Basin Wide Non-Game Native Fish Survey 2008

INTRODUCTION

Lake Tahoe is an international treasure that is esteemed for incredible water quality and clarity. Great interest and attention have surrounded Lake Tahoe's water for centuries. With all of the attention paid to the lake itself it is surprising more attention has not been given to the tributaries and the fish communities that inhabit them. Very few biological assessments of these fish communities have occurred and those that were attempted have limited information and generally do not focus on the native species, specifically non-game species, of Tahoe.

The Tahoe Regional Planning Agency and Forest Service compiled a guide for planning in 1971 called "Fisheries of the Lake Tahoe and its Tributary Waters." Many institutions and agencies contributed to this publication but most of the information regards sport fisheries. Information pertaining to the native species is nothing more than presumed in most cases, especially the smaller non-game species. This publication is, unfortunately, the most comprehensive guide to fish communities in the tributaries to Lake Tahoe.

Dennis Murphy and Christopher Knopp published the "Lake Tahoe Watershed Assessment" in 2000. This publication assesses many of the factors pertinent to the Lake Tahoe basin but does not include any information on the fish communities themselves. With the exception of non-native introduced species and their influence in the lake there is little mention of fish at all.

Most of Tahoe's fish species have been overlooked for centuries. Even the most magnificent of all freshwater trout, the native Lahontan cutthroat trout, was extirpated from Lake Tahoe in the 1920's due to a number of human influences. "There are possibly other native species near extinction or that have gone extinct within Lake Tahoe as a result of exotic introductions and habitat degradation" (Murphy and Knopp 2000). "Without recent inventory studies, the status of much of Tahoe's macrobiotic populations remain unknown" (Murphy and Knopp 2000). Prior to1930 the status of native non-game fish in the lake is unknown (Murphy and Knopp 2000). Studies assessing the impact of non-native fish introductions on native species are strongly recommended (Murphy and Knopp 2000). It is for these reasons it is imperative that a basin wide fish assessment in Lake Tahoe's tributaries is conducted.

The intent of this assessment is to build an indicative foundation to base future management around. Determining what fish species are found in which streams and what habitat types will provide information for future watershed management projects. Currently no one has any real idea of what species are where and how many are present. It is necessary to collect this information for future management plans based on real facts rather than conjecture and assumption.

METHODS

The Lake Tahoe Basin Management Unit Fisheries Department conducted non-game native fish surveys in streams of the California side of Lake Tahoe. In 2007, stream surveys started in early June when stream discharge reached a safe wadeable level and continued through October when other projects took priority. Taylor Creek was surveyed first and surveys continued around the lake in a clockwise manner. Surveying began June 16, 2008 where last year's surveys ended on the upper reaches of Mckinney Creek. Surveys were conducted throughout the summer until the

end of August, when other Fisheries projects took priority. Nine streams were surveyed during the 2007 field season and nine more were surveyed in 2008. All streams are sampled continuously from the mouth to endpoints such as the headwaters or natural barriers. Exceptions to continuous sampling occurred in streams with exceptionally dense vegetation engulfing the stream, forcing spot sampling (Homewood Canyon Creek, Madden Creek, Watson Creek), and continuous habitat and single species domination (Burton Creek and upper reaches of Ward Creek).

All surveys were conducted using a backpack electrofisher. A Smith-Root LR24 was the primary unit used in 2007. In 2008, a Halltec HT2000 electrofisher was also used. Both backpack electrofishers were calibrated prior to the field season. Electric conductivity (EC) varies from day to day and stream to stream. The backpack electrofishers were adjusted as necessary to accommodate for EC and cause the least amount of injury to fish while still being effective. Crew members were trained to safely and appropriately operate backpack electorfishers. Field safety precautions were discussed and all members of the Fisheries crew reviewed and signed an electrofishing and stream wading Job Hazard Analysis. All members of the crew were trained in identification of native and non-native fish species in both adult and juvenile stages. Stream habitat types were reviewed along with Rosgen channel classification.

Two crew members are required for a stream survey (1 backpack shocker, 1 netter/processor). Beginning each stream flows measurements are conducted using a March-McBirney Flowmate flow meter. Velocity and area are recorded in the field and discharge is then calculated. All surveys begin as close to the mouth of the stream as possible. Exceptions include unshockable terrain (i.e. culverts and subsurface flow) and private land boundaries. Additionally, portions of Mckinney and Blackwood Creeks were surveyed in 2007 and those portions were not surveyed in 2008. In 2007, habitat units were divided by change in habitat type (pool, riffle, run). In 2008, habitat units are measured with a 100 meter tape rather than change in habitat type. If the end of a habitat unit is in the middle of a habitat type it is extended and measured to the end of a habitat type. For each new habitat unit (reach) the habitat type, channel type, unit length and UTM's are recorded. UTM's are recorded using a Trimble GeoXH handheld GPS unit. The species and size class of each fish is recorded. The size classes for all species are as follows (0-5cm, 5-10cm, 10-20cm, 20-30cm, 30+cm).

Crew members carefully walk through the stream with electrofisher proceeding first as the netter/processor follow closely behind to capture any stunned fish. All fish captured are placed in a recovery bucket full of water until they can be processed. During the height of summer water temperatures are high and dissolved oxygen in the recovery bucket is depleted quickly, especially when large quantities of fish are captured in a reach. It is imperative to refresh the water in the recovery bucket frequently to improve survivability. Occasionally it is necessary to divide a reach in half to facilitate more frequent fish processing to avoid increased mortality rates. At the end of each reach fish are processed, recording the species, size, and quantity captured in said reach. The fish are released downstream in a previously sampled reach. All field data is entered into an Excel spreadsheet and checked for accuracy.

RESULTS

Seven species of fish were sampled this field season. Five of these species are native. These include; Lahontan redside shiner, Paiute sculpin, Speckled dace, Tahoe sucker, and Tui chub.

Three species were non-native trout including brook trout, brown trout and rainbow trout. Reference Table 1 for the distribution of the aforementioned species in each creek. The native fish species were generally uncommon and non-native trout of one species or another were the most common members of the fish communities in all creeks. Fish native to Tahoe and historically present in the tributaries not sampled in 2008 include the Lahontan cutthroat trout and mountain whitefish.

Table 1. Fish species sampled in 2008 and their distribution in creeks surveyed.

Creek Name	Lahontan Redside Shiner	Paiute Sculpin	Speckled Dace	Tahoe Sucker	Tui Chub	Brook Trout	Brown Trout	Rainbow Trout
McKinney Cr.	-	-	-	-	-	+	-	+
Quail Cr.	+	-	-	-	-	+	+	+
Homewood Cr.	-	-	-	-	-	-	-	+
Madden Cr.	-	-	-	-	-	+	-	+
Blackwood Cr.	-	-	-	-	-	+	+	+
Ward Cr.	+	+	+	-	-	+	+	+
Burton Cr.	-	-	-	-	-	+	-	-
Watson Cr.	-	-	-	-	-	+	-	-
Griff Cr.	-	-	+	+	+	+	+	+

Discuss location of fish, habitat types, distribution and give graphs and a spatial representation of fish distribution.

Griff Creek

Historic data indicates there were known populations of Tahoe sucker, speckled dace and rainbow trout in Griff Creek (TRPA and FS 1971). Griff Creek had the most species diversity of all the streams sampled. However, of the six species sampled all but rainbow and brook trout were excluded from the community above a beaver dam occurring 127 meters upstream from the mouth of the creek. Nearly all of the speckled dace were sampled within 30 meters of the lake edge in shallow, freestone, exposed reach. Surprisingly, this short habitat unit with the many species represented was the most impacted by siltation and human development of all creeks sampled This creek looks disgusting as soon as you get off the lake shore and move into the canopy. Littered with garbage, detritus and an abundance of silt the creek quickly leaves the lake, goes through a culvert and is impacted by a beaver dam. The creek continues northward through a residential area and contains only brook trout and rainbow trout above the beaver dam (reference Appendix B). Reference appendix C for species distribution across habitat/channel types. Stream type is characterized by run/riffle dominated waters. Likely a type E6 stream using the Rosgen scale. This was the last stream sampled in 2008 and will be the first to be sampled in 2009.

Watson Creek

Historic data states it is probable there were Tahoe sucker, speckled dace, rainbow trout and brook trout in Watson Creek (TRPA and FS 1971). Watson Creek has an immediate fish barrier in the form of a culvert 1.5 meters above the highest water levels of Lake Tahoe and 1 meter above non-channelized granite cobbles. Spot shocking was employed due to intensely thick alder enveloping nearly the entire length of the creek. Brook trout were the only species found in Watson Creek during 2008 (reference appendix B). No native fish were found (reference table 1). Reference appendix C for species distribution across habitat/channel types. Stream type is characterized by riffle/pool dominated waters. Based on the Rosgen scale, Watson Creek is primarily a channel type B3 stream with a few sections of channel type A2 stream. Reference appendix C for fish distribution in different channel types within Watson Creek.

Burton Creek

Historic data indicates that Burton Creek had known populations of Tahoe sucker, tui chub, rainbow trout, brook trout, brown trout, kokanee salmon, and probable populations of Lahontan redsisde shiner, speckled dace, paiute sculpin and mountain whitefish (TRPA and FS 1971). Burton Creek was dry from mouth to impoundment occurring approximately 2900 meters upstream. This impoundment is at the end of a large meadow. In this meadow the creek is narrow (average approximate width of 0.5 meters) and deep (average approximate depth of 0.7 meters) with a mud bottom and thick sedges enveloping most portions of creek. There is a large beaver dam complex that was not sampled in this meadow. Spot shocking was employed as habitat type did not change and only brook trout were sampled for entire length (reference appendix B). No native fish were present in Burton Creek (reference table 1). Based on the Rosgen scale, the portion of Burton Creek containing water and therefore fish is a channel type E6 stream. Reference appendix C for fish distribution in different channel types within Burton Creek.

Homewood Canyon Creek

Historic data indicates little was known about Homewood Canyon Creek's fish community and it is probable that rainbow trout and brook trout were present (TRPA and FS 1971). Homewood Canyon creek cuts through private property and climbs straight up Homewood Mountain Ski Resort (HMSR). HMSR allowed access to sample all streams on their property. This creek is characterized by channel type A2 from the headwaters to within 500 meters of the lake where morphology changes to a channel type B3 and a riffle dominated stream. Vegetation is very thick and did not allow survey to continue into channel type A. Only rainbow trout were found and no native fish were present in Homewood Canyon Creek (reference table 1). Reference appendix C for species distribution across habitat/channel type. As only rainbow trout were found (reference appendix B) and inability to access the creek it was determined to cease the survey on Homewood Canyon Creek and move on to a new drainage.

Madden Creek

Historic data indicates little was known about Madden Creek's fish community and it is probable that rainbow trout and brook trout were present (TRPA and FS 1971). Madden Creek falls

steeply down a narrow canyon and is characterized by channel type B2/B1 for much of its length but also contains long sections of Type A2 habitat. Only trout species were found in Madden Creek including rainbow trout, brook trout and 2 brown trout (reference appendix B and table 1). No native fish were present. Madden Creek is divided into three habitat units; a lower channel type B2, and an upper channel type B2, separated by a section of channel type Aa+2. Brown trout are excluded from the community once you move upstream of the lower channel type B2 and into the channel type A2 (reference appendix C). The cascading nature of this A2 section serves as an upstream fish barrier. Lake Louise is at the headwaters of Madden Creek and may supply many of the rainbow and brook trout via downstream migration out of the lake.

Quail Creek

Historic data does not even acknowledge the existence of Quail Creek (TRPA and FS 1971). Four species of fish were sampled in Quail Creek including Lahontan redside shiner, rainbow trout, brook trout, and brown trout (reference table 1 and appendix B). The single Lahontan redside shiner, the only native fish represented, was found within 9 meters of the lake edge. A culvert interrupts the creek at 10 meters for the lakeshore and from there only trout were found. A mix of rainbow and brook trout were sampled with one brown trout within 150 meter of the mouth of Quail Creek. With the exception of one Lahontan redside shiner and one brown trout this creek has only brook and rainbow trout (reference appendix B). This small creek emanates from Quail Lake and cascades steeply off the hillside until it has a short (approximately 300 meters) relatively low gradient run into Lake Tahoe. The creek is hidden in thick vegetation for most of its length and difficult to shock due to vegetation and steep terrain. The stream disappeared as the survey proceeded upstream and vegetation became impenetrable. The portion of stream surveys was characterized by a channel type B3. All fish were found in this channel type (reference appendix C).

McKinney Creek

A small section (595 meters) of McKinney Creek was sampled in 2008 to complete the survey that began in 2007. Historic data indicates that McKinney Creek hosted rainbow trout, brook trout, brown trout, kokanee salmon and mountain whitefish (TRPA and FS 1971). It is speculated that Tahoe sucker, speckled dace, tui chub, and paiute sculpin “probably” inhabited McKinney Creek (TRPA and FS 1971). Paiute sculpin, Tahoe sucker, tui chub, and speckled dace were sampled in lower extent of McKinney Creek in 2007 along with rainbow trout and brook trout. Only rainbow trout and brook trout were sampled in 2008 (reference table 1 and appendix B).

Ward Creek

Historic data implies there was a known population of mountain whitefish, rainbow trout, brook trout, brown trout, and kokanee salmon in Ward Creek (TRPA and FS 1971). There is no mention of the smaller native fishes like dace and shiners. Lahontan redside shiner, speckled dace, and paiute sculpin were present along with rainbow trout, brook trout and brown trout in 2008 (reference table 1 and appendix B). Significant numbers of Lahontan redside shiner were found within 1200 meters of Lake Tahoe. Only two Lahontan redside shiners were found beyond this and both were well upstream from the lake. Paiute sculpin were well represented throughout the entire extent of the survey. Only two speckled dace were found in Ward creek and these were in the lower reaches (within 1100 meters of lake shore). Ward Creek is one of the larger tributaries to Lake Tahoe and is unique in morphology. The Ward Creek watershed

is a relatively narrow drainage typified by a channel type B2 for almost its entire length. Small sections (less than 500 meters) had low slope typical of channel type C, but not found in a broad valley and deeply entrenched. These habitat units were labeled as channel type C2. Habitat type changed significantly above the last extent sampled from a channel type B3 to channel type B1. Further survey is recommended.

Blackwood Creek

Historic data indicates Blackwood Creek was known to support populations of rainbow trout, brook trout, brown trout, kokanee salmon, and mountain whitefish (TRPA and FS 1971). It is "probable" that Lahontan redside shiner, Paiute sculpin, tui chub, Tahoe sucker, and speckled dace were also present in Blackwood Creek (TRPA and FS 1971). The only native fish sampled in Blackwood Creek was the Paiute sculpin and it was present throughout most of the Creek including the North Fork tributary. Rainbow trout, brook trout, and brown trout were also present in both the main stem and tributaries of Blackwood Creek. This large creek, by Tahoe standards, is in a wide valley and much of the habitat is composed of channel type C3/C4. Mostly dominated by riffle/pool morphology, Blackwood Creek does shift between channel type between C3/C4 and B3/B4. Small sections (less than 50 meters) can be classified as channel type B1. The North Fork Blackwood was primarily

Discussion

Without hard evidence to support the presence or absence of species in the tributaries of Lake Tahoe it is difficult to interoperate the information gathered over the course of the basin wide non-game native fish survey. What can be said is there is now a database regarding the current extent of species in the tributaries is being built and filled. There is now a starting point to base future management decisions from. Further surveys are necessary to provide a complete dataset of the entire Lake Tahoe basin. Currently, only the creeks on the west and north shore of the California side of Lake Tahoe have been surveyed by the Forest Service Fisheries crew. Collaboration with Nevada Department of Wildlife on their findings may be included in this database or may suggest further sampling by the Forest Service is necessary.

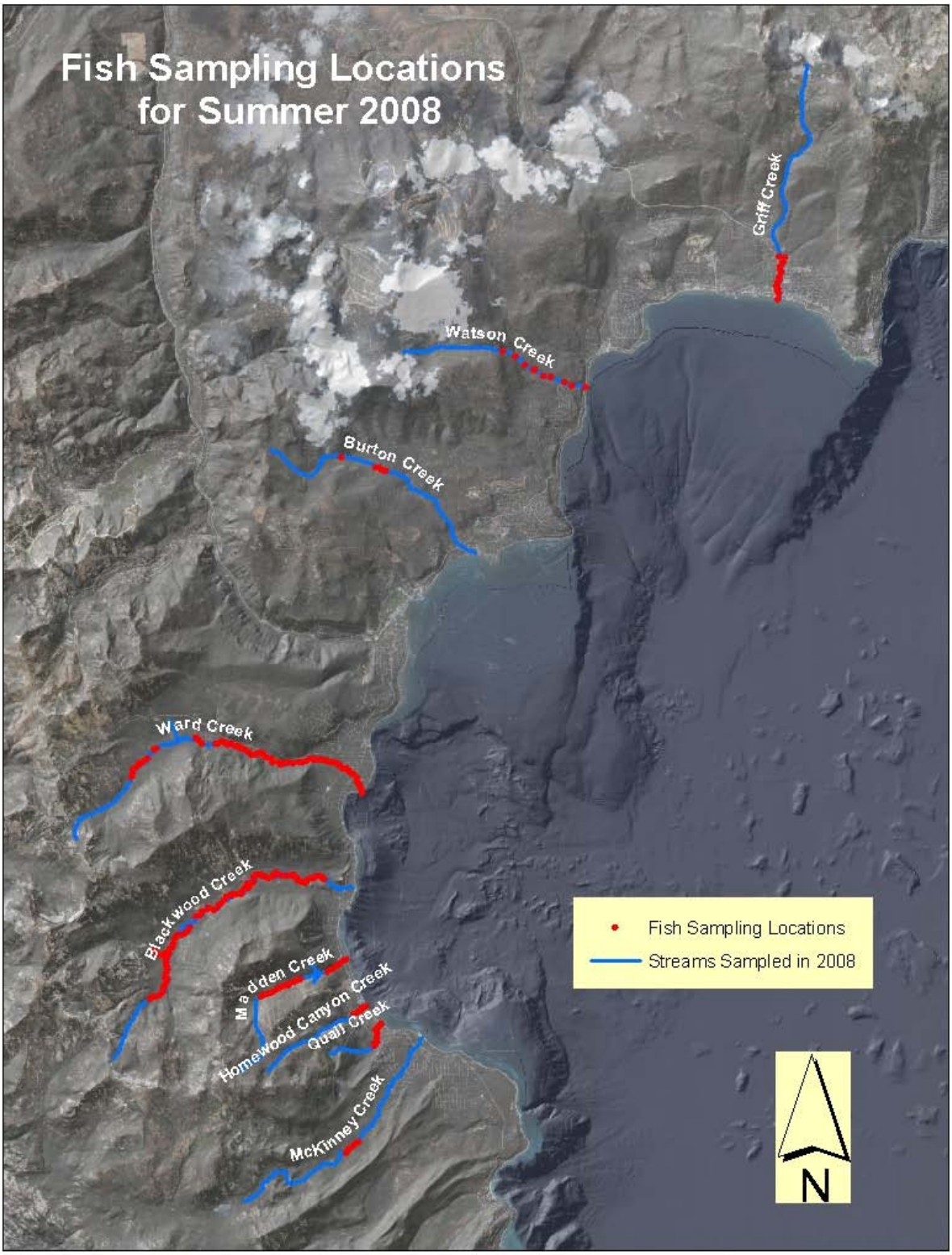
If the assumption that historic data is acceptable and that "probable" presence of fish can serve as a guide, the creeks sampled in 2008 have been greatly impacted over the past 37 years. Very few creeks sampled in 2008 had any non-game native species and those that did had very small populations. Rainbow trout and/or brook trout have occupied nearly every cubic foot of water in all of the tributaries. Native fish, like the mountain whitefish, that were known to occur in creeks like Blackwood Creek and Ward Creek, were not found anywhere during the 2008 field season and only one found in Taylor Creek in 2007, indicating a significant impact on their distribution. It is known that introductions of non-native species have greatly reduced populations of native forage fish within Lake Tahoe so one can assume a direct correlation with low densities in the tributaries. Establishing a foundation of information continued monitoring will explore how significant the impact on non-game native fishes is and will be.

To improve future implementation of this project a few guides must be created and early season instruction should be given. A guide to Tahoe fishes with complete descriptions and a plethora of photos is necessary and will ensure proper identification. Included in this guide to Tahoe fishes should be a section devoted to identifying young trout (YOY). A guide to classifying

stream types would be helpful. Classifying stream type in 2008 was very subjective and many habitat units are likely not correct. This was due to lack of understanding of the Rosgen classification method and lack of materials to aid in proper classification. A good guide was created however, not until after the field season was completed. Fish identification is fundamental to this project and early instruction is necessary.

Appendix A

Figure A. Map of streams sampled in 2008 and the portions sampled.



Appendix B. Fish community compositions in each creek.

Figure B1. Griff Creek fish community from mouth to beaver dam at 127 meters upstream from mouth.

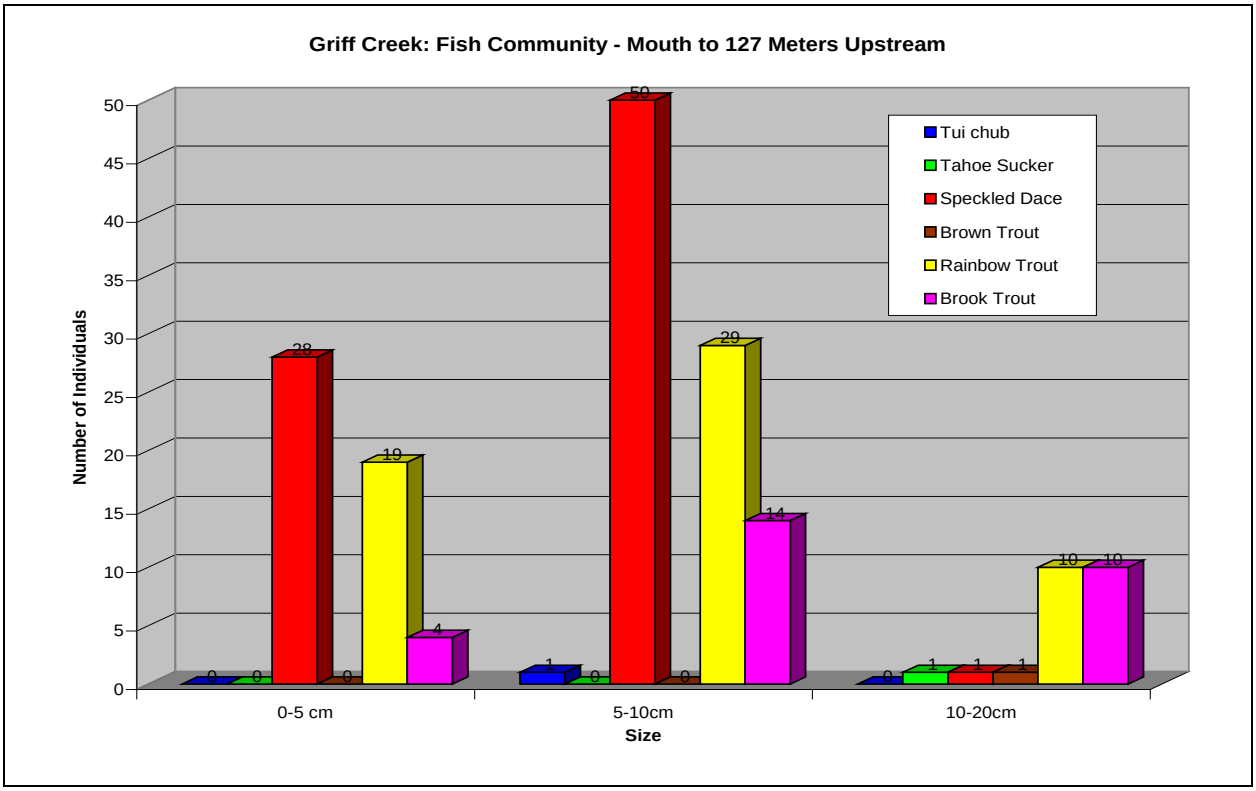


Figure B2. Griff Creek fish community from beaver dam upstream 1172 meters to end of sampling.

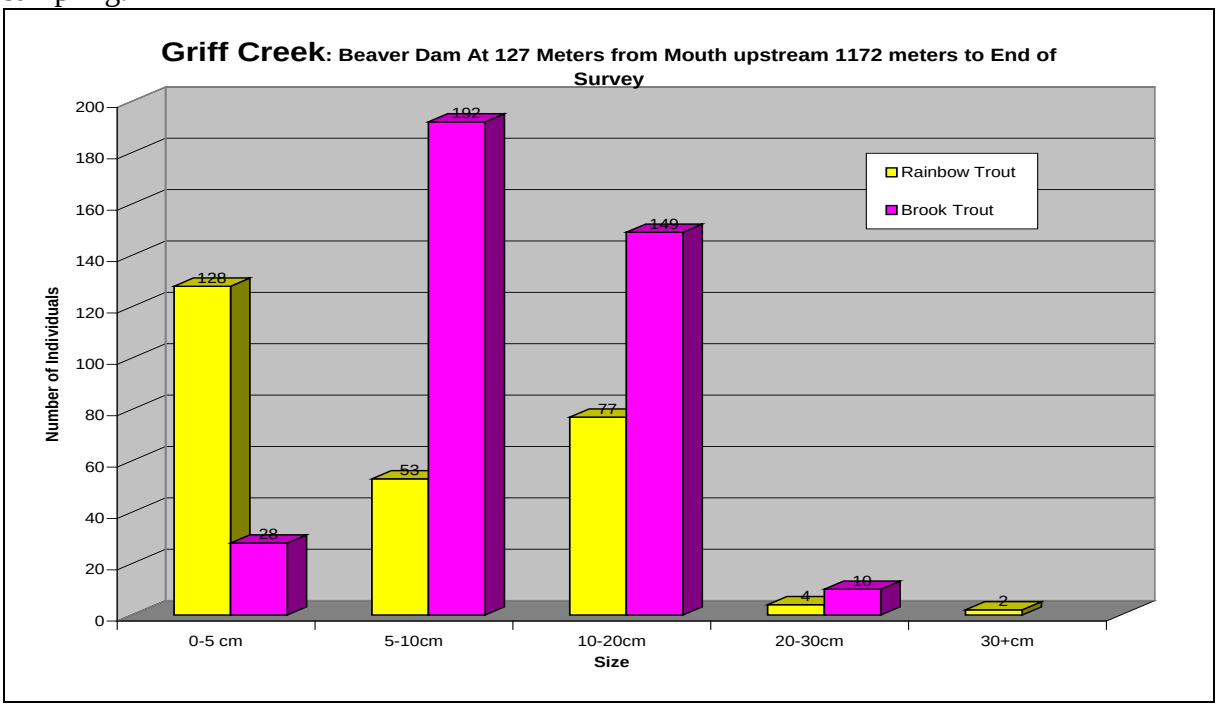


Figure B3. Watson Creek fish community over entire length of creek

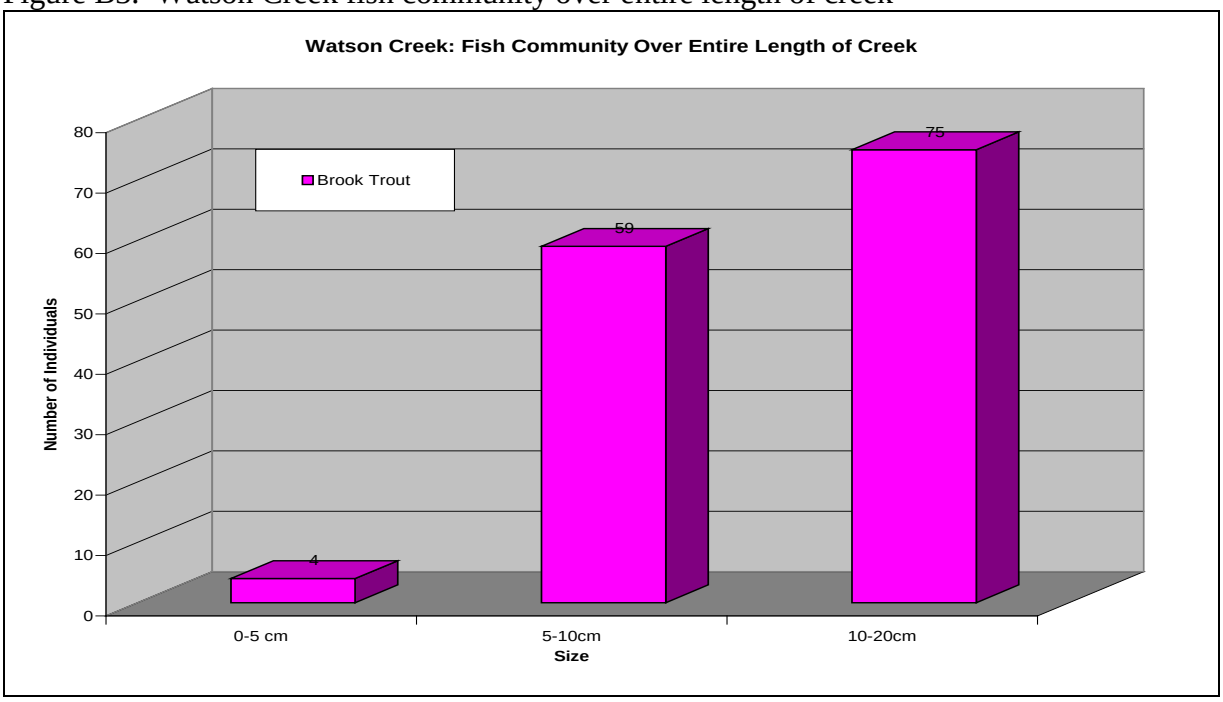


Figure B4. Burton Creek fish community over entire length.

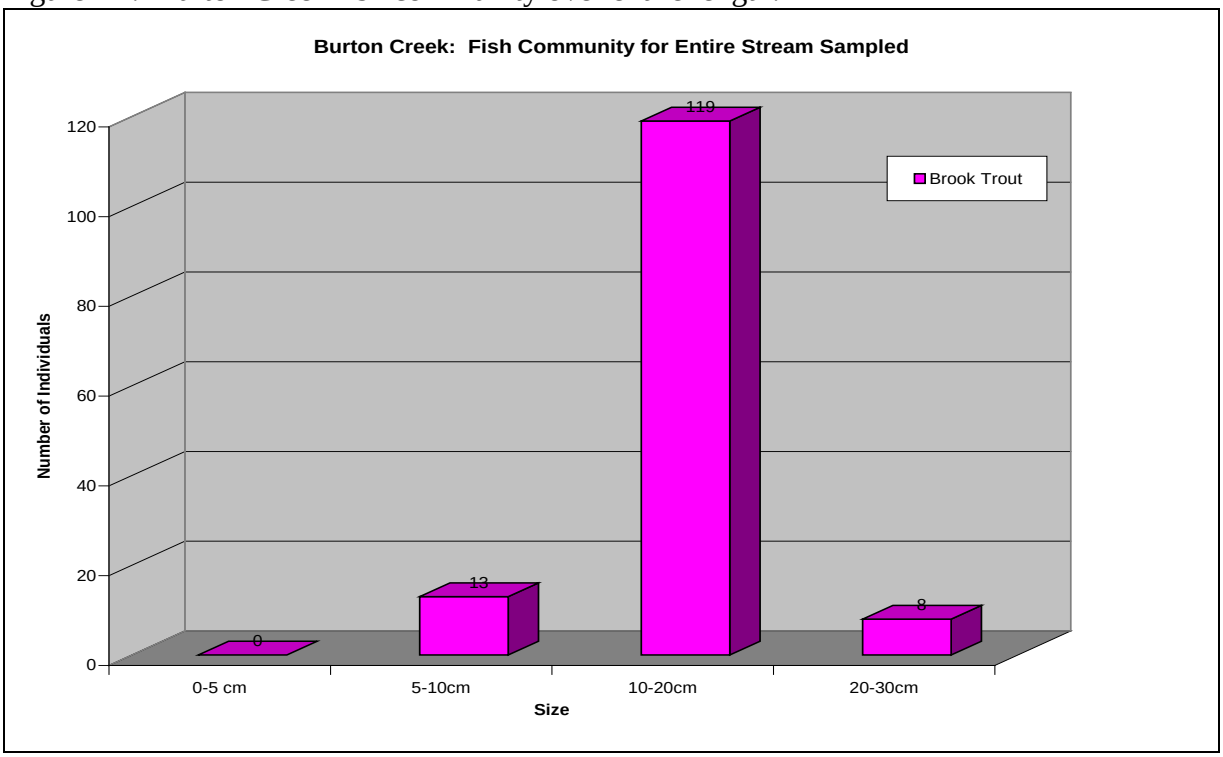


Figure B5. Homewood Canyon Creek fish community composition for total stream surveyed.

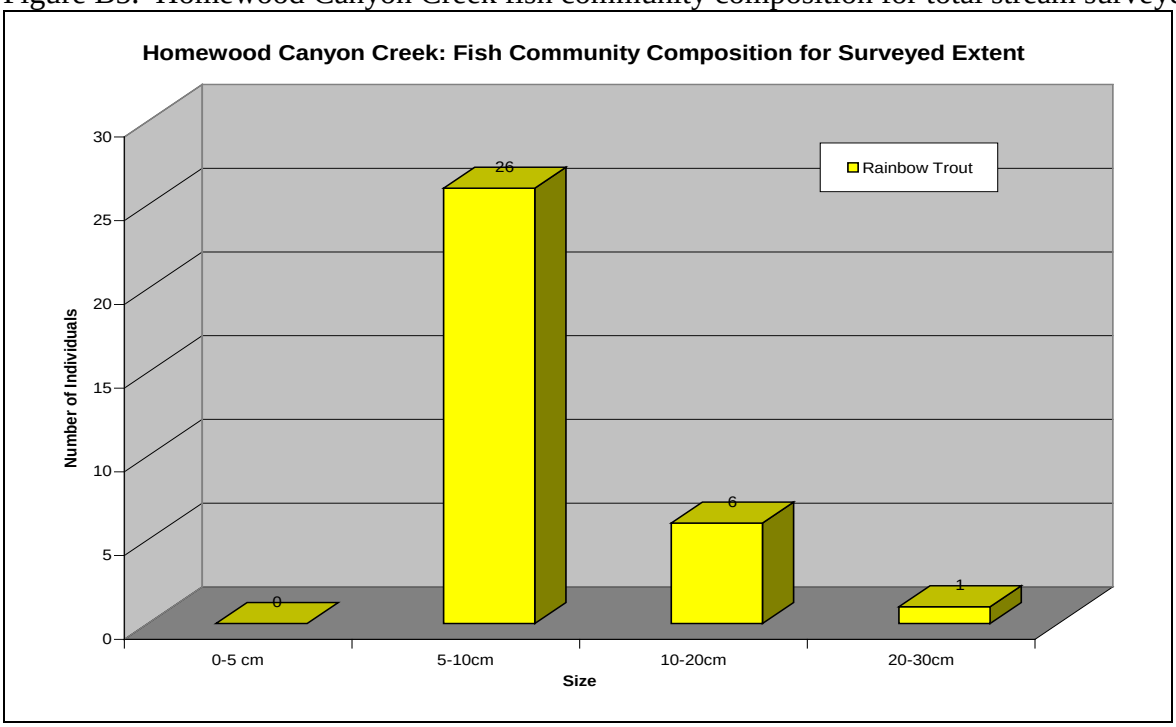


Figure B6. Madden Creek fish community composition for total stream.

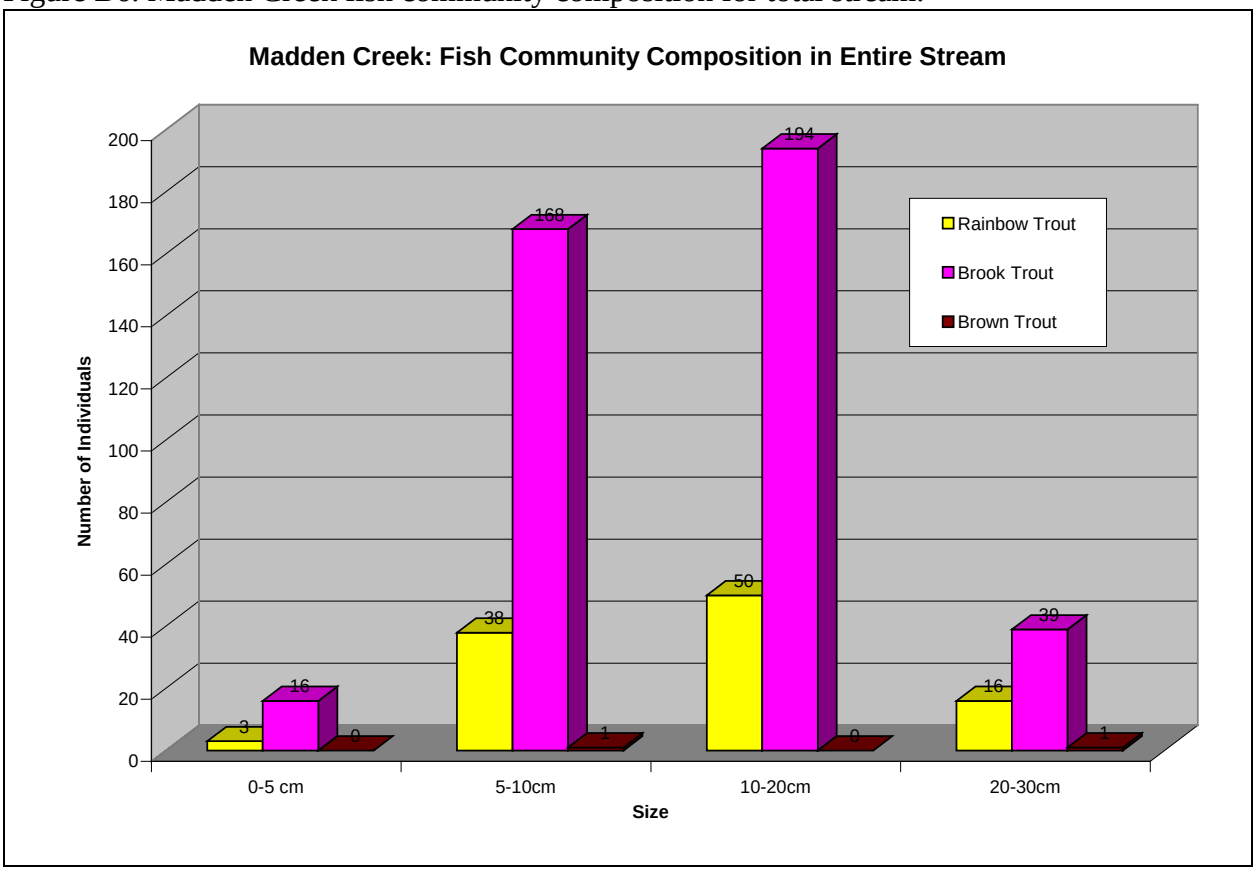


Figure B7. Quail Creek fish community composition for total stream.

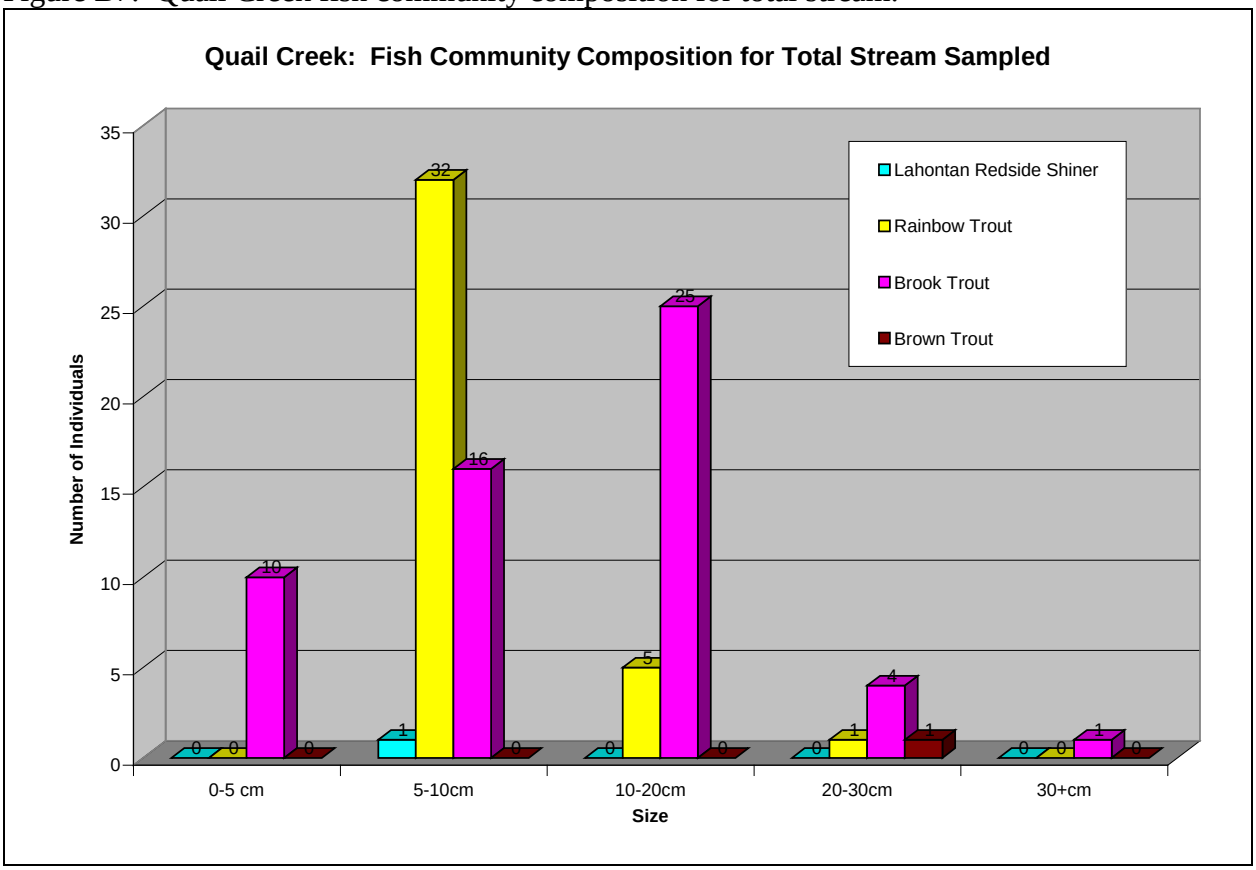


Figure B8. McKinney Creek fish community composition in headwaters sampled in 2008.

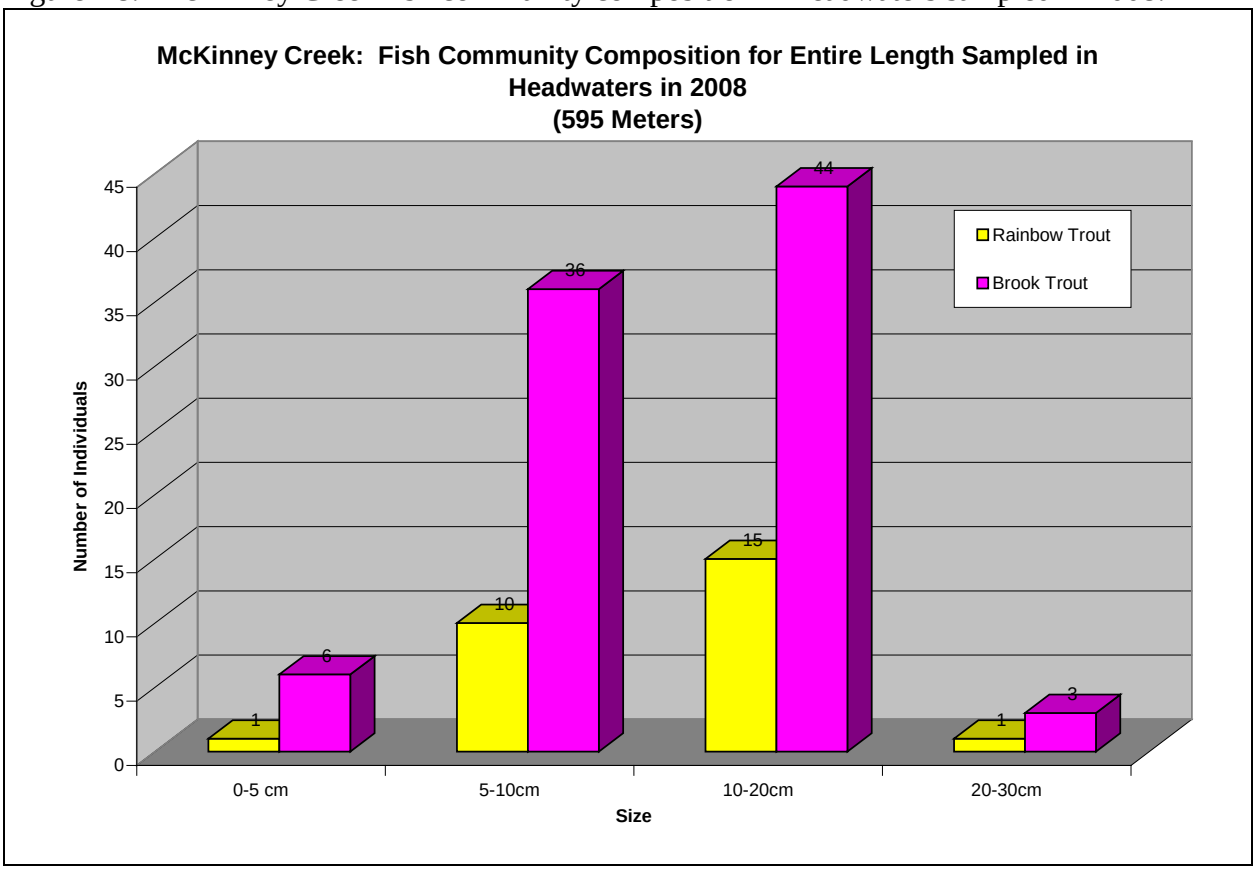
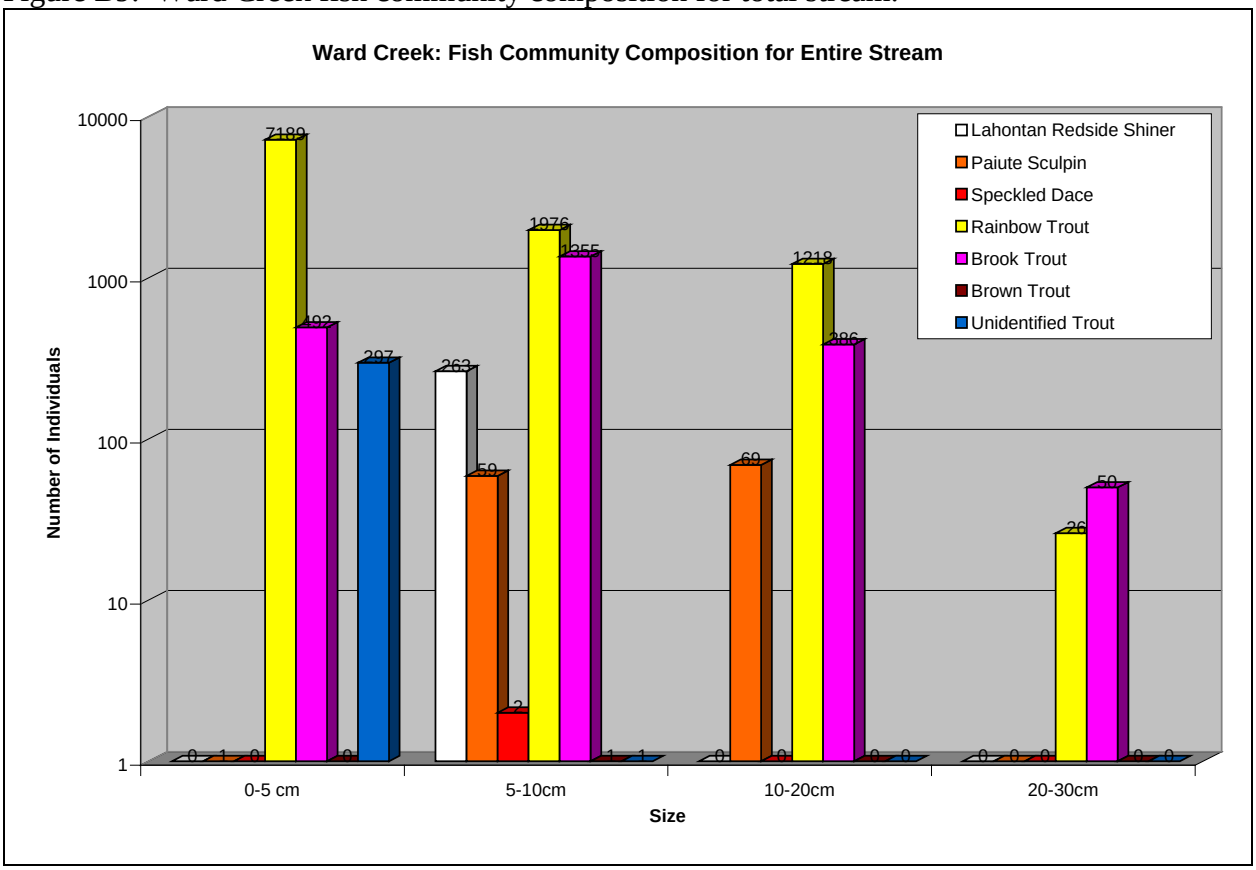


Figure B9. Ward Creek fish community composition for total stream.



Appendix C. Channel Types and associated fish communities in each creek.

Figure C1. Griff Creek fish community and channel type used below beaver dam.

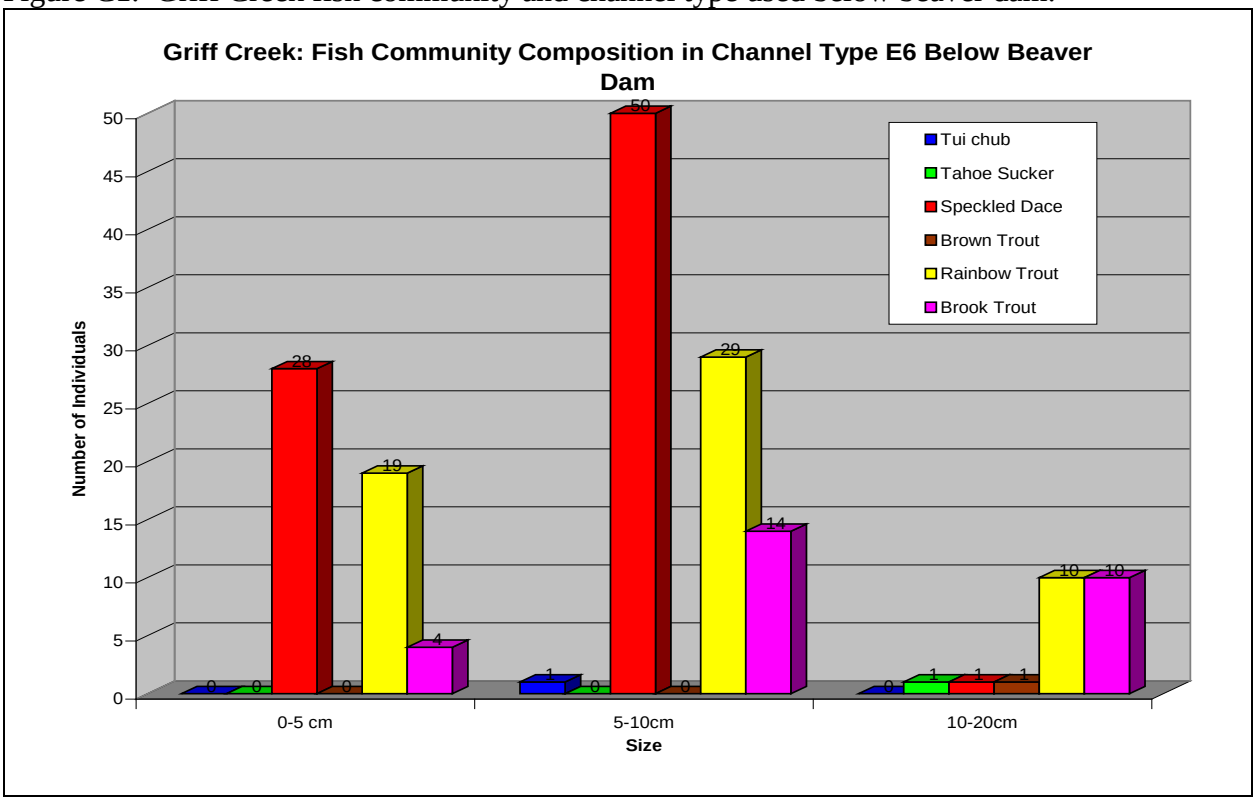


Figure C2. Griff Creek fish community and channel type used above beaver dam.

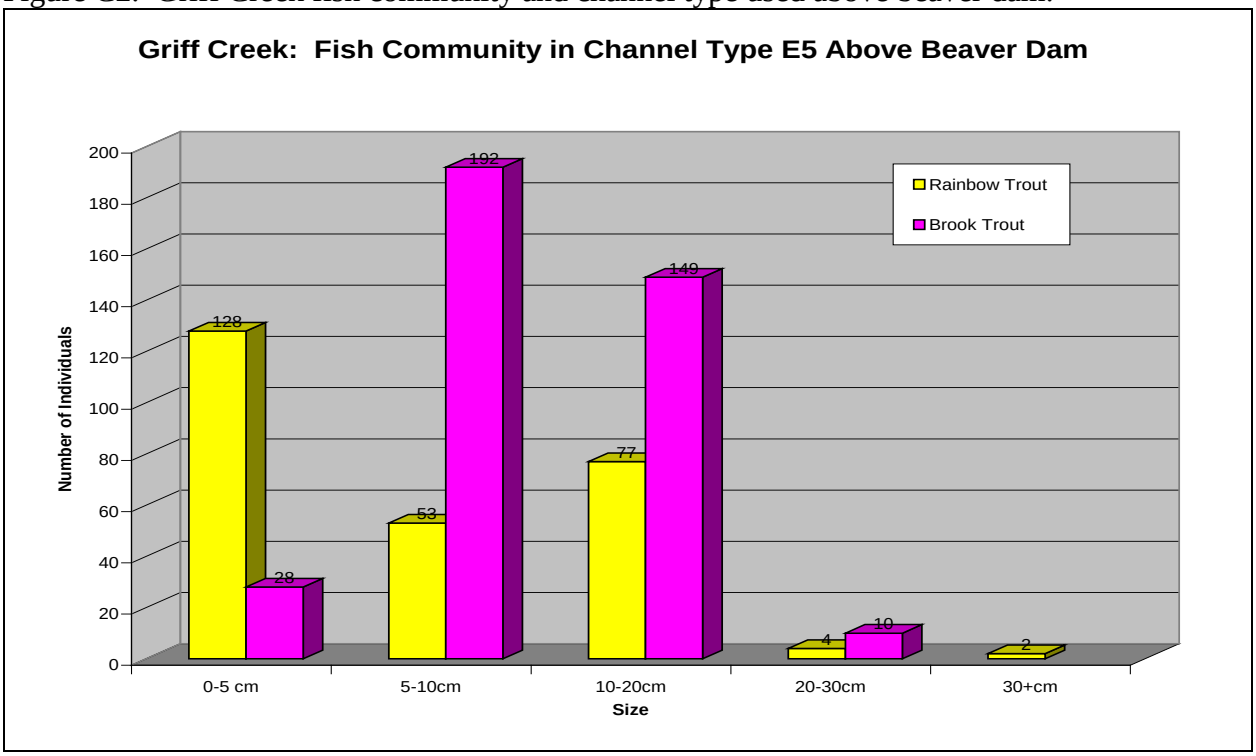


Figure C3. Watson Creek fish community composition in specific channel type.

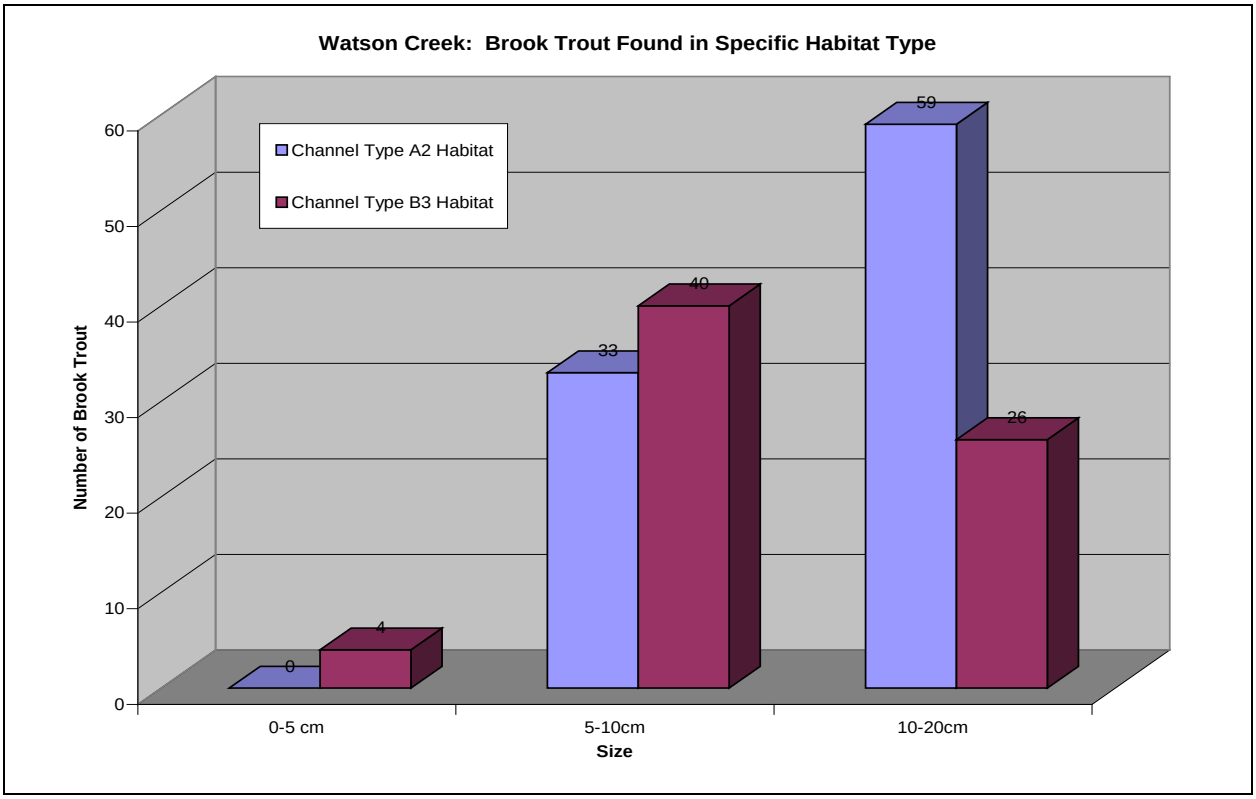


Figure C4. Burton Creek fish community composition in specific channel type.

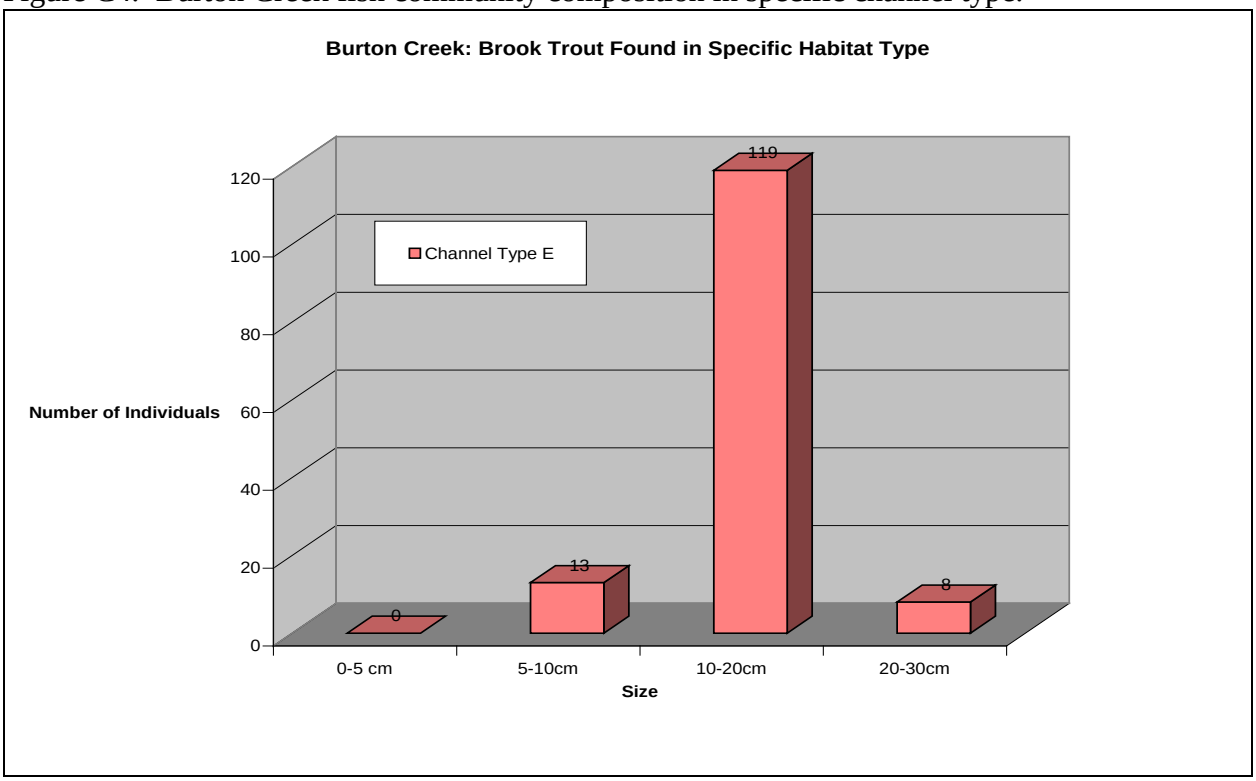


Figure C5. Homewood Canyon Creek fish community composition in specific channel type.

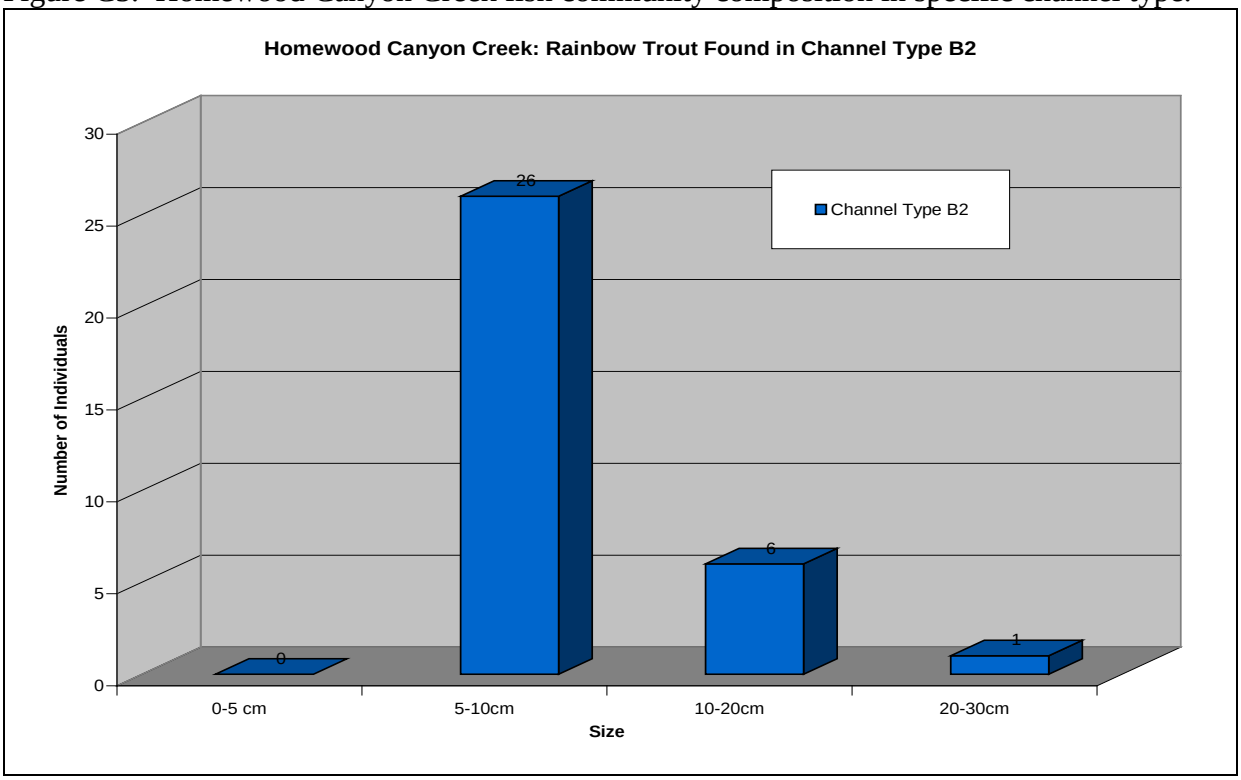


Figure C6. Madden Creek fish community composition in specific channel types.

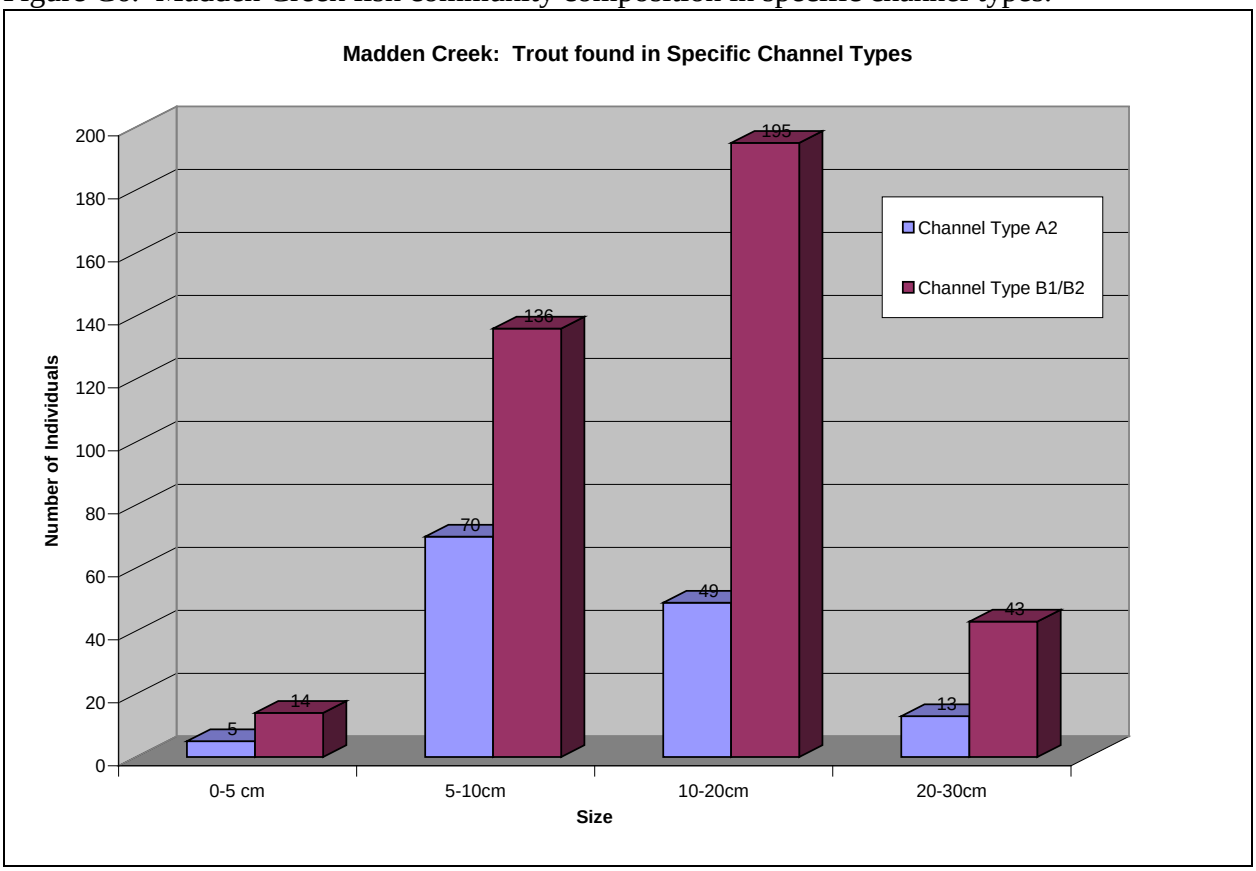


Figure C7. Madden Creek fish community composition for lower channel type B2.

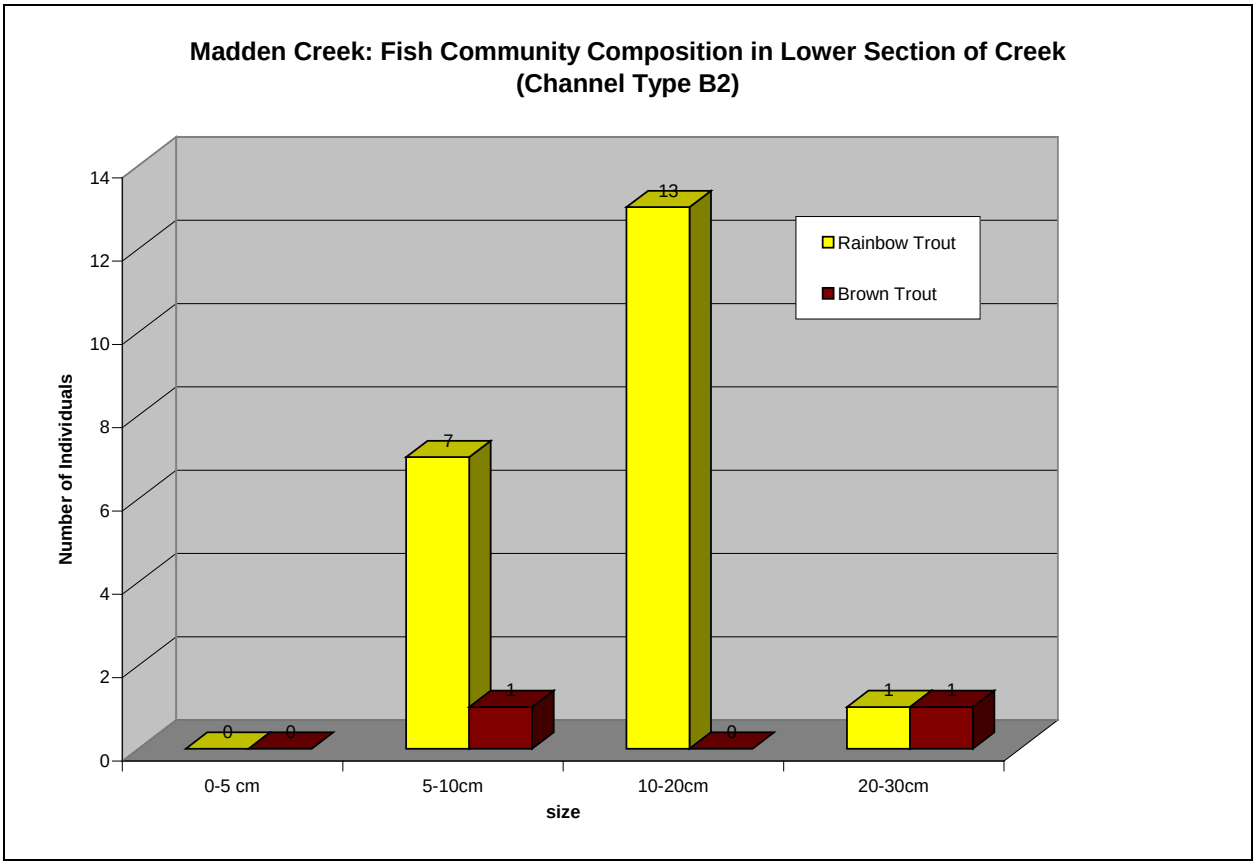


Figure C8. Madden Creek fish community composition for middle channel type Aa+2.

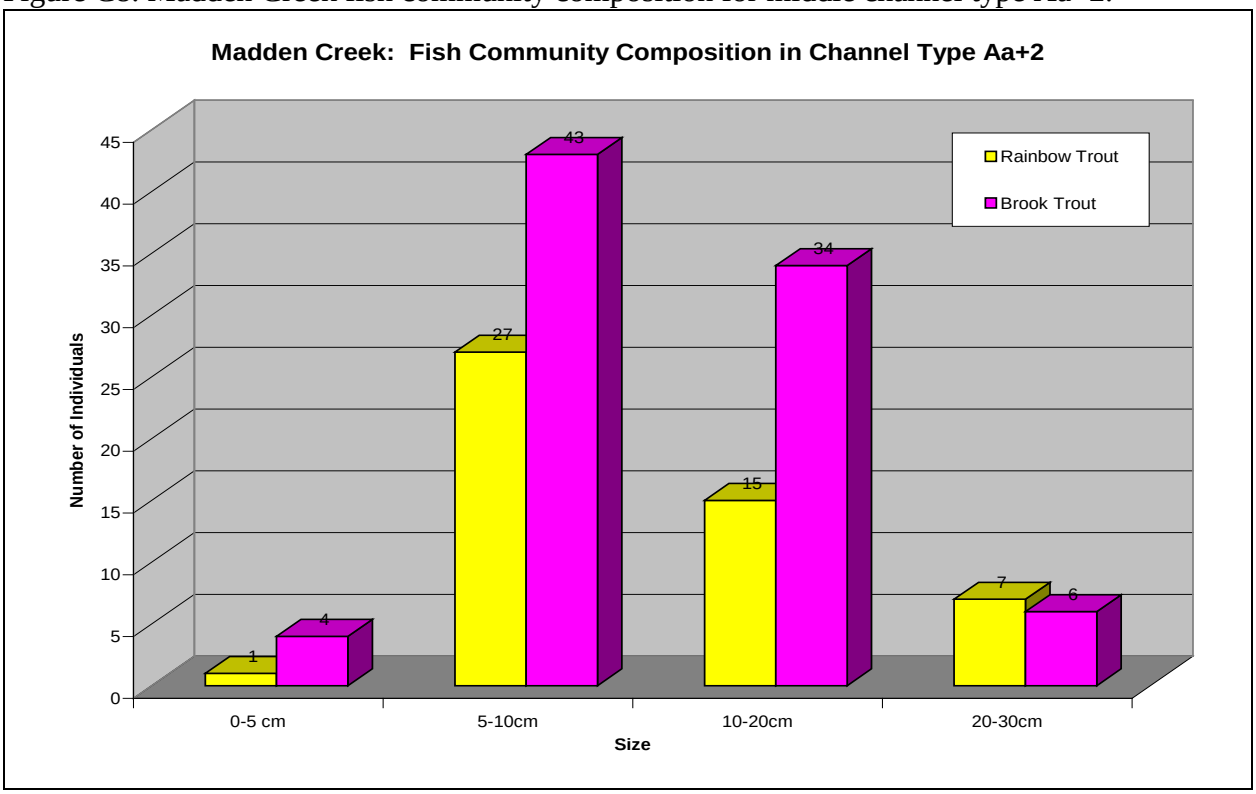


Figure C9. Madden Creek fish community composition for upper channel type B2.

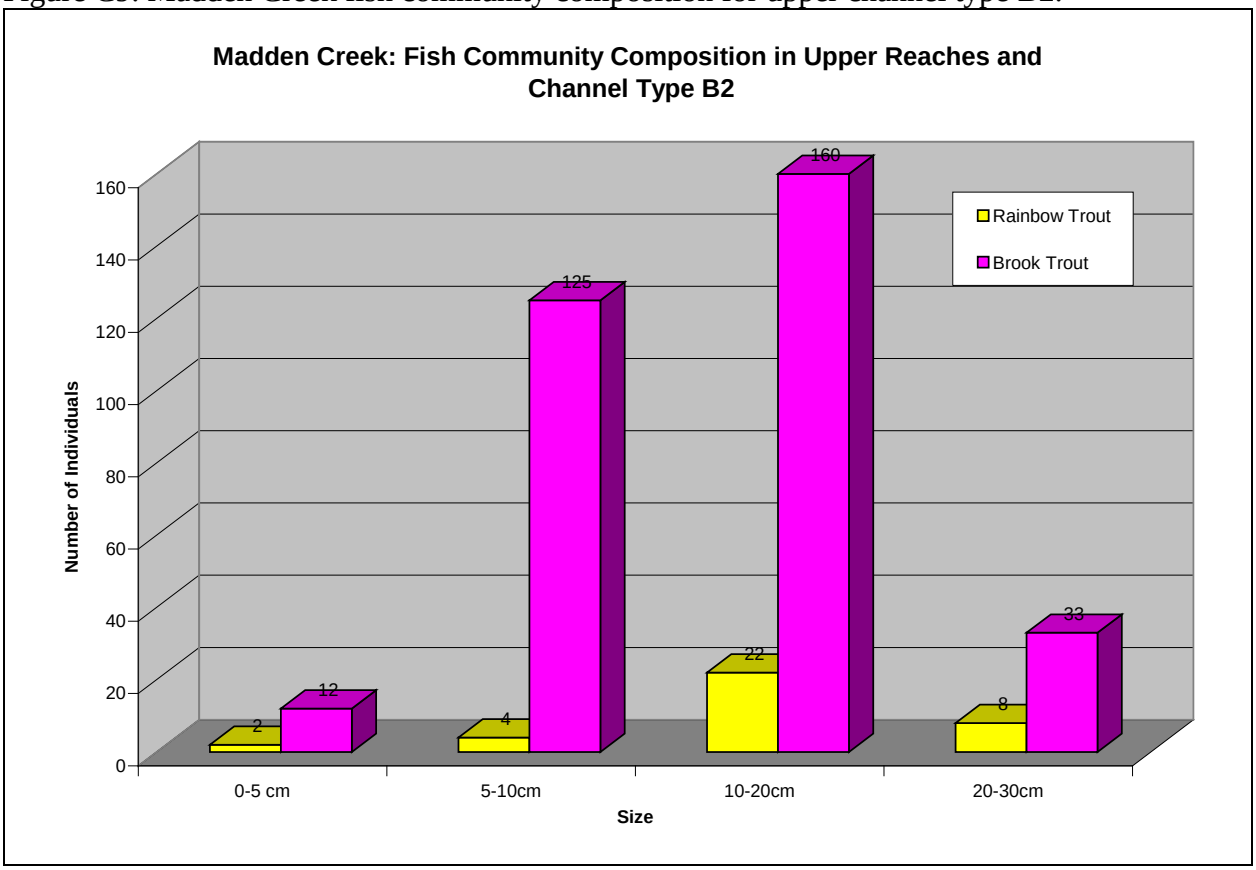
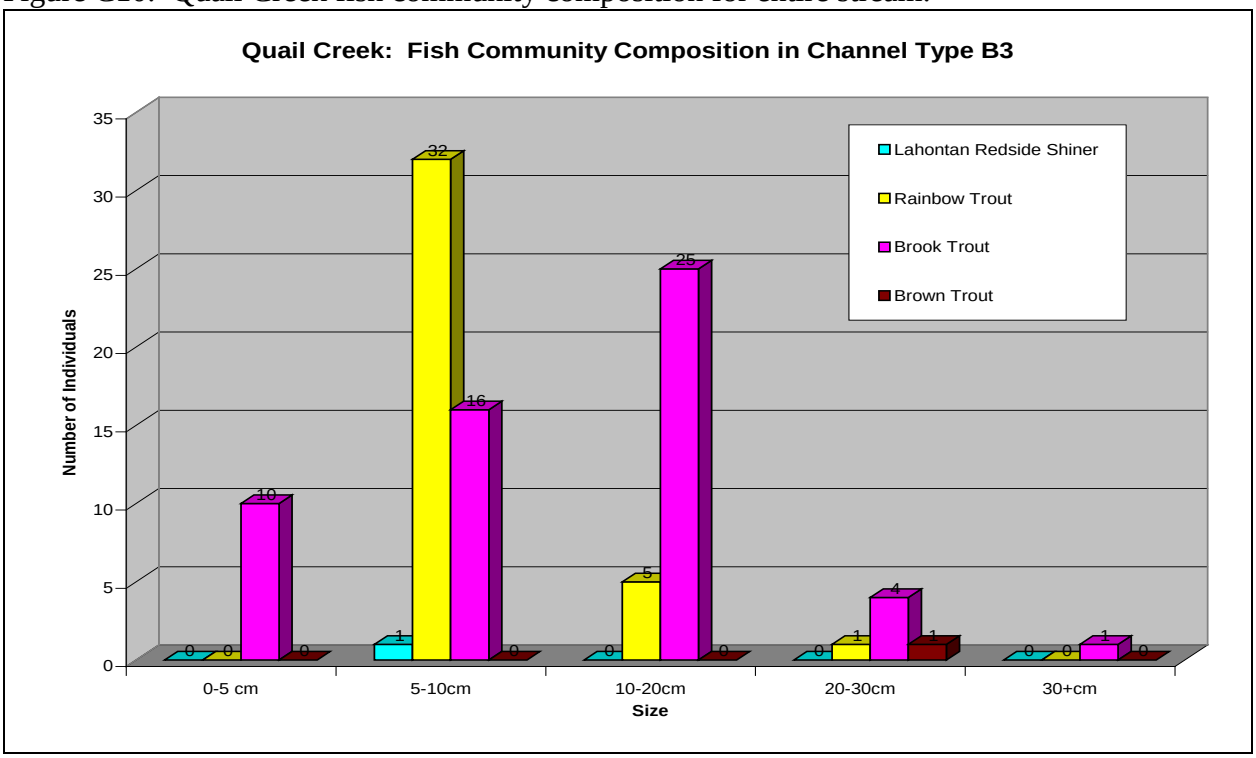


Figure C10. Quail Creek fish community composition for entire stream.



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