Geronimo and Alligator Creeks

Water Quality Conditions and Concerns
Presentation Overview

• Description of Geronimo and Alligator Creeks Watershed
Presentation Overview

• Description of Geronimo and Alligator Creeks Watersheds

• TCEQ Water Quality Standards and Stream Assessment for Geronimo Creek
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• GBRA Historical Monitoring of Geronimo Creek
Presentation Overview

- Description of Geronimo and Alligator Creeks Watershed
- TCEQ Water Quality Standards and Stream Assessment for Geronimo Creek
- GBRA Historical Monitoring of Geronimo Creek
- Geronimo Creek Monitoring Program
Watershed:
44,152 acres (69 square miles)

Begins in Comal County near New Braunfels

Confluences with Guadalupe River near Seguin in Guadalupe County
Watershed:
Upper Alligator Creek – 
New Braunfels’ Extra-Territorial Jurisdiction (ETJ)
Watershed: Upper Alligator Creek - New Braunfels ETJ

Lower Geronimo Creek - Seguin ETJ
Vegetation Cover:

45.5% cropland

31.6% rangeland

9.8% forest

11.5% developed land
Climate:
Average rainfall - 29 in/yr
Average temp
- Jan 35°
- July 95°
Water Quality Standards for Streams in Texas

WQ Standard is made up of two parts:
- Designated uses
- Criteria to meet those uses

Based on flow
Designated Uses

Contact Recreation
Designated Uses

Contact Recreation

Aquatic Life Use
Designated Uses

Contact Recreation

Aquatic Life Use

Domestic Water Supply
Flow in Alligator and Geronimo Creeks

- **Alligator Creek**
  - Intermittent with and without perennial pools
  - “Limited” aquatic life
    - Protected by 3.0 mg/L Dissolved Oxygen

At Barbarossa Road

At Huber Road, just upstream of confluence
Flow in Alligator and Geronimo Creeks

- **Geronimo Creek**
  - Perennial stream
  - “High” aquatic life use

5.0 mg/L
Dissolved Oxygen
Numeric Stream Standards

For Contact Recreation:

E. coli

- 126 organisms/100mL (geometric mean)
- 394 organisms/100mL (single grab sample)
Numeric Stream Standards

For High Aquatic Life Use - Geronimo Creek
- 5.0 mg/L Dissolved Oxygen
- 6.5 - 9.0 pH
- 90°F (32.2°C)
TC EQ Stream Assessments

All streams in Texas assessed every two years:

305b Water Quality Inventory and 303d List

Use previous seven years of data

Look for number of exceedences of stream standard

Sources of data include Clean Rivers Program, TC EQ Regional Staff, Surface Water Quality Monitoring Team
Geronimo Creek
Aquatic Life and General Uses Met
Standards Not Met...

• Geronimo Creek - Listed on 303d list

Contact Recreation Use

Elevated E. coli -
162 organisms/ 100 mL
Concern.....

- Geronimo Creek - Nutrient Enrichment -
  Nitrate Nitrogen

  60 samples exceeded screening concentration of 1.95 mg/L

  Human and Animal Health Concern

  Drinking water standard - 10 mg/L
GBRA Monitoring Program
GBRA Monitoring Program
Geronimo Creek at SH 123

- Monitoring since late 1996; moved in 2003

- Monthly - Conventional, Flow, Nutrients, Bacteria

- Location of Rain Gage
Geronimo Creek at SH 123
# Geronimo Creek at SH 123

**(October 1996 - September 2003)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissolved Oxygen, mg/L (5.0mg/L)</td>
<td>9.15</td>
<td>6.0 – 12.5</td>
</tr>
<tr>
<td>Specific Conductance, umhos/cm</td>
<td>919</td>
<td>755 - 1013</td>
</tr>
<tr>
<td>Temperature, °C (32.2°C)</td>
<td>21.5</td>
<td>15.6 – 26.4</td>
</tr>
<tr>
<td>Total Suspended Solids, mg/L</td>
<td>14.8</td>
<td>5.3 – 40.4</td>
</tr>
<tr>
<td>Turbidity, NTU</td>
<td>6.2</td>
<td>3 - 76</td>
</tr>
<tr>
<td>Chloride, mg/L (100 mg/L)</td>
<td>61.1</td>
<td>38.4 – 93.4</td>
</tr>
<tr>
<td>Sulfate, mg/L (50 mg/L)</td>
<td>56.9</td>
<td>11.6 - 235</td>
</tr>
<tr>
<td>Hardness, mg/L</td>
<td>318</td>
<td>175 - 430</td>
</tr>
<tr>
<td>Chlorophyll a, ug/L (14.1 ug/L)</td>
<td>&lt;1</td>
<td>&lt;1 – 13.4</td>
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## Geronimo Creek at SH 123


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<td>Flow, cfs</td>
<td>4.93</td>
<td>1.1 – 19</td>
<td></td>
</tr>
<tr>
<td>Nitrate Nitrogen, mg/L</td>
<td>9.99</td>
<td>5.2 - 18.2</td>
<td>1.95 / 10.0</td>
</tr>
<tr>
<td>E. coli, org/100 mL</td>
<td>144*</td>
<td>4 - 1497</td>
<td>126*</td>
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* Geometric mean

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2006 303d list – 162 org/100 mL
### Geronimo Creek at SH 123


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2006 303d list – 162 org/100 mL
Geronimo Creek at Haberle Road

- Replaced SH123 site
- 5 miles downstream
- Monitoring since 2003
- Monthly - Conventional, Flow, Nutrients, Bacteria
- Annual - Biological Assessments
- Ecoregion Reference Site
Geronimo Creek at Haberle Road
### Geronimo Creek at Haberle Road

**(October 2003 - September 2007)**

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<td>9.21</td>
<td>6.9 - 13</td>
</tr>
<tr>
<td>Specific Conductance, umhos/cm</td>
<td>875</td>
<td>485 - 982</td>
</tr>
<tr>
<td>Temperature, °C (32.2oC)</td>
<td>22.9</td>
<td>11.9 - 27</td>
</tr>
<tr>
<td>Total Suspended Solids, mg/L</td>
<td>7</td>
<td>1 - 60.7</td>
</tr>
<tr>
<td>Turbidity, NTU</td>
<td>6.2</td>
<td>3 - 76</td>
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<tr>
<td>Chloride, mg/L (100 mg/L)</td>
<td>40.4</td>
<td>20.6 - 80</td>
</tr>
<tr>
<td>Sulfate, mg/L (50 mg/L)</td>
<td>64</td>
<td>32.5 - 85</td>
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<tr>
<td>Hardness, mg/L</td>
<td>310</td>
<td>184 - 334</td>
</tr>
<tr>
<td>Chlorophyll a, ug/L (14.1 ug/L)</td>
<td>&lt;1</td>
<td>&lt;1 - 5</td>
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Geronimo Creek at Haberle Road

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*Geometric mean
Comparison of two GBRA sites
(GBRA data only – entire historical data set)

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<td>156*</td>
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2006 303d list – 162 org/100 mL
TCEQ Historical Site

- Monitoring 1990-91
- Very little data collected
- Some biological data

Geronimo Creek at FM 20
Timing is everything!

• Stream listed on 303d - E.coli (2006)
Timing is everything!

- Stream listed on 303d - E.coli (2006)
- Concern for Nitrates (2002)
Timing is everything!

- Stream listed on 303d - E.coli (2006)
- Concern for Nitrates (2002)
- Guadalupe County Flood Mitigation Study
Timing is everything!

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- City of Seguin Long Range Planning Efforts
Timing is everything!

- Stream listed on 303d - E.coli (2006)
- Concern for Nitrates (2002)
- Guadalupe County Flood Mitigation Study
- City of Seguin Long Range Planning Efforts
- Growth in Alligator Creek - need for wastewater treatment
Geronimo Creek Project Monitoring Component

• **May 2009 - April 2010**

• Routine monitoring at 7 sites/monthly

• Targeted monitoring at 15 sites quarterly (wet conditions/dry conditions)

• Heavy metals – 3 routine sites and one groundwater/annual

• Three groundwater site/quarterly

• One wastewater site/quarterly
Geronimo Creek Project
Monitoring Component

- May 2009 – April 2010
- **Routine monitoring at 7 sites/ monthly**
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- Three groundwater site/quarterly
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Geronimo Creek Project Monitoring Component

• **Parameters:**
  - **Field parameters** – pH, Dissolved Oxygen, Temperature, Specific Conductance
  - **Conventional parameters** – TSS, Turbidity, Sulfate, Chloride, Chlorophyll a, Ammonia-Nitrogen, Nitrate-Nitrogen, Hardness, Total Phosphorus
  - **Flow**
  - **E. coli**
  - **Effluent Parameters** - BOD, CBOD, COD
  - **Heavy Metals** – Al, As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Zn
Geronimo Creek Project Monitoring Component

- Collected under an approved Quality Assurance Project Plan
- Hampered by extreme drought
- Will post data on website
- Will submit data to TCEQ to be used in future assessments