Lone Star Healthy Streams:

Keeping Texas Waters Safe and Clean

Beef Cattle Production
The goal of Lone Star Health Streams is to reduce the levels of bacterial contamination of Texas watersheds from livestock by:

- Developing an educational curriculum,
- Evaluating and demonstrating best management practice (BMP) effectiveness,
- Testing the functionality of the education program and,
- Promoting statewide adoption of appropriate BMPs.

Project is funded by EPA and TSSWCB through 319 funds.
LSHS Advisory Committee

- Grazing Lands Conservation Initiative (GLCI)
- Independent Cattlemen’s Association
- Little Wichita Soil and Water Conservation District
- Natural Resources Conservation Services (NRCS)
- Texas AgriLife Extension Service
- Texas AgriLife Research
- Texas Cattle Feeders
- Texas Commission on Environmental Quality
- Texas Department of Agriculture
- Texas Department of Agriculture
- Texas Farm Bureau
- Texas and Southwestern Cattle Raisers Association
- Texas State Soil and Water Conservation Board
- Texas State Soil and Water Conservation Districts
- Texas Water Resources Institute
- USDA-ARS
- Victoria Soil and Water Conservation District
- Welder Wildlife Foundation
Purpose of this Presentation

To make you aware of a water quality issue affecting beef cattle producers statewide…
Background on the Issue


- States set water quality standards based on State’s choice of designated use (e.g. drinking water, contact recreation, aquatic life, etc.).

- EPA must approve standards.

- CWA requires States to assess quality of surface water (i.e. whether the water meets state-set water quality standards).
Section 303(d) of the Federal Clean Water Act requires all states to:

- Identify water bodies that do not meet water quality standards and are impaired (i.e. the 303(d) List)
- Develop total maximum daily loads (TMDLs) for impaired water bodies

If State does not, then EPA must
What is a TMDL?

- A TMDL outlines:
  - Pollution reductions needed to restore water quality in “impaired” water bodies
  - Where reductions will come from (in the broadest terms)

- TCEQ Commissioners vote to approve each TMDL
  - TSSWCB Board votes to approve TMDLs with significant agricultural and silvicultural issues.

- TMDLs must also be approved by EPA
Example: Bosque TMDL

Pollution reductions needed
- 50% reduction in phosphorus

Parties responsible for reductions
- Sewage treatment plants
- Dairies
  - Comprehensive nutrient management plans
  - Permitted dairies must remove 50% of the manure

NOTE: Most Ag measures are voluntary, but there have been instances of regulation; be proactive…
WATER QUALITY IMPAIRMENTS IN TEXAS

Bacteria impairment

Dissolved oxygen impairment

Toxicity impairment

pH impairment

Dissolved solids impairment

Nitrate and nitrite impairment
Bacteria: Number One Water Quality Contaminant in Texas

Sources of bacteria
Managing Bacteria

• *Escherichia coli* (*E. coli*) is the leading cause of food borne illness.
  – There have, however, been a few documented cases of water-borne illnesses in Texas.

• *E. coli* is an indicator organism of other pathogens.
  – Enterrococcus
  – Giardia

• Because *E. coli* lives in the intestines of healthy cattle, preventive measures on cattle ranches are being investigated.
Livestock *ARE* part of the problem...
LSHS: BMPs to Reduce Fecal Contamination by Grazing Cattle
Two Classifications of BMPs

1) Riparian Protection
   - Designed to protect environmentally sensitive stream side areas

2) Vegetation Management
   - Maintenance of adequate ground cover
     • Involves use of appropriate stocking rate
     • Reduces overland water flow
     • Reduces sediment production (soil erosion)
     • Reduces bacteria and nutrient transport
Riparian Protection BMPs

- **Full Exclusion**
  - Fence entire stream out
  - Use of rip-rap
  - Filter strips
  - Prescribed Grazing

- **Exclusion – Limited Access**
  - Hardened single-point stream watering points
  - Hardened stream crossings

- **No Exclusion – Full Access**
  - Development of alternative water source
  - Shade
  - Mineral and/or salt locations
Full Exclusion

• Current recommendation.
• Eliminates cattle access to streams.
• Permanent fences are expensive to construct & maintain.
  – Cost-share from NRCS
• Not feasible to fence-off entire stream in many cases.
• Electric fencing may provide a lower-cost alternative.
## Exclusionary Fencing

<table>
<thead>
<tr>
<th>Fecal Coliform Reduction</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>30%</td>
<td>Brenner et al. 1994</td>
</tr>
<tr>
<td>41%</td>
<td>Brenner 1996</td>
</tr>
<tr>
<td>66%</td>
<td>Line 2003</td>
</tr>
</tbody>
</table>
As an additional benefit, filter strips develop into excellent wildlife habitat...
Use of Filter Strips

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Note denuded stream banks, sand depositions in creek, and algal bloom.

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Note the effectiveness of a vegetative filter strip in trapping sediment that would have wound up in the creek or reservoir. Nutrients, pesticides and bacteria were also trapped.
Filter Strip Effectiveness in Reducing Fecal Coliform Levels

Figure 3. Effectiveness of filter strips in reducing fecal coliform levels under varying conditions

<table>
<thead>
<tr>
<th>Fecal Coliform Reduction</th>
<th>Slope</th>
<th>Buffer Length</th>
<th>Runoff Source</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>94.8% – 99.9%</td>
<td>5% - 35%</td>
<td>.1 – 2.1m</td>
<td>Grazing cattle</td>
<td>Tate et al. 2006</td>
</tr>
<tr>
<td>43% - 74%</td>
<td>9%</td>
<td>9m</td>
<td>Poultry litter on no-till cropland</td>
<td>Coyne et al. 1995</td>
</tr>
<tr>
<td>64% - 87%</td>
<td>4%</td>
<td>9m</td>
<td>Manure</td>
<td>Fajardo et al. 2001</td>
</tr>
<tr>
<td>&gt;99%</td>
<td>4%</td>
<td>1 - 25m</td>
<td>Manure on pastureland</td>
<td>Sullivan et al. 2007</td>
</tr>
</tbody>
</table>

But, can I still use my protected riparian pastures?
## Filter Strip Specifications

Minimum width for vegetative filter strips.


<table>
<thead>
<tr>
<th>Slope</th>
<th>Minimum width of buffer strip</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3%</td>
<td>25 ft</td>
</tr>
<tr>
<td>4-7%</td>
<td>35 ft</td>
</tr>
<tr>
<td>8-10%</td>
<td>50 ft</td>
</tr>
</tbody>
</table>
Prescribed Grazing:

- Is the controlled harvest of vegetation by grazing animals
- Is used to maintain a stable and desired plant community
- Improves or maintains health and vigor of selected plants
- Provides water quality benefits
- Reduce soil erosion.
- You **can graze** the protected riparian pastures, but under carefully controlled conditions.
Use of Rip-Rap Instead of Fencing

- Cattle will not travel over large rocks.
- Can we use of large rocks to modify cattle travel patterns?
- Depending on the amount used, there may be a reduced cost compared to fencing.
  - Reduced maintenance
Exclusion with Limited Access
In-Stream Watering Points

- Firm footing, single-point water locations along streams designed for 1 – 2 animals reduces time spent loafing in stream.
- Moderate cost associated with building & installation.
- Can be used for streams or ponds.
Gravel alley with geotextile fabric or concrete. Alley width = 4'. Do not extend alley more than 2.5' into pond. Source: NC State University
Think about alternative water delivery from ponds...
Hardened Stream Crossings

- Establish hardened stream crossings using geotextile and gravel.
  - Reduces bacteria levels in streams.
  - Facilitates cattle movement.
  - Reduces loafing time in stream.
  - Reduces stream turbidity and sediment loading.
- Moderate cost associated with building and maintaining.
Geotextiles provide base support.

Panels are often used.

Fine layer of top gravel encourages cattle to readily travel across.

In some cases, a bridge over the creek may be preferred; here is a novel use of an old stock trailer.
No Exclusion, Full Access

- With full access, cattle will destroy creek banks and defecate directly into streams.
- Careful management is required when full access is allowed.
- Consider rotational stocking with limited access to riparian pastures.
Alternative Water Source

- Encourages livestock to obtain water away from the stream.
- Easy to implement
- NRCS cost-share programs reduce costs.
- Consider solar-powered wells.
Without an alternative water source, this producer is out of business...
## Alternative Water Source

<table>
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<th>Fecal Coliform Reduction</th>
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<tbody>
<tr>
<td>57 – 95%</td>
<td>Byers et al. 2005</td>
</tr>
<tr>
<td>51%</td>
<td>Sheffield 1997</td>
</tr>
<tr>
<td>Reduced time in riparian area 48 – 53%</td>
<td>Wagner et al. 2009</td>
</tr>
<tr>
<td></td>
<td>(unpublished Texas data)</td>
</tr>
</tbody>
</table>
Shade Structures

- Can be permanent or portable…
- May improve nutrient distribution & recycling in the pasture.
- Improves weight gain of cows and calves.
Shade Structures

- Coupled with alternative water & salt/mineral locations, encourages cattle to spend less time in riparian areas.

- Moderate cost associated with building and maintaining.
- Easy to implement following construction.
Salt, Mineral, & Feeder Locations

When used in conjunction with alternative water sources or shade, this BMP encourages cattle to spend less time in riparian areas.

- Inexpensive
- Easy to implement
Summary of Riparian Protection

- Riparian areas are environmentally sensitive areas that deserve protection.
- Full exclusion offers the highest level of riparian protection.
- Where full exclusion is not practical, alternative BMPs provide enhanced protection of riparian areas.
Vegetation Management BMPs

• Vegetation Management BMPs are designed to:
  – Reduce soil erosion
  – Improve forage production
  – Enhance water conservation

• Vegetation Management BMPs also:
  – Improve animal performance
  – Enhance long-term sustainability of beef cattle production systems
Grazing Management

- Maintaining adequate ground cover is essential for watershed protection and optimum beef cattle performance.
- The correct stocking rate is the most critical component of grazing management.
- Consider the total amount of grazeable acres...
- Is drought management a part of the grazing management strategy?
- What grazing system is appropriate?

- Additional Grazing Management module available through LSHS.
Sources of Cost-Share Funds

• Environmental Quality Incentive Program (EQIP)
  – Cost-share programs for cross-fencing, water development, erosion control, etc.
  – Select EQIP 09 Standard Rate (XLS; 82 KB)

• 319
  – Clean Water Act money from EPA passed through to TSSWCB

• Water Quality Management Plans (WQMPs)
  – Affords producer protection from regulation.
Conclusion

• Bacteria in Texas waterways is a concern for everyone.
• BMPs can reduce the bacterial contamination.
  – Full exclusion offers the highest level of protection for Texas waterways.
    • Exclusionary fencing
• Where full exclusion is not practical, alternative BMPs provide enhanced protection of riparian areas.
  – Alternative water sources
  – Shade
  – Hardened crossings
  – In-stream watering points
  – Others
For More Information Contact:

- Texas State Soil & Water Conservation Board
- Your local NRCS office
- Your local Soil & Water Conservation District office
- Your local County Extension office
"A thing is right if it tends to preserve the stability, integrity, and beauty of the biotic community. It is wrong if it tends otherwise."

Aldo Leopold, 1966.