An Integrative Study of Past Stream Restoration Projects in the Upstate of South Carolina for Use in Future Stream Restoration Projects: Preliminary Analysis and Results

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Background
- Historic agricultural land use, an increase in channelization, dredging with the removal of streamside or riparian vegetation, and urbanization effects has led to stream degradation.
- Flow analysis of Hunnicutt Creek
- These restoration locations are at the Booth, D.B, and C. J. Fischenich. 2015. A channel evolution model to river restoration.
- The upper restored cross-sectional changes for Hunnicutt Creek, 2013
- Still to come:
- As result of urbanization effects.
- The upper restored cross-section of Hunnicutt Creek is aggrading, both in the channel and the floodplain, and the thalweg of the channel is still deep. An incised channel could result in a tremendous rain event. This is most likely a result of urbanization effects.
- Little Garvin Creek is experiencing aggradation of the floodplain and channel, as well as a shift in the channel. This could be the result of multiple beaver dams located within the reach and upstream inputs.
- These restoration locations are at the bottom of the watershed, which increases the likelihood of unsuccessful restoration efforts. Choosing a better reach, more suitable for restoration, could have been potentially more successful, stable, and beneficial.

Description of the Study Sites
Hunnicutt Creek & Little Garvin Creek

Pre-Restoration Conditions

Historically, both streams have experienced substantial channelization. Hunnicutt Creek, containing the main stem, contains the majority of the urbanization for the study site. This includes the area for the impervious surface in the watershed, which includes the change of channel dimensions property.

Impervious Surface Cover Data from 2001, 2006, and 2011 for Hunnicutt Creek

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Year</th>
<th>2001</th>
<th>2006</th>
<th>2011</th>
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<tbody>
<tr>
<td>Hunnicutt Creek</td>
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<tr>
<td>Little Garvin Creek</td>
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These graphs depict the cross-sectional changes from surveys done in 2006 to the surveys done in 2016 compared to the pre-restoration conditions. Cross-sectional changes for Hunnicutt Creek.

Acknowledgements
I would like to thank my graduate advisor and committee members for all their advice and assistance in learning stream restoration techniques, and for this educational opportunity. I would like to thank my graduate peers for helping me to accomplish all of my surveys thus far.

Citations

Methods
- Cross-sectional analyses using the single level method (Snurr, Fall, Williams)
- Cross-sectional analyses of substrates using the wetted perimeter public cross (Snurr, Fall, Williams)
- GIS survey
- Longitudinal profiles
- Macroinvertebrate samples
- BOD/DO analyses
- Flow analysis of Hunnicutt Creek

Results

Summary Table of Characteristics of Hunnicutt Creek and Little Garvin Creek

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Type of Creek</th>
<th>2006</th>
<th>2006</th>
<th>2011</th>
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<tbody>
<tr>
<td>Little Garvin Creek</td>
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<tr>
<td>Hunnicutt Creek</td>
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Conclusions
- Both stream systems are relatively unstable systems.
- Landuse has significant effects on natural stream systems. These influences are still in effect presently.
- Hunnicutt Creek has substantially greater impervious surface covers, indicating an urban watershed; this will have drastic effects on hydrology within the watershed (i.e. flashy flow, increased sediment deposition, increased surface runoff, etc.)

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Angricultural ditch is not a readily feasible restoration. These two streams contain areas that are highly impacted and not suitable for restoration. These are the two restored cross-sections within the monitored reach. Included are the pre-restoration for the three riffles.

Future Stream Restoration

These graphs depict the cross-sectional changes from surveys done in 2006 and 30 as compared to the as-built condition that can not be visually observed by the distance and elevation differences for Little Garvin Creek. These are the three cross-sections within the monitored reach. Included are the pre-restorations for the three sites.

Little Garvin Creek

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