Inventorying Culverts in Connecticut

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INTRODUCTION

Human construction has greatly impacted fish and wildlife across Connecticut. One of the major impacts is segmentation and isolation of fish and animal populations due to road/culvert construction. The fragmentation of native brook trout populations by impassible barriers is a common cause of loss of these fish in small to moderate size streams. In an effort to protect and enhance our native trout species the DEEP is working with volunteer groups to document the condition of road culverts across the state. This information will be used to identify culverts in need of replacement or modification. Culverts that are too high, steep, or long all form barriers will be fixed to allow more frequent trout movement.

ABSTRACT

The Connecticut Culvert Assessment for brook trout passage is collecting data on culverts such as, crossing type, length, and the projection from the culvert, to see how they can make them more efficient. This ongoing project has covered 26 of 169 towns in Connecticut. Brook trout are the only native trout species to New England. Segmentation of stream population and genetic isolation is the cause for unhealthy offspring. Our goal is to find any culverts in our area, collect data from them, and then report back to the DEEP so they can assess the problem with the culvert design. From the data we collect, the DEEP Fisheries Division will work in conjunction with the Connecticut DOT to design future culverts to replace existing ones, or to install brand new ones. Better designed culverts allow brook trout to interbreed with other isolated population. This will enhance the communicability of brook trout during spawning season and help the population become more genetically diverse. This will allow the brook trout to proliferate and reclaim historic ranges.

Table 1 Torrington Culvert Baseline Data

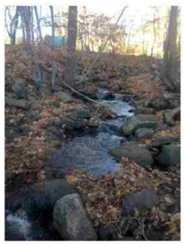
Crossing #	Street Name	Type of Xing	Number of Xing	Xing Material	Drop at End of Pipe (inches)	Projection of Pipe (inches)	Drop through Xing (inches)	Interior Material	Stream Size (width in feet)	Culvert Shape	Round Culvert (diameter/ inches)	Arched, Box, Oval Culvert (height/width inches)
1	Pythian	Bridge	2	Cement	15"	25"	25"	Cement	12'5"	Sphere	75.25"	70"
2	Calhoun	Bridge	2	Cement	15"	25"	25"	Cement	12'5"	Sphere	75.25"	70"
3	Alice	Bridge	1	Cement	0"	0"	0"	Cement	8'	Sphere	96"	68"
4	Brightwood	Bridge	1	Cement	0"	0"	0"	Cement	11'	Rectangle	x	40"
5	Margerie	Culvert	1	Cement	0"	0"	0"	Cement	6'	Rectangle	x	59"
6	Daley Route 8	Culvert	0	Plastic	12''	0"	55"	Plastic	5'5''	Tube	6'9"	82.8''

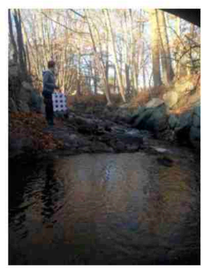
The chart above is an example of the layout of our data. We collected information such as the crossing type (whether it's a culvert or a bridge, number of culverts, the length, material type (whether it's stone, concrete, metal, plastic or wood.), the perched height, drop through the culvert and projection coming out of the pipe, whether or not the culvert bottom is natural material, the angle of approach, and the pool at the bottom of the culvert.

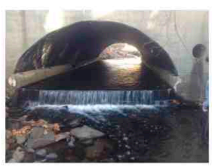
MATERIALS AND METHODS

Throughout our project we worked with materials that would help us calculate things such as the drop at the end of the pipe we were measuring, the projection of the water coming out of the pipe, the length of the pipe, the stream size, the diameter of the culvert, etc. We used a meter stick and a tape measure to measure things like the diameter of the culvert, the drop at the end of the pipe, the height of the culvert, how long the pipe is, etc. We also needed to use a map to point out where exactly the culverts were, to identify the roads where the culverts are located, and to pin point where exactly we needed to go. We also used a clipboard and a pencil to record out data. Another thing that we used was a camera to take photographs of the culverts to show what exactly the culvert looks like and what needs to be done in order to help populate fish movement.

Our methods and procedure for this project were to first identify the town and culvert number. Then, measure the width and length of the culvert. After, we then measured the projection out of the culvert. After all our physical data was recorded we took multiple photographs looking both up and down the stream sides. Photographs are very important to this project because they can tell you whether or not the culvert lets the trout get through, if the culvert is clean or if it's polluted, also they even help explain and clarify your information from the charts.

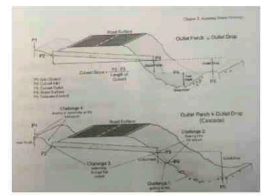






RESULTS

	Independent	Dependent
Drop	We discovered that the drop of a culvert exceeds fish jumping ability, or jump pool is insufficient to generate sufficient thrust.	The impact is that fish cannot enter structure, can be injured, or will expend too much energy entering the structure to traverse other obstacles.
Velocity	We discovered that high velocity exceeds fish swimming ability.	The impact is that fish tire before passing the crossing.
Turbulence	We discovered that turbulence within culvert prevents fish from entering them, or confuses sense of direction.	The impact is that fish do not enter culvert or are unable to successfully navigate the waterway.
Length	We discovered that long culverts can get fish tired and may not finish their travel.	The impact is that fish may not enter structure due to darkness, Fish may fatigue before traversing the structure.
Depth	We discovered that low flow depth in a culvert can cause the fish not to be fully submerged I water.	The impact is that fish will be unable to swim efficiently or unable to pass the structure.
Debris	We discovered that debris caught within a culvert could block flow or portions of flow.	The impact is that fish may not be able to pass by debris, or constricted flow may create a velocity or turbulence barrier within the culvert.
Cumulative	We discovered that series of cumulative culverts will stress fish during its passage.	The impact is that the group of passable culverts may be a combined barrier



CONCLUSIONS

From what we have seen from our data collection many of the culverts are not suited for brook trout passage. The culverts have too much turbulence, high velocity, and low water levels. Culverts that are clogged with debris can constrict the water flow which creates a turbulence barrier and prevents the trout from passing through. High water velocity in culverts will tire the brook trout out before they are able to pass the crossing. Culverts with low water levels can cause the brook trout to not be fully submerged, this makes the trout unable to swim through the culvert efficiently. As further data is collected the Connecticut state DEEP will use our data to help asses better construction methods for future culverts, and to replace existing culverts.

REFERENCES

Charlotte Rand, Program Coordinator, NRC, Academy University of Connecticut, Department of Natural Resources and the Environment, Neal Hagstrom, Senior Fisheries Biologist, CT-DEEP 209 Hebron Rd. Marlborough, CT 06447 (860-295-9523-W or 203-631-5205 Cell), Phone: (860) 486-4917, Trout Unlimited, and of course our Teacher and Mentor Mr. Thomas Pepe.

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