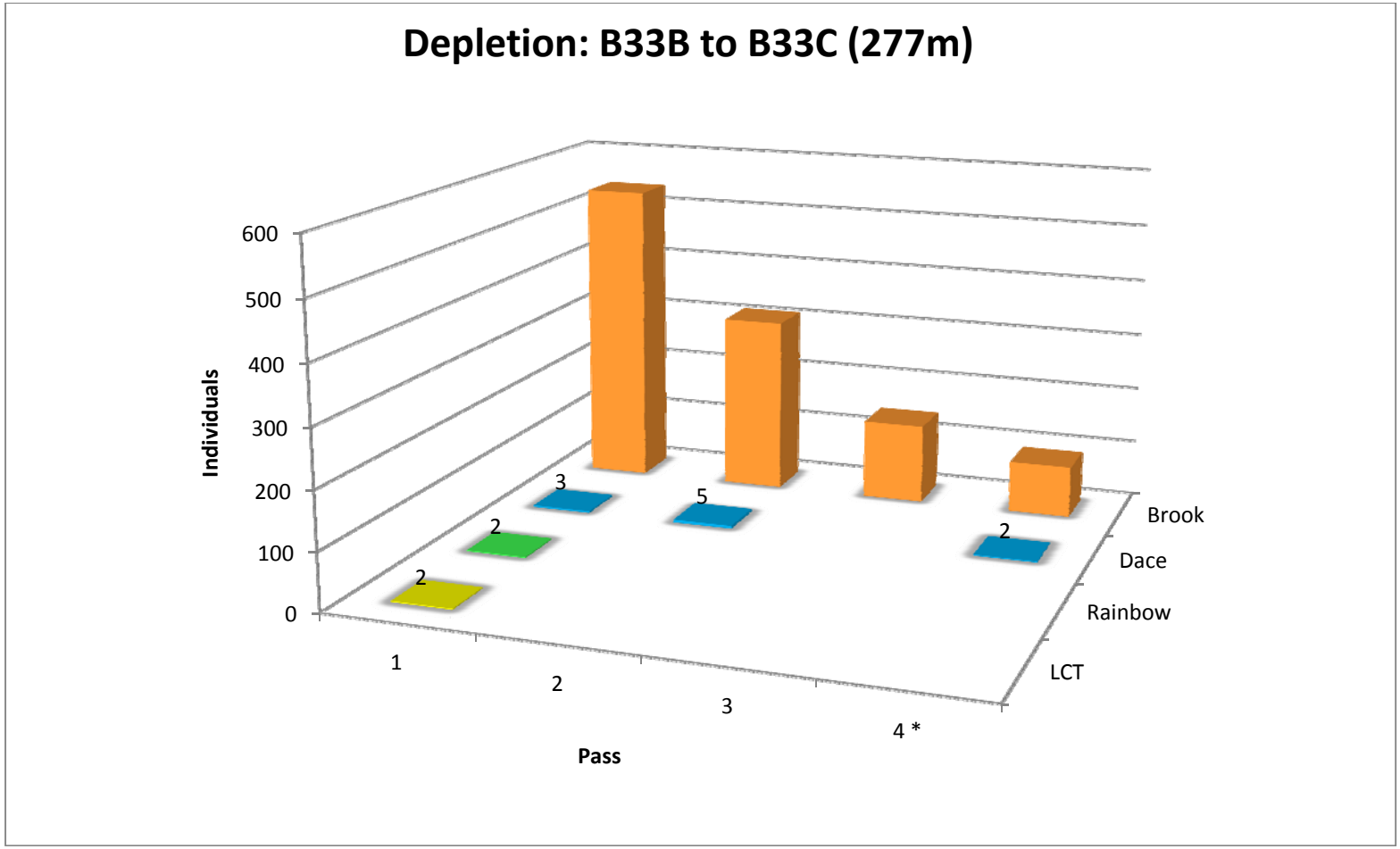


Figure B37. Depletion over three passes on Upper Truckee River between barrier B33B and B33C. *Fourth pass was completed as QA/QC inspection of contract.

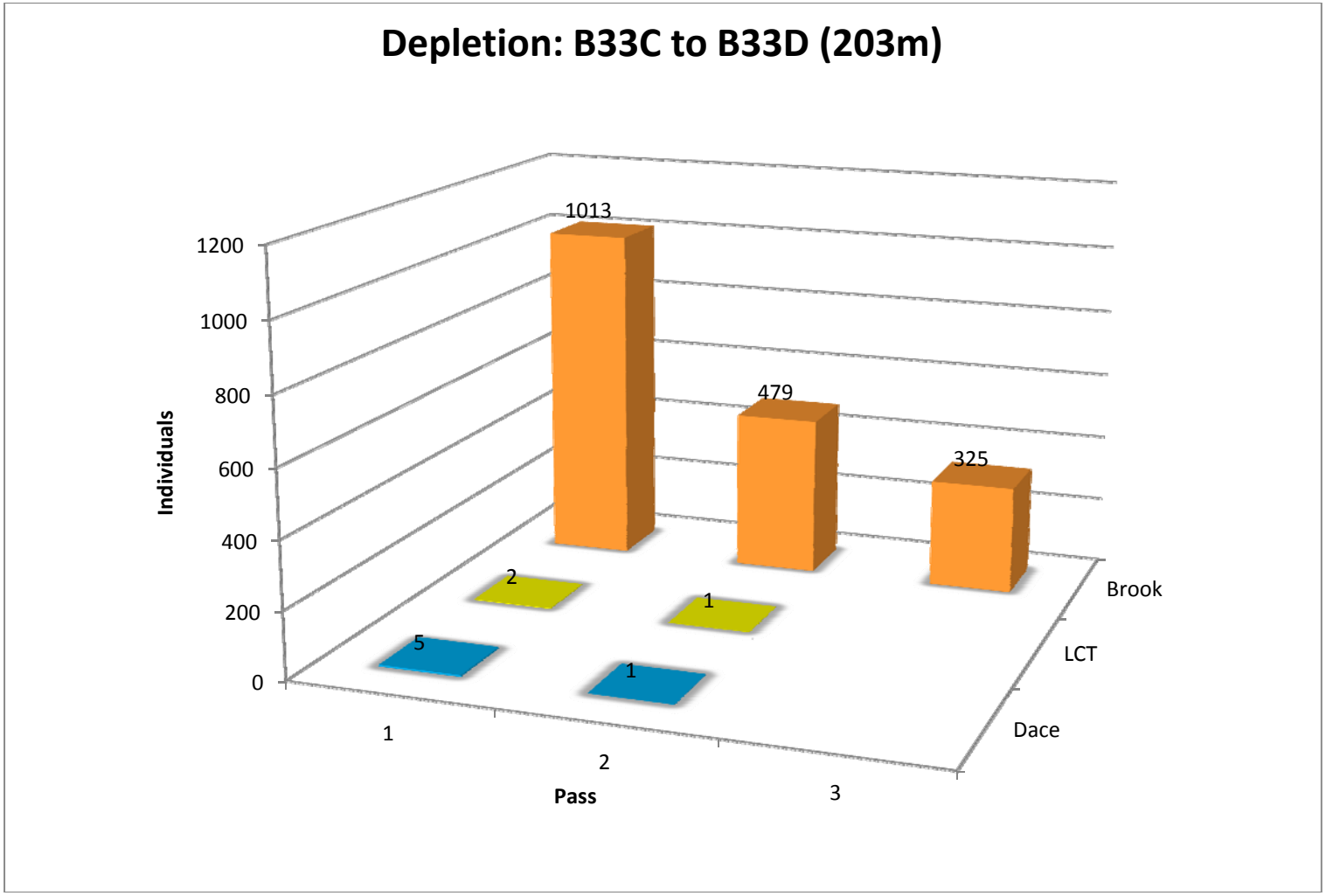


Figure B38. Depletion over three passes on Upper Truckee River between barrier B33C and B33D.

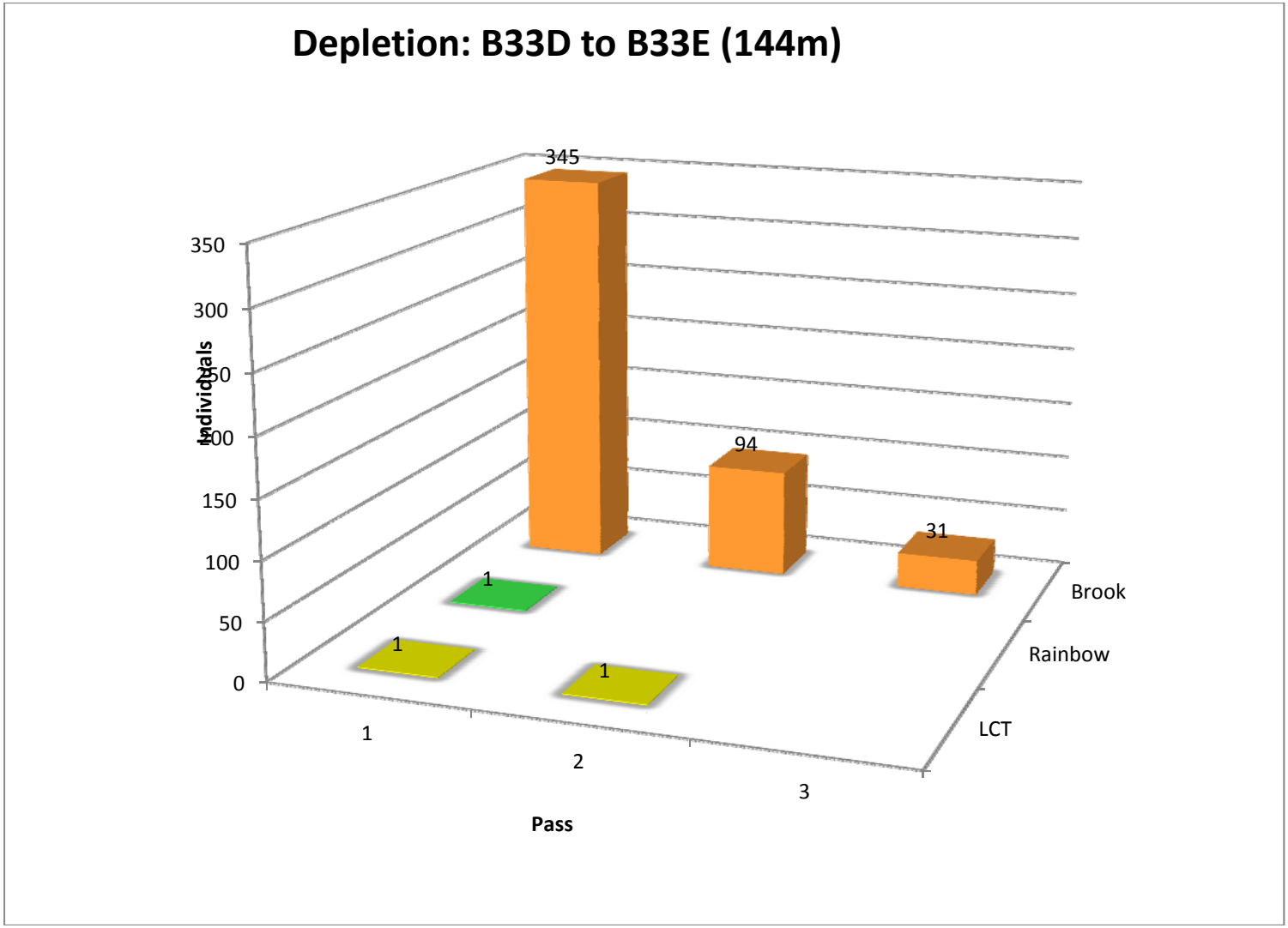


Figure B39. Depletion over three passes on Upper Truckee River between barrier B33D and B33E.

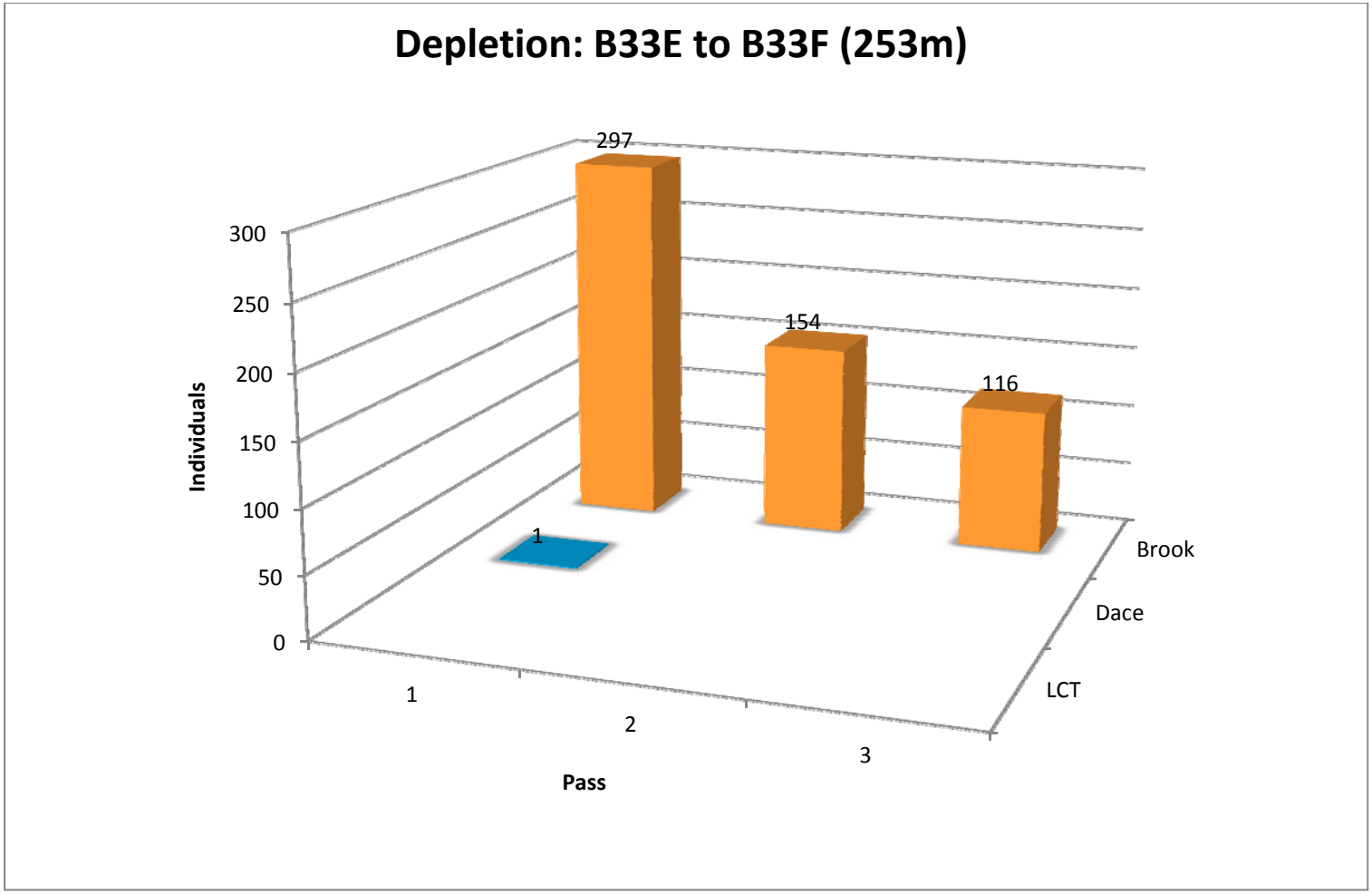


Figure B40. Depletion over three passes on Upper Truckee River between barrier B33E and B33F.

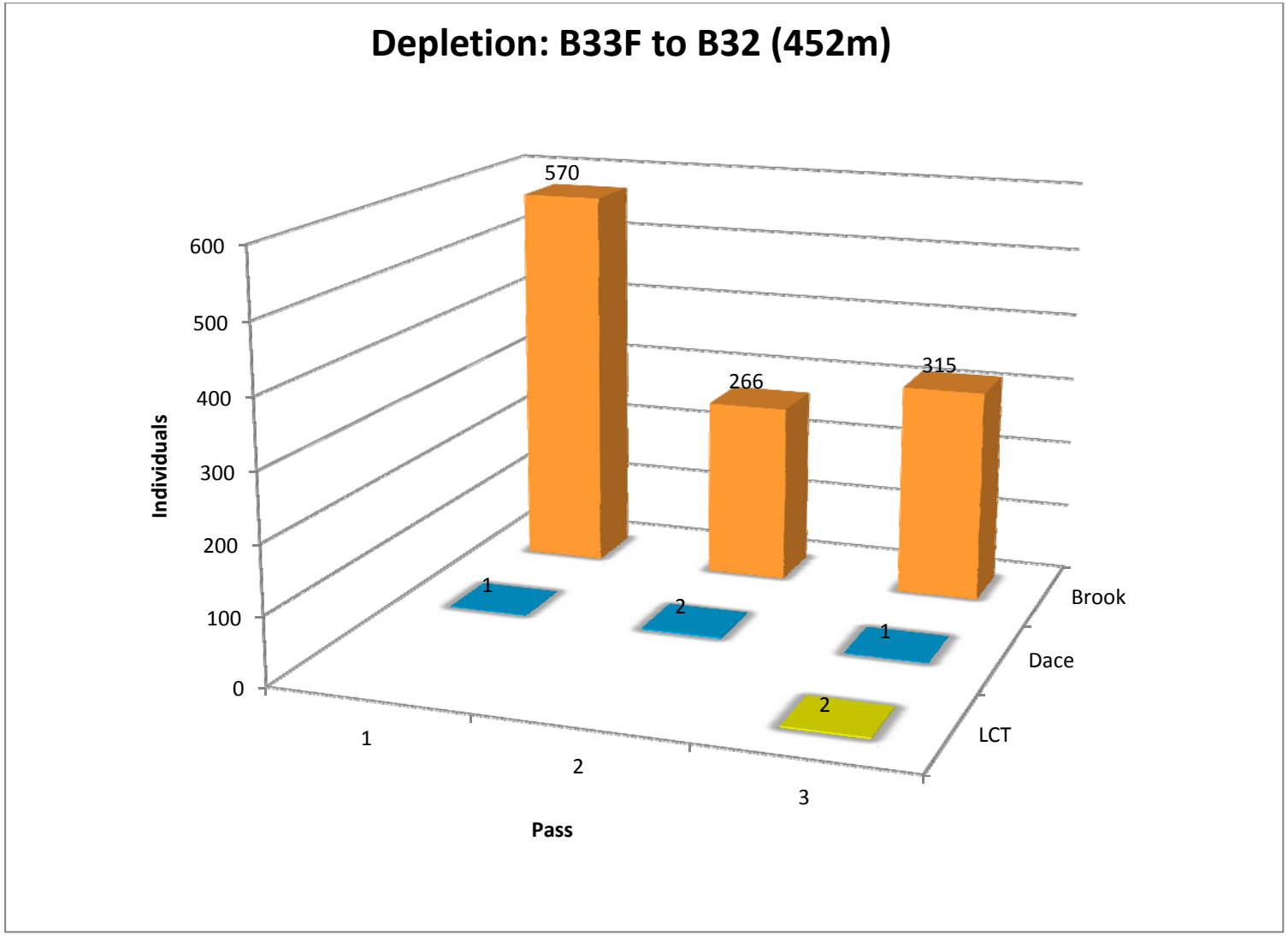


Figure B41. Depletion over three passes on Upper Truckee River between barrier B33F and B32.

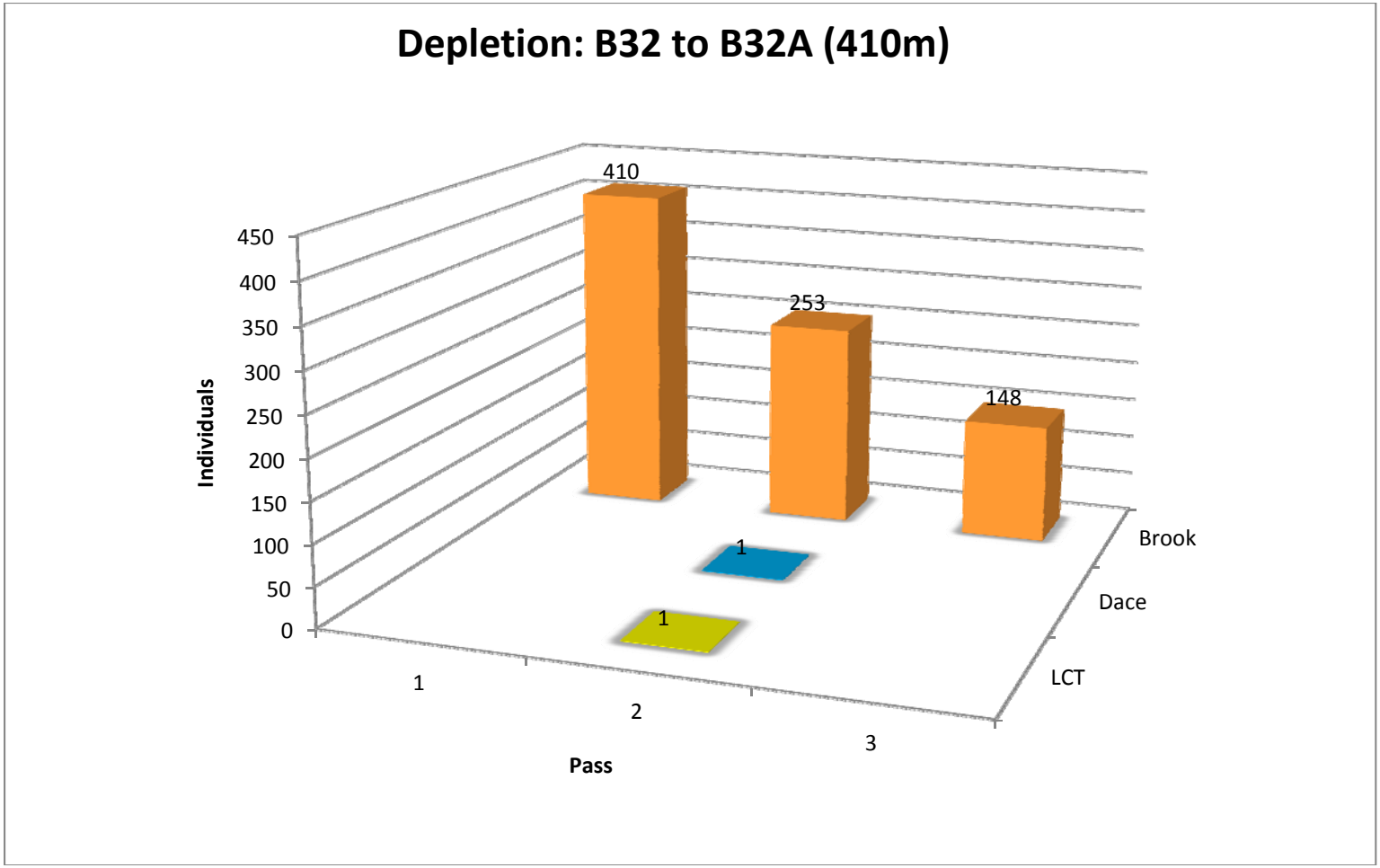


Figure B42. Depletion over three passes on Upper Truckee River between barrier B32 and B32A.

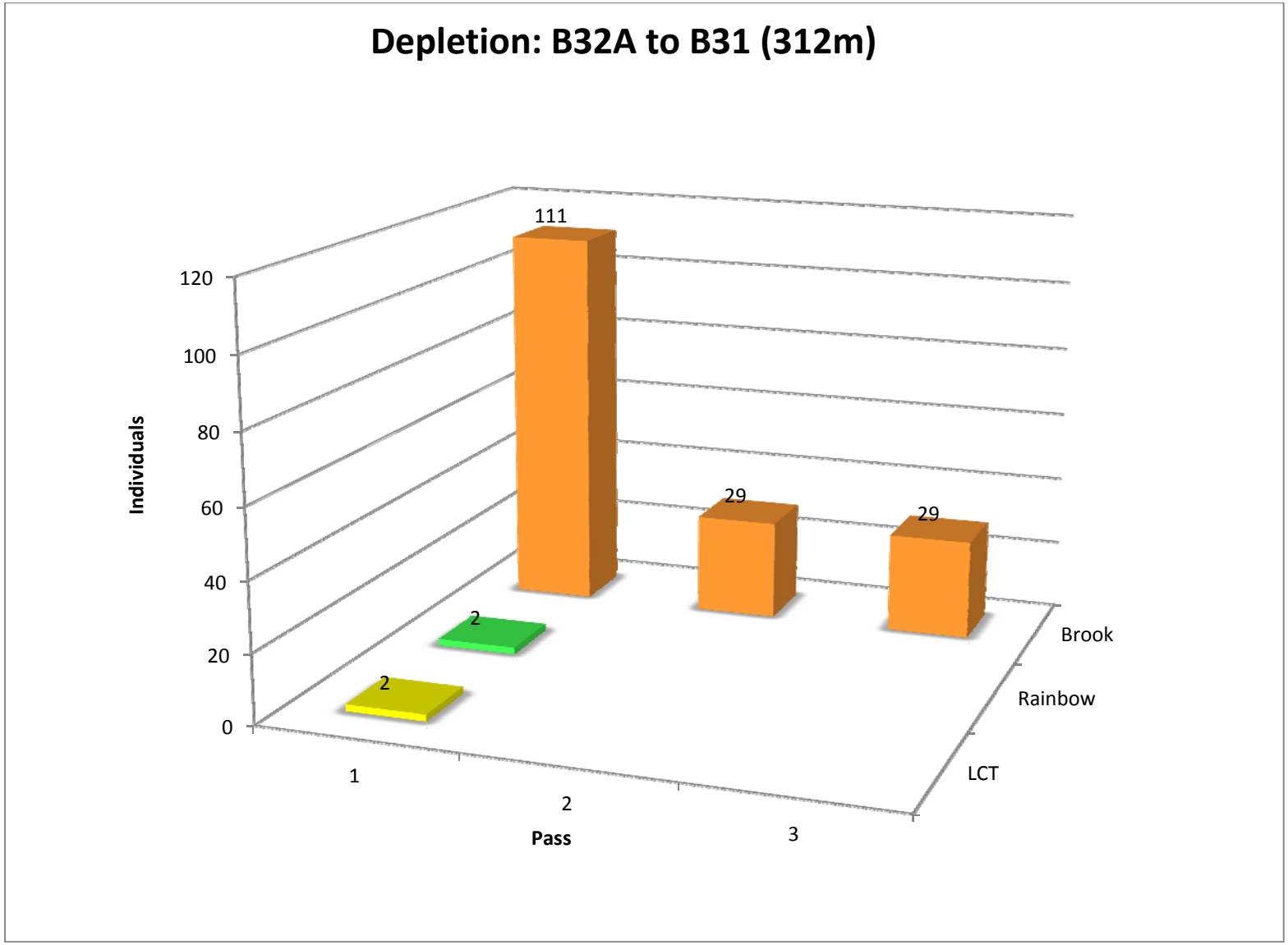


Figure B43. Depletion over three passes on Upper Truckee River between barrier B32A and B31.

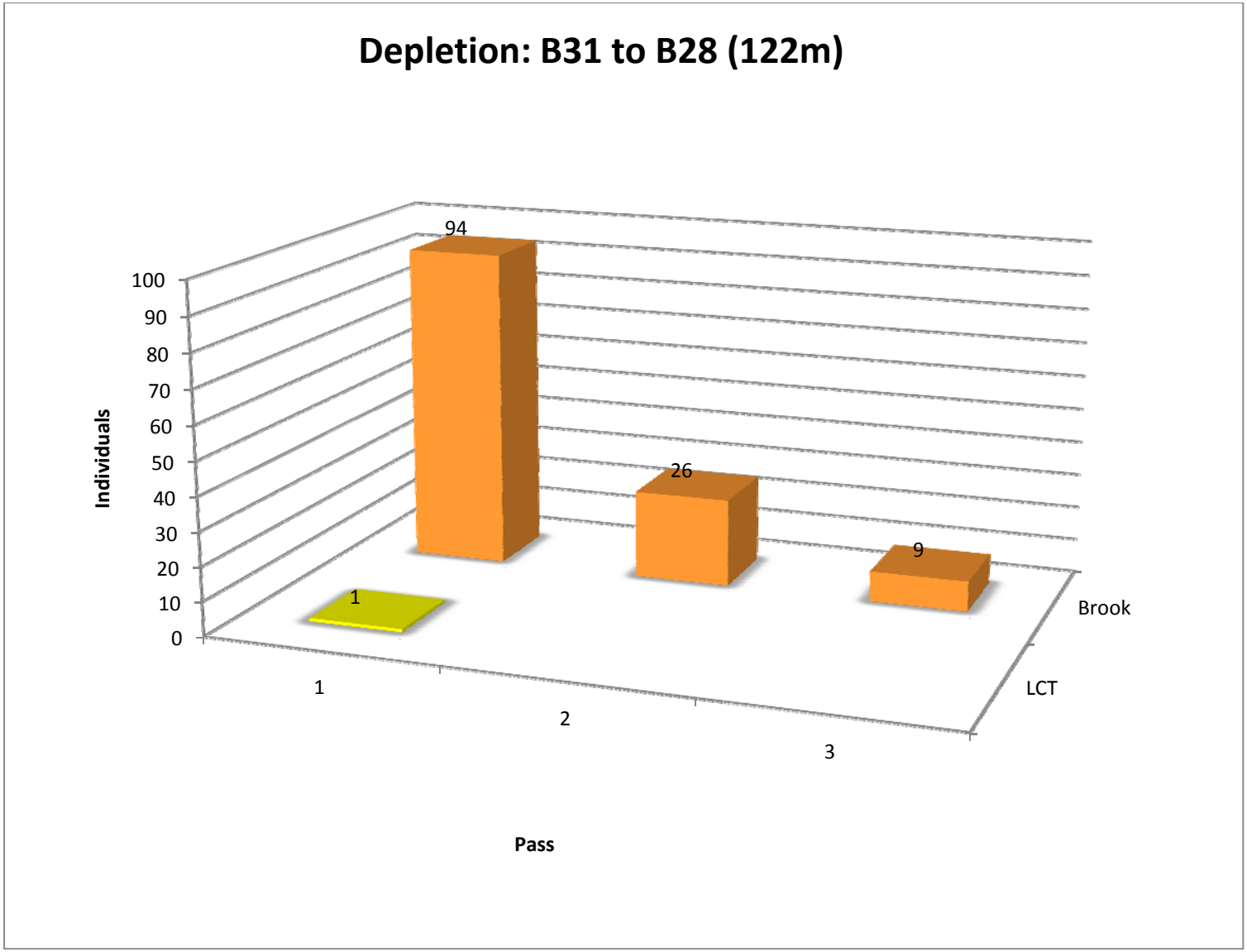


Figure B44. Depletion over three passes on Upper Truckee River between barrier B31 and B28.

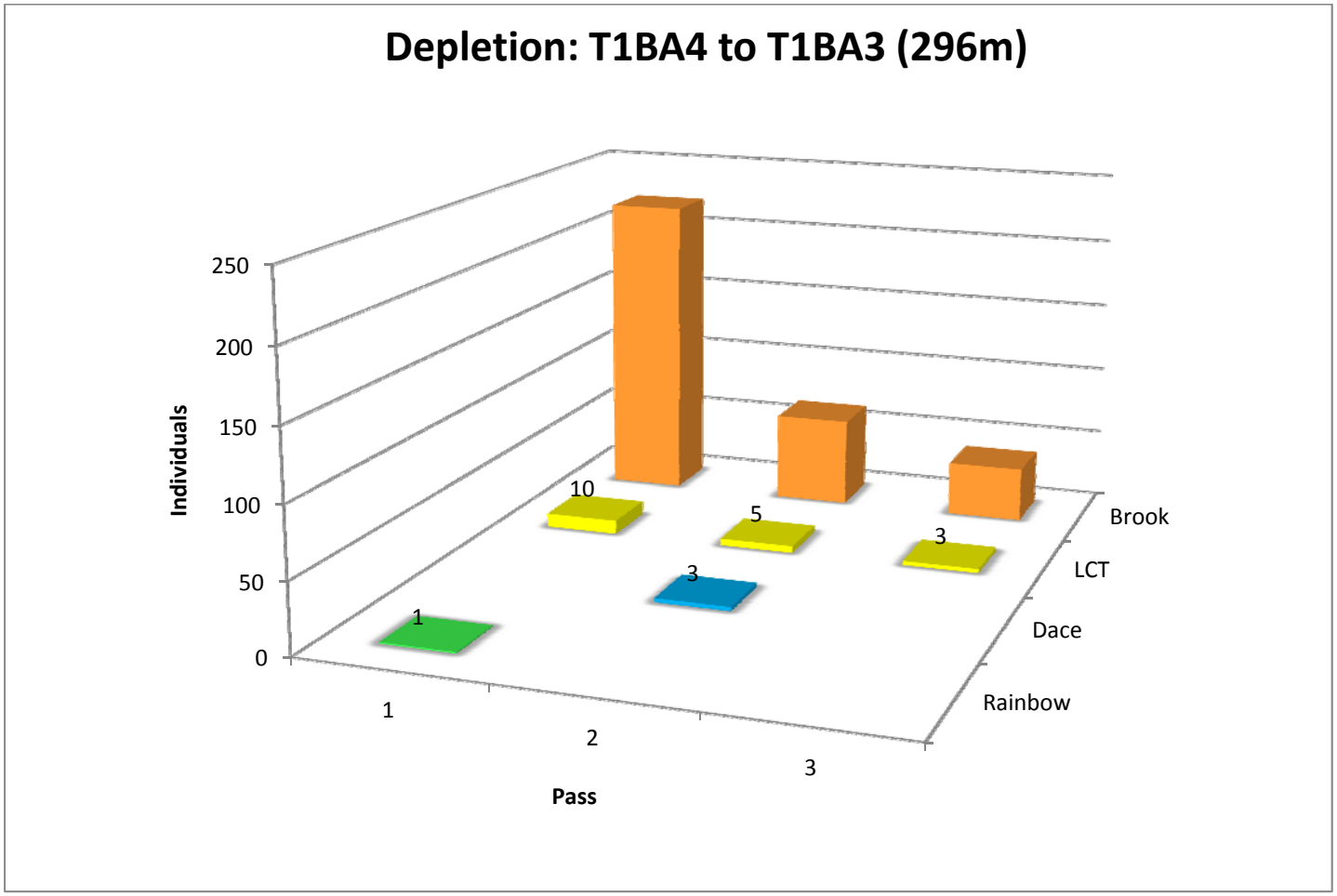


Figure B45. Depletion over three passes on Round Lake Tributary between barrier T1BA4 and T1BA3.

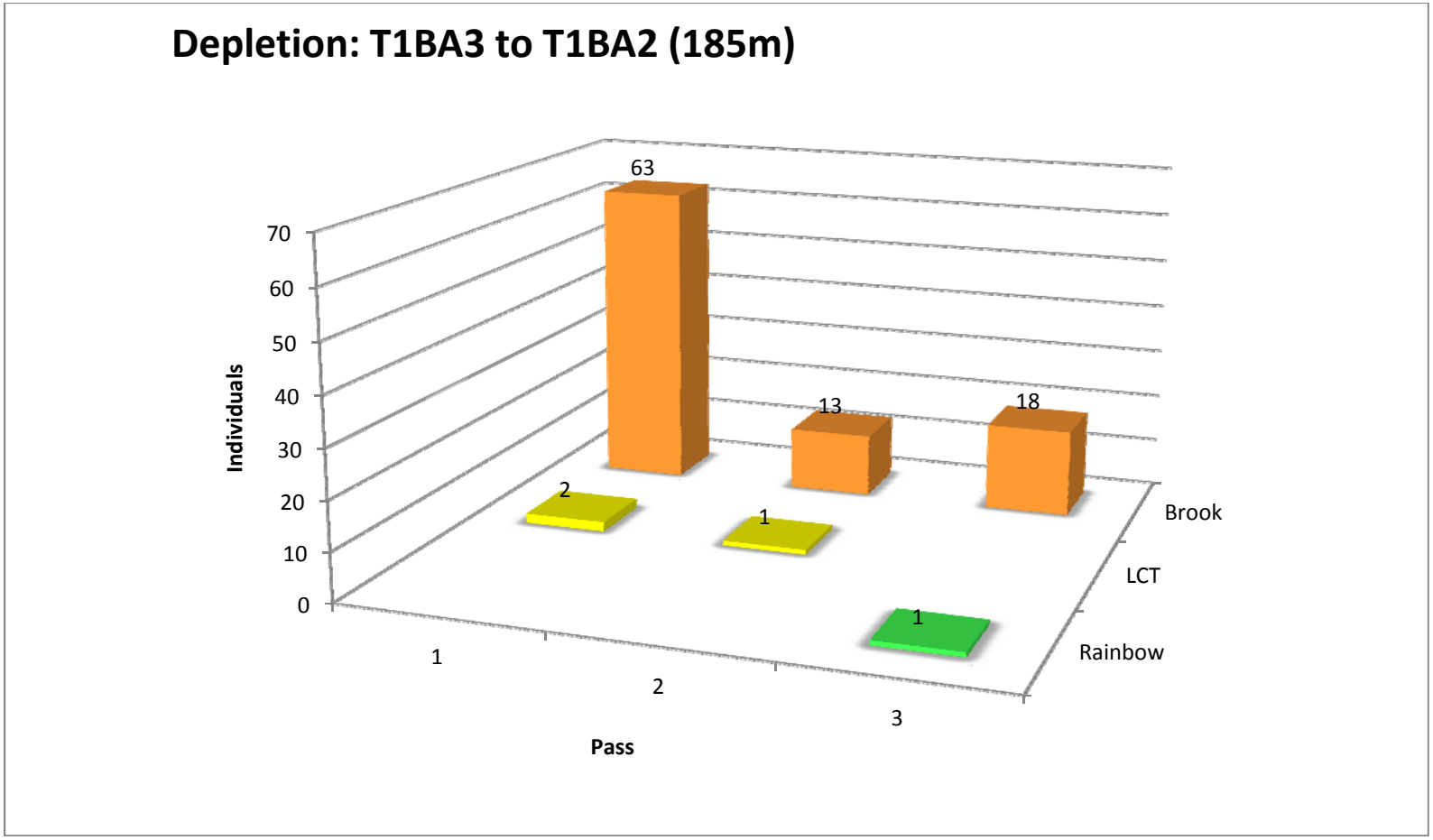


Figure B46. Depletion over three passes on Round Lake Tributary between barrier T1BA3 and T1BA2.

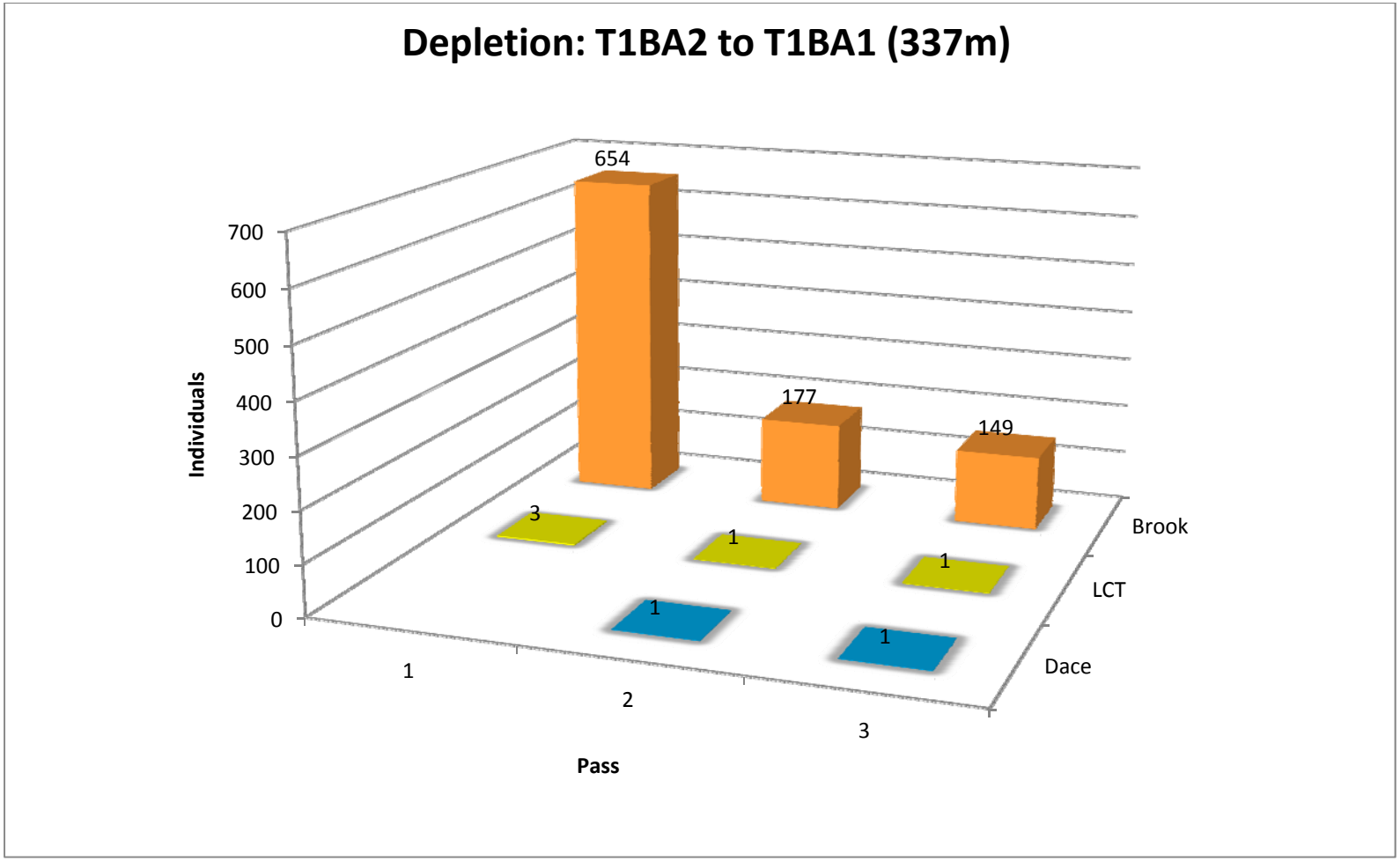


Figure B47. Depletion over three passes on Round Lake Tributary between barrier T1BA2 and T1BA1.

Appendix C – Observed Mortality.

Table C1. Observed mortalities in LCT restoration expansion area in 2010.

Species	Number of individuals	Mortalities
LCT	509	68
Dace	211	
Brook	9343	9343
Rainbow	80	80