Woods Cr Rapid Bio-Assessment Inventory 2008

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Conducted for: **Marys River Watershed Council**
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Introduction

A Rapid Bio-Assessment snorkel inventory was conducted in the Woods Creek subbasin, a tributary of the Marys River, between August 12-14, 2008. The survey began at the confluence with the Marys River and extended to RM 6.1. The end point of the inventory can also be described as the stream crossing under a gated Starker Forest road adjacent to the rock quarry on Woods Cr road.

The intent of the inventory was to describe the current distribution and relative abundance of multiple age classes of Cutthroat within the Woods Cr subbasin and to compare this distribution with channel morphology and current land use. These overlapping layers of physical habitat condition and the biological response of fish distribution and abundance revealing information about how Cutthroat are currently utilizing stream habitats. The development of these relationships results in final recommendations for enhancing or restoring the existing aquatic conditions in Woods Cr.

Methodology

Woods Cr was prioritized by the Marys River 6th field Assessment document that suggests that the subbasin has the potential for restoration actions that could immediately benefit native fish populations. The survey was conducted by a single snorkeler to reduce the variability known to exist between surveyors. The survey was conducted in a 3 consecutive day period eliminating the potential of population shifts in response to changes in flow or temperature. As a result, the Cutthroat distributions observed should be considered a snapshot of a very dynamic distribution pattern that has the potential of exhibiting extensive seasonal variation. Landowner contacts were made for all of the small private and industrial ownerships prior to conducting the inventory.

The protocol was consistent for both mainstem and tributary reaches (2nd order). The first pool above the stream or tributary confluence was selected as unit number one. Every subsequent 5th pool was inventoried after the initial pool selection to produce a 20% sample of the current distribution and abundance.

The survey continued sampling at a 20% frequency until the survey was terminated by the biologist because of declining habitat surface areas and limited potential for meaningful restoration.

Pools had to meet the minimum criteria of being at least as long as the average stream width. They also had to exhibit a scour element (this factor eliminates most glide habitats) and a hydraulic control at the downstream end. There were no minimum criteria established for depth. Only main channel pools were sampled. Side channel pools, back waters and alcoves were not incorporated into the surveyed pool habitats.

The lineal distances represented in the database were estimated by pacing from the beginning of one sampled unit to the beginning of the next sampled unit. Total distances represented in the database are consistently greater than map wheeled distances using USGS 1:24,000 series maps. This is related to the level of sinuosity within the floodplain that is not incorporated in mapping. .

Pool lengths and widths were generally estimated. Because pool widths vary significantly within a single unit, a visual estimate of the average width was considered adequate.

A cover/complexity rating was attributed to each pool sampled. This rating was an attempt to qualify the habitat complexity within the reach. The 1 - 5 rating is based on the abundance of multiple cover components within a sampled unit (wood, large substrate, undercut bank, overhanging vegetation). Excessive depth was not considered a significant cover component. The following criteria were utilized:

1 0 cover present
2 1-25 % of the pool surface area is associated with cover
3 26-50 % of the pool surface area is associated with cover
4 51-75 % of the pool surface area is associated with cover
5 > 75 % of the pool surface area is associated with cover

A numerical rating was given to each sampled unit for the surveyor's estimate of visibility. The following criteria were utilized:

Visibility
1 excellent
2 moderate
3 poor

There was also commentary recorded within each of the surveyed reaches that included information on temperature, tributary junctions, the abundance of other species and adjacent land use. This information can be retrieved from the Access database provided as a deliverable of this project.

Results

Distribution and Abundance

RM 0 – RM1.1 Cutthroat was the dominant species observed. There were however high concentrations of redside shiner in the lower 1200 ft just above the confluence with the mainstem Marys and two 1+ age class steelhead were also observed in the lower 1.1 miles of Woods Cr. There were 7 pools sampled in the first ½ mile of Woods Cr. This expands to approximately 35 total pools in this section that we are suggesting would exhibit the same levels of cutthroat abundance observed in the 7 sampled pools. Only 1 of the 7 sampled pools contained cutthroat and they were older age class individuals only, stacked in high concentrations below an impassable full spanning log jam (figure 2). This concentration and the absence of pool occupancy below this jam suggest that cutthroat are making upstream temperature dependant migrations from the mainstem Marys River. This behavior was an expected phenomenon as multiple age classes within the Marys River mainstem are known to seek summer pinch period temperature refugia in cold smaller order tributaries.

RM 1.1 – RM 1.9 exhibited very low cutthroat abundance with most sampled pools vacant. The extremely poor pool quality in this segment was likely directly related to the observed low abundance (figures 1 & 2).

RM 1.9 – RM 4.7 exhibited increasing densities of cutthroat rearing in a general pattern that leveled off at RM 2.6. The average density was approximately 0.3 fish / sq. meter with higher quality pools in the 0.7 fish / sq. meter range (figure 1). These densities compare favorably with cutthroat densities observed on coast range streams with both resident and anadromous populations of cutthroat. For a relative measure, high quality coastal habitats almost never exceed cutthroat densities greater than 0.75 fish / sq.meter. Because levels of full seeding are unknown for cutthroat in their varied latitudes and habitats, we suggest that the observed abundances in Woods Cr appear comparatively high for habitats exhibiting complex habitat characteristics. The variation in rearing density between sampled pools is likely directly correlated with the differential in pool cover and complexity.

RM 4.7 – 6.1 exhibits steadily increasing cutthroat densities from those observed in the previous reach. The 1.4 mile final reach averages 0.5 fish / sq.meter with high quality pools in the 0.9 fish / sq. meter range (figure 1). These levels exceed expectations for summer rearing abundance and indicate that the observed higher levels of instream wood complexity within this reach are likely playing a favorable role in maximizing production.

Interestingly, when the distribution of cutthroat is broken down into age class, additional patterns

no lower basin spawning is occurring in the subbasin. In addition, it suggests that no 0+ age class fry are present in the mainstem Marys River that might be utilizing Woods Cr as summer cold water refugia. Almost all of the Cutthroat observed in this lower reach were older age class adults (2+ and older, compare figures 4 & 5). These individuals were likely either upstream migrants from the mainstem Marys River or Woods Cr residents exhibiting a higher tolerance for elevated summer water temperatures (known behavior).

The highly functional and consequently productive stream reach for Cutthroat appears to be concentrated between RM 1.9 and RM 5.4 (figure 2). This is the zone that all age classes of cutthroat inhabit during summer inventories. The suggestion is that there are functional habitats for each age class and season within this reach. Above and below this segment exhibits physical habitat conditions that either benefit or limit the distribution of a particular age class of Cutthroat. The upstream limitation is gradient. These upper habitats (above RM 5.4) provide high quality spawning and incubation but do not provide the low velocity winter habitats necessary to maintain significant abundances of older age class cutthroat during winter flow regimes. The downstream limitation is temperature and poor habitat quality (below RM 1.9).

Migratory patterns
Blockages to low flow summer migrations upstream currently limit the ability of the Woods Cr to function as cold water refugia for cutthroat originating in the Marys River. A definitive summer barrier currently exists at approximately RM 0.6 (230 ft above the Starker bridge crossing to old mill pond). This is an ephemeral (short-lived) barrier composed of live trees and transient woody debris. This jam is passable at winter and spring flows and probably does not completely terminate the utilization of Woods Cr to potential fluvial migrants on spring spawning migrations.

Physical habitat conditions
Viewing Woods Cr in an upstream progression from the Marys River, the following gradations of habitat were observed:

RM 0 – RM 1.1 exhibits measurable temperatures that meet or exceed the sub lethal threshold for salmonids. This is the zone where the cumulative effects of solar radiation from inadequate riparian canopy and elevated impoundment temperatures begin to impact water quality and biotic communities. These elevated temperatures have resulted in the observed species shift in the lower ½ mile from cutthroat to redside shiner. Minor wood loading.

RM 1.1 – RM 1.9 exhibits a deeply entrenched active channel that is scoured to bedrock. There is no bedload accumulation and therefore no potential for pool scour or the development of deep, complex pool habitat. This segment is further compromised by Woods Cr road that permanently confines the active channel to its current location. Because of the close proximity of road bed and stream corridor, a limited riparian canopy exists to provide shade and future wood recruitment. The result is a dysfunctional stream segment with no potential for actually recruiting or storing mobile wood and substrate resources. The reach functions as a transport corridor only, providing limited summer, no winter and no incubation habitat. No wood loading.

RM 1.9 – RM 4.7 transitions into a stream corridor that exhibits functional stream characteristics not observed in the lower 2 miles (zone begins above 2nd culvert and ends at the confluence of Trib D). These are interactive floodplain terraces, higher pool complexity and scour created by intermittent zones of bedload accumulation. Wood loading remains nearly non existent in this segment as the residential interface effectively eliminates migratory woody debris because of the perceived and real potential for negative impact on stream adjacent terraces. This reach encompasses a key anchor habitat that exists at RM 2.7-2.8. These are very general reach characterizations and, of all the reaches described, this segment exhibits the greatest range in functionality. (High quality anchor site, RM 2.7–

RM 4.7 – RM 6.1 There is a definitive gradient shift that characterizes this last reach that occurs between Trib D and Enos Cr. In addition, what sets this last productive rearing segment apart from the lower 4.7 miles is the increased densities of instream large woody debris (LWD). The increase in wood is directly responsible for a radical increase in the abundance of spawning gravels appropriate for cutthroat trout (unquantified). The highest quality gravels are almost always associated with full spanning jams that function to retain and sort fine gravels.

Spawning and Incubation
Significant cutthroat spawning is occurring in the following tributaries:
Trib C
Trib D
Trib E
In addition, mainstem spawning is likely significant between RM 4.7 – RM6.1, where the appropriate sized gravels were observed sorting above full spanning LWD jams.

Tributaries

- Trib A – Enters at RM 1.5, contains cutthroat in low densities, minor contribution to basin scale production. The trib is currently disconnected from the mainstem as a source of summer cold water refugia because of multiple full spanning jams that have aggraded the channel and cause surface flows to disappear into alluvium. Minor summer flow contribution at confluence.
- Trib B – Enters at RM 3.7. 59deg. Culvert exhibits 6" perch. Bedrock slide above on 15% gradient that terminates upstream migration of juveniles during summer flow regimes. Not a significant source of habitat or refugia.
- Trib C – Enters at RM 4.1. Cold water contributor (56deg @ 16:00). Surveyed 1,545 ft to establish rearing densities but cutthroat utilization extended well beyond extent of survey. High 0+ densities, obvious target destination for spawning and incubation. Very high quality, very high state of function.
- Trib D – Enters at RM 4.6. New Benton County culvert is currently upstream barrier to migration during summer flow regimes for all age classes. Excellent spawning habitat and currently exhibits good densities of 0+ age cutthroat fry. Does not provide rearing potential for older age class component of the population. The location of this tributary confluence high in the subbasin and the excellent summer temperature profiles within the mainstem at this location, probably indicate that the temperature dependant upstream migration of juveniles is currently not occurring or required for survival.
- Enos Cr – Enters at RM 5.6. Temperature was 58 deg @ 14:00. 5 ft vertical head cut terminates migration 250 ft above the confluence with the mainstem. No passage.
- Tatum Cr – Enters at RM 5.8. 65 deg @ 15:00 just above confluence. Mainstem of Woods Cr just above this confluence was 57 deg and 58 deg just below the confluence. 350 ft above the confluence Tatum is impounded by a man made dam that spills surface flows at 70 deg. There is no access to Tatum from Woods Cr. because of an impassable concrete culvert at the road crossing and an impassable dam fill.
- Trib E – Enters at RM 5.9. Contributes 15% of mainstem flow at 56 deg (15:15). Excellent spawning habitat and high densities of 0+ age fry. Trib is low gradient, complex, accessible and provides the highest potential for production of all of the tributaries inventoried. Distribution of cutthroat extends well beyond the extent of the current inventory (463 ft).

Recommendations

- No alteration to the ephemeral jam at RM 0.6 is recommended because of the likelihood that this jam will eventually migrate out of the system as part of the natural progression of wood and substrate towards the mainstem Marys. In addition, the impounded habitats existing above the jam are providing the highest quality winter habitat observed in the subbasin for the Woods Cr resident Cutthroat population.
- Reduce solar impacts on exposed bedrock (RM 1.1 – 1.7) to address the cumulative impacts to the lower 1 mile of Woods Cr above the confluence of the Marys River. This would likely involve the planting of a very narrow riparian canopy adjacent to the county road. Consider leafy deciduous vegetation with no expectation that this material would ever function within the stream channel to provide LWD complexity.
- Investigate the relationship between the old mill pond and lower Woods Cr elevated summer temperatures. There is the potential that this large body of water is impacting mainstem Woods Cr temperature profiles. The relationship is unknown and could be positive or negative.
- Design a modified overflow for the pond on Tatum Cr whose warm surface spill appears to elevate the mainstem of Woods Cr by 1 deg at its confluence.
- Enhance the abundance of low velocity winter habitat by maximizing floodplain interaction with the placement of full spanning wood structure. This would be appropriate anywhere below RM 5.4 that doesn't conflict with the residential interface.
- Enhance the accumulation of migratory bedload with the placement of full spanning wood structure to reduce the summer temperature impacts of shallow flows over bedrock. Areas of solar impact would be prioritized (RM 1.1 – 1.7).

Figure 1A

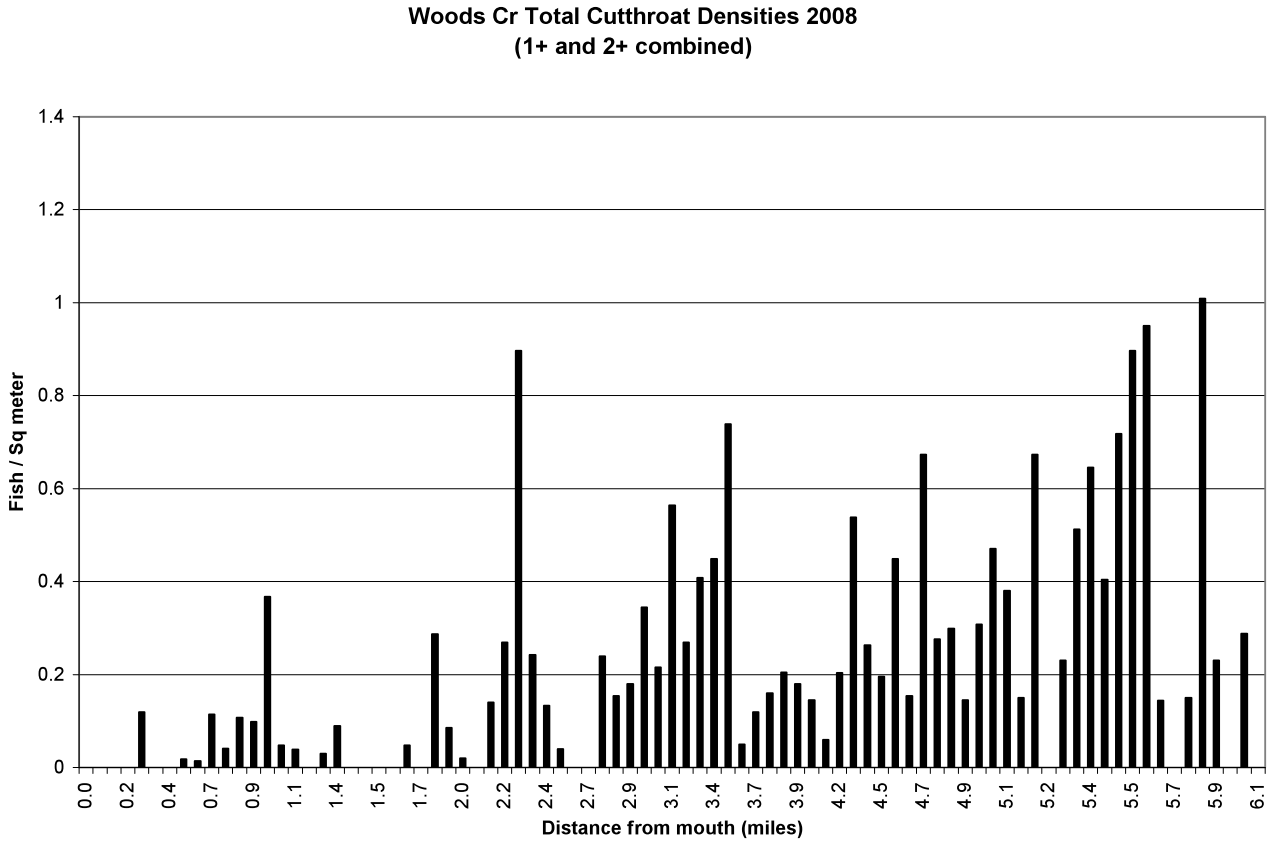


Figure 1B

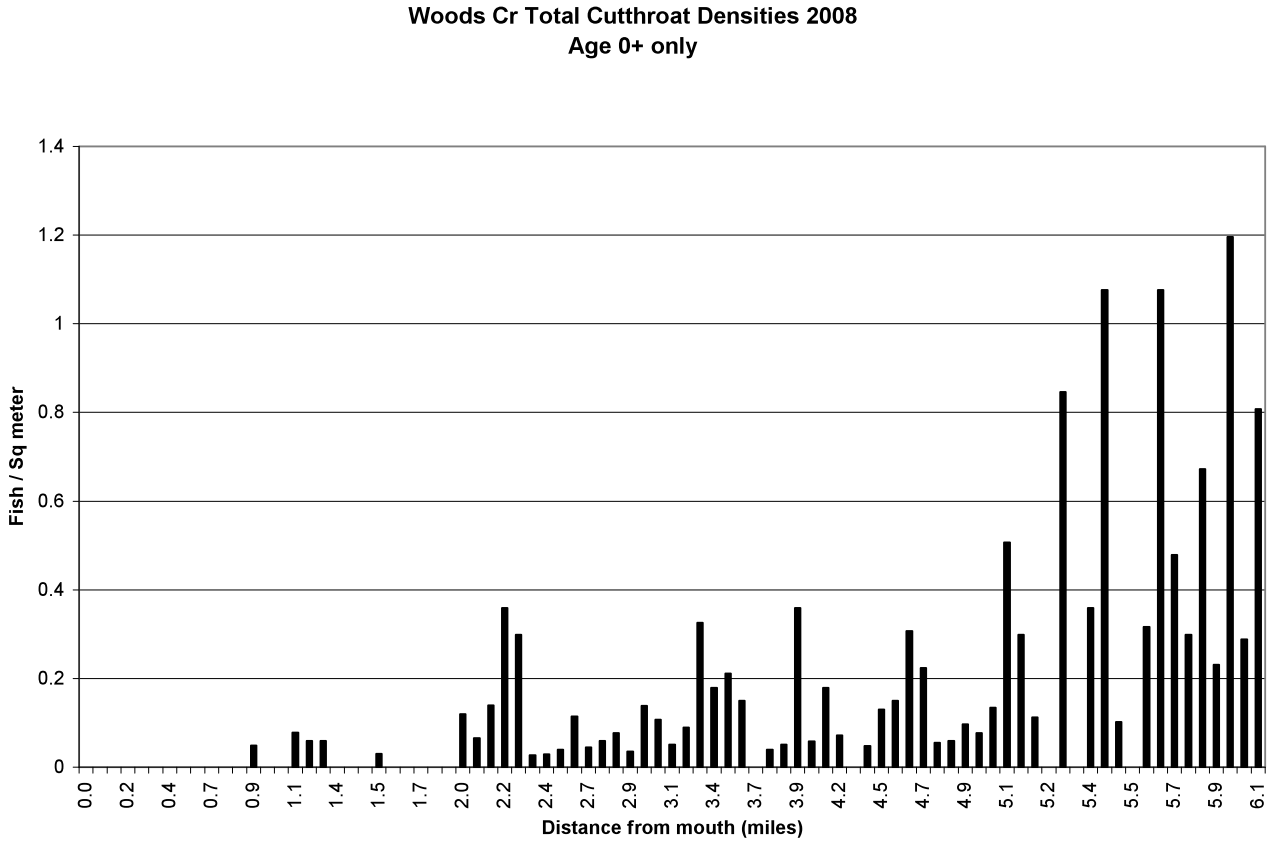


Figure 2

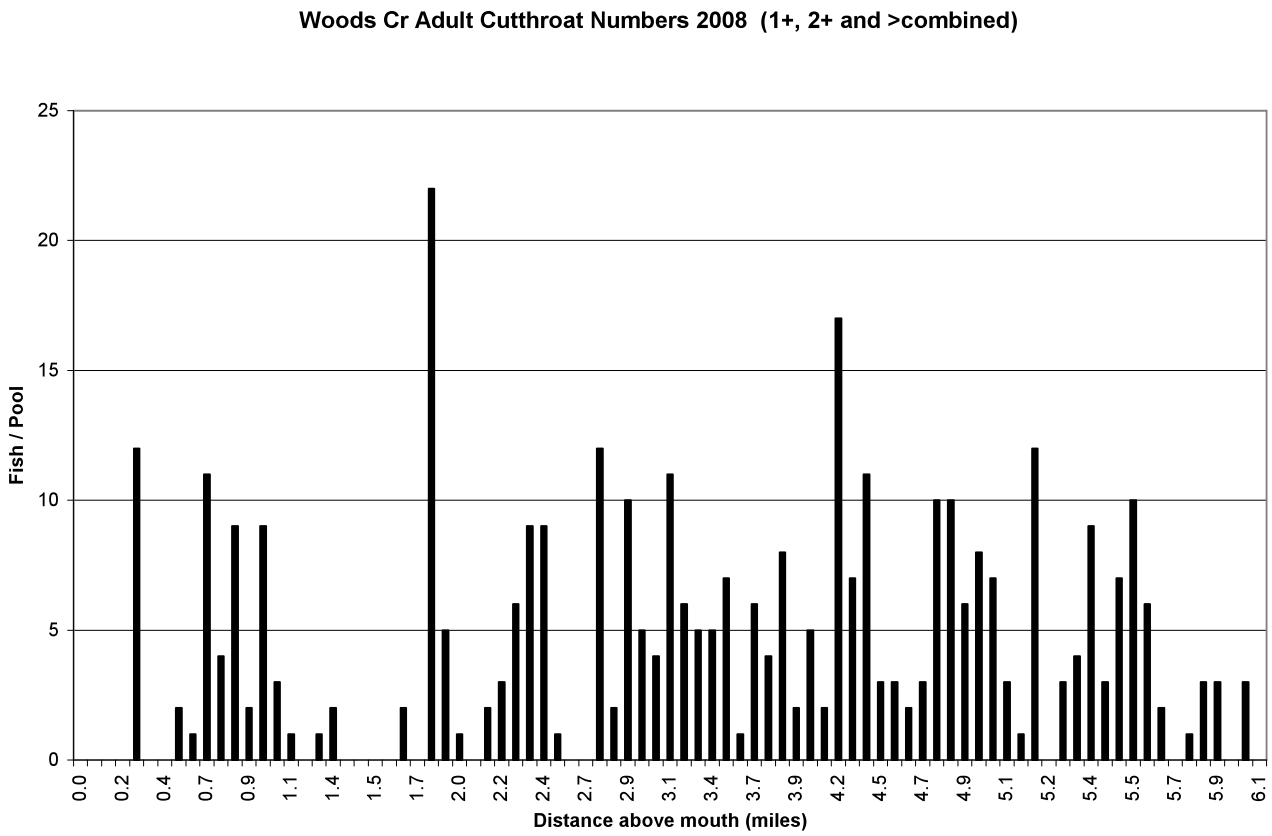


Figure 3

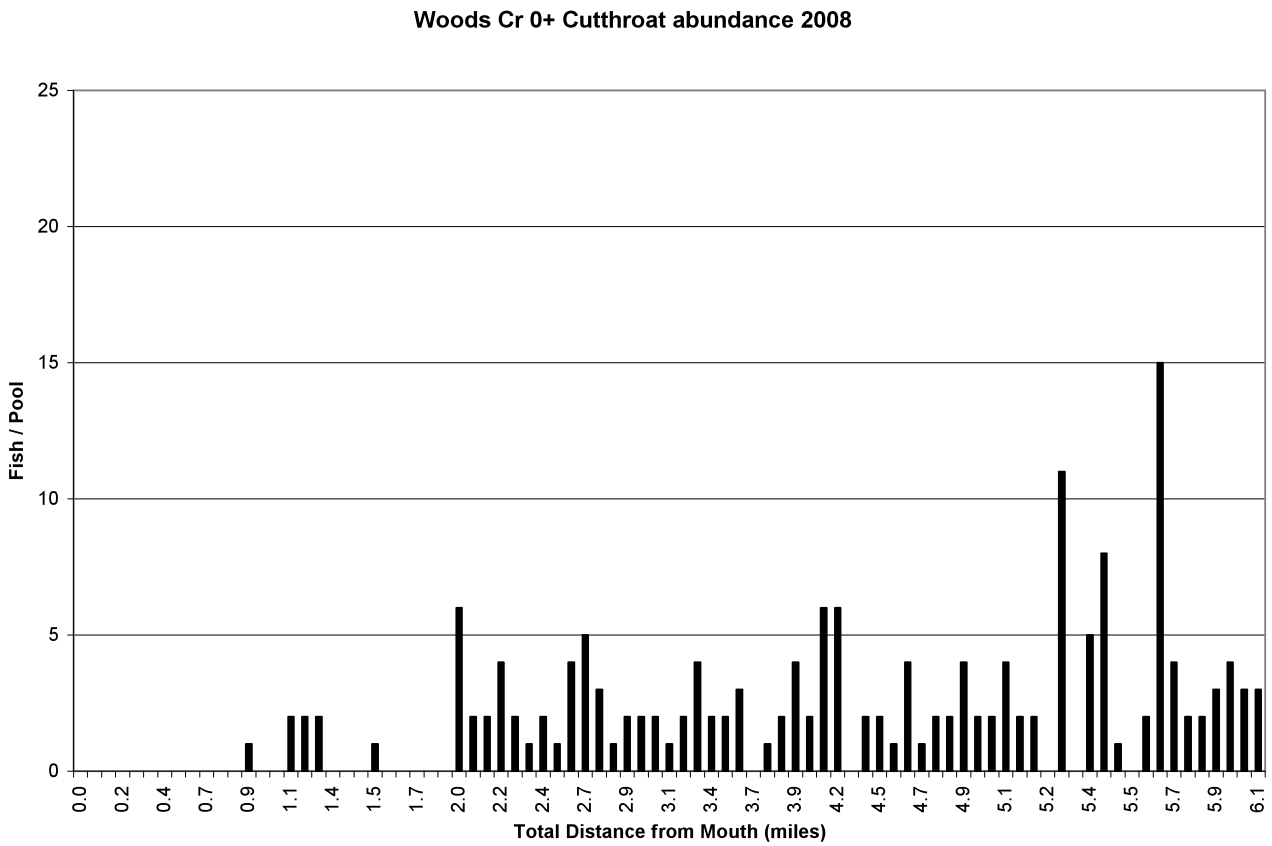


Figure 4

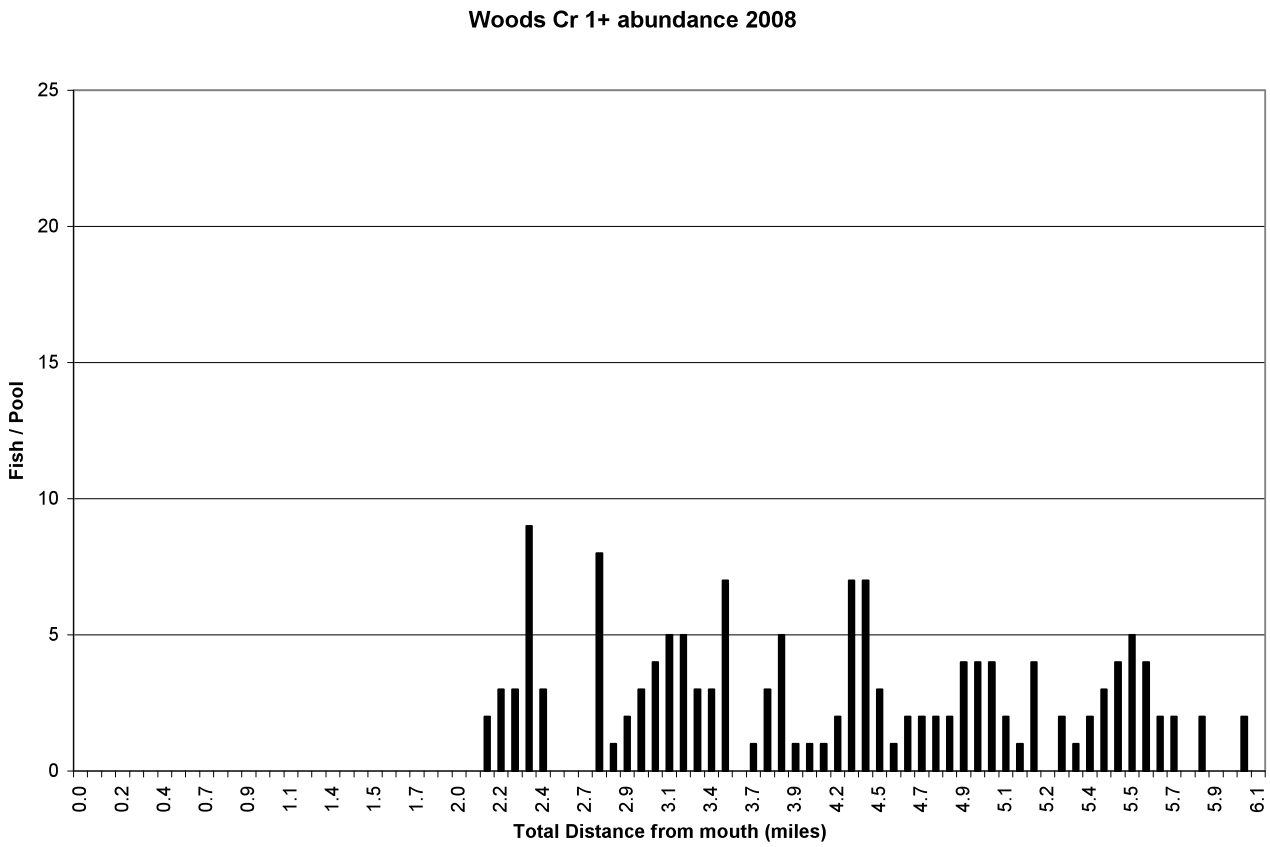
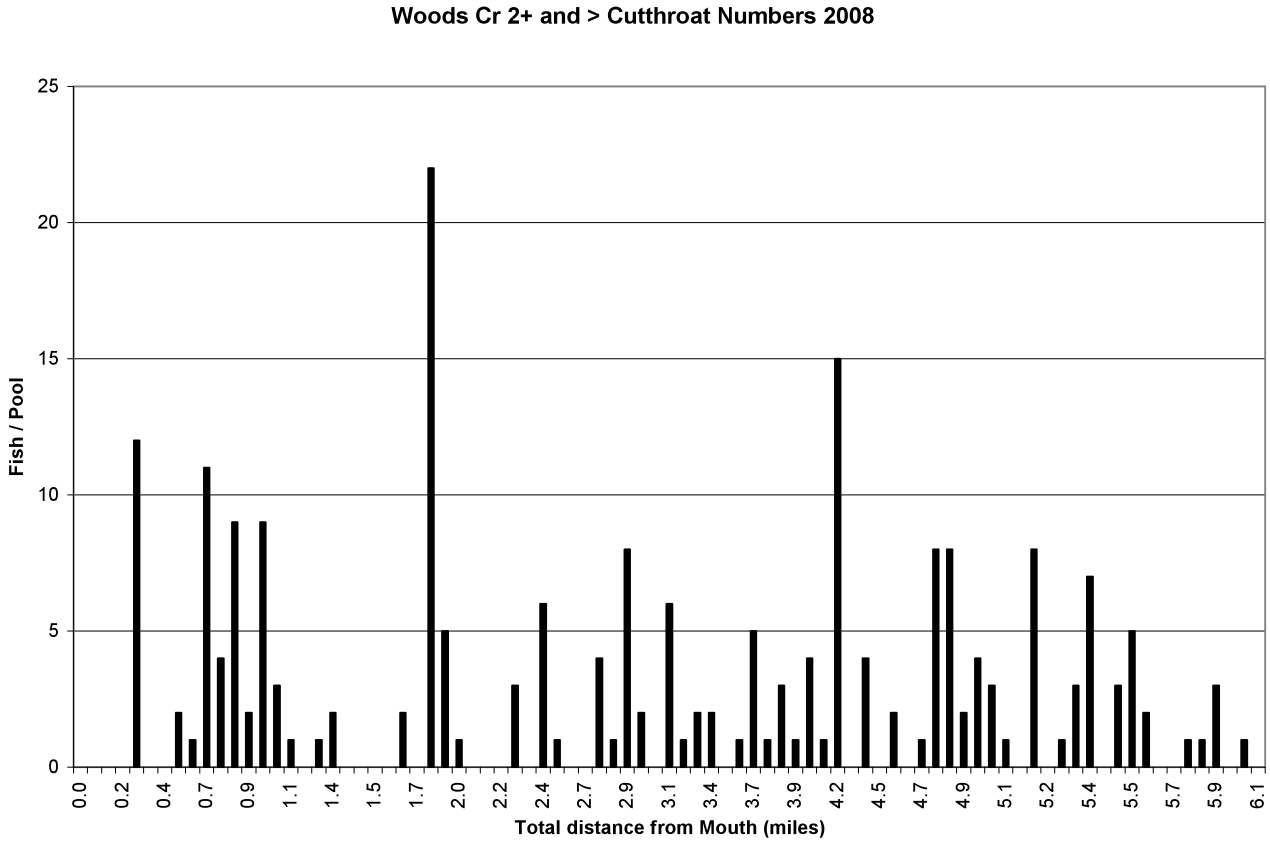
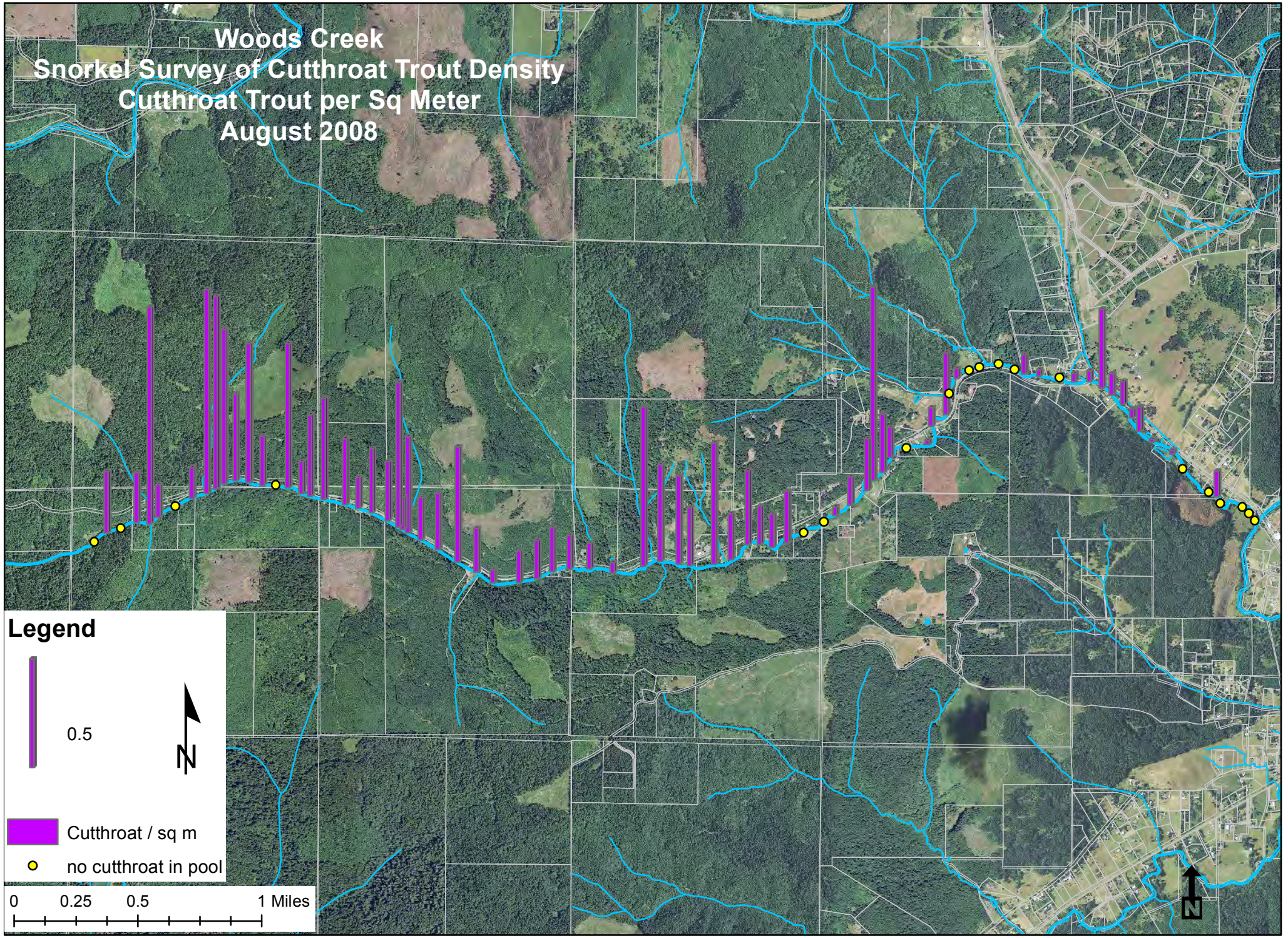


Figure 5




Woods Creek
Snorkel Survey of Cutthroat Trout Density
Cutthroat Trout per Sq Meter
August 2008
Legend
0.5
N
Cutthroat / sq m
no cutthroat in pool
0
0.25
0.5
1 Miles
N