Best management practices employed in agricultural landscapes aim to improve the water quality of storm runoff by controlling or trapping pollutants. Installation of low-grade weirs in agricultural drainage ditches are being evaluated as an innovative, yet cost effective practice to reduce nutrient, specifically nitrate-N concentration and loads by increasing the hydraulic residence time within the ditches.

Objective
To assess, experimentally, the nitrate-N reduction capabilities of low-grade weirs in drainage ditches under a simulated storm event.

Methods
Eight artificially constructed drainage ditches, 4 with weirs and 4 without weirs, were amended with a replicated storm event for seven hours. This storm event consisted of a NO$_3^-$ concentration of 10-11 mg/L that was delivered to each ditch via QD pumps, simulating nutrient laden runoff from agricultural landscapes.

Results
<table>
<thead>
<tr>
<th>Ditch</th>
<th>Type</th>
<th>Flow Rate (L/min)</th>
<th>Total Water Volume (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Non-Weir</td>
<td>31.26</td>
<td>2382</td>
</tr>
<tr>
<td>2</td>
<td>Non-Weir</td>
<td>30.01</td>
<td>3740</td>
</tr>
<tr>
<td>3</td>
<td>Weir</td>
<td>28.77</td>
<td>1760</td>
</tr>
<tr>
<td>4</td>
<td>Non-Weir</td>
<td>28.31</td>
<td>2674</td>
</tr>
<tr>
<td>5</td>
<td>Weir</td>
<td>29.7</td>
<td>2440</td>
</tr>
<tr>
<td>6</td>
<td>Weir</td>
<td>27.53</td>
<td>2061</td>
</tr>
<tr>
<td>7</td>
<td>Non-Weir</td>
<td>29.23</td>
<td>1467</td>
</tr>
<tr>
<td>8</td>
<td>Weir</td>
<td>29.53</td>
<td>8770</td>
</tr>
</tbody>
</table>

Discussion
The increase in residence time observed in weir ditches allows for increased opportunity of nitrate-N reduction, however, longer sampling duration may have yielded greater overall nutrient reduction percentages.

Implications
Drainage ditches are common features found throughout agricultural landscapes that could provide additional sites for nutrient reduction. Utilizing these sites for nutrient cycling could prove to be beneficial by mitigating the increase use in N-fertilizer as crop production will be expected to meet the demands of a steadily increasing human population.