Presented by
Alec Stilwell and Sierra Kintigh
Bellaire High School
Zach Pederson
Elk Rapids High School
Elements of the Sampler

1. Macroinvertebrate Assessment of Shanty, Cold, and Finch Creeks
2. Stormwater Flow Assessment of Shanty Creek
3. Aquatic Plant Survey of Lakes Bellaire, Clam, and Torch
4. Fish Population Survey in Shanty Creek
5. Clam River Plume Assessment
6. Observations of Fish Shelter Project
7. Public Awareness and Education
Macroinvertebrate Study

- Small Aquatic Organisms (e.g. insect larvae)
- Indicators Of Water Quality
- Vary In Tolerance To Water Conditions
- Studies Resulted In Numerical Ratings
- Reveals Water Quality Trends
### Stream Quality Scores from Macroinvertebrate Counts

<table>
<thead>
<tr>
<th></th>
<th>Shanty Creek</th>
<th>Cold Creek</th>
<th>Finch Creek</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spring 2012</strong></td>
<td>Fair 25</td>
<td>Fair 28.3</td>
<td>Poor 12.2</td>
</tr>
<tr>
<td><strong>Fall 2011</strong></td>
<td>Fair 20.3</td>
<td>Poor 13.2</td>
<td>Fair 24</td>
</tr>
<tr>
<td><strong>Spring 2011</strong></td>
<td>Fair 22</td>
<td>Good 30</td>
<td>Fair 20</td>
</tr>
</tbody>
</table>

* 0-18 Poor 19-33 Fair 34-48 Good MiCorps Scoring Scale
STORMWATER ASSESSMENT OF SHANTY CREEK

• Document Shanty Creek Flow During Storm Events
• Compare Stormwater Flow, Shanty Creek and Cold Creek
Stormwater Assessment

- Development is affecting erosion and sedimentation accumulation build up in Grass River
- Development
  - Housing and Condos
  - Golf Courses
  - Ski Slopes
  - Impervious Surfaces

Conclusion:
Ratio between normal flow and a storm event:
Shanty Creek 2.7x  Cold Creek 1.9x.
Excess stormwater is contributing to greater erosion.
AQUATIC PLANT SURVEY OF BELLAIRE, CLAM, AND TORCH LAKES

Goal: locate colonies of Eurasian water milfoil (EWM)
  • Prescreen aerial photos for aquatic plant beds
  • Revisit previous known sites w/ EWM

Method: Visit sites and use rake method, identify and map.
Aquatic Plants

Findings:
12 species Lake Bellaire
11 species in Clam Lake
9 species in Torch Lake

Eurasian (invasive) water-milfoil found at Butch’s Marina (Clam), Alden Harbor (Torch) and between Stony and Lone Tree Points (Torch).
Electrofishing

- Goal: to collect fish data up and downstream from a small dam
- Three locations on Shanty Creek electrofished July 2012
Electrofishing

- Four species found:
  - brook trout
  - rainbow trout
  - brown trout
  - mottled sculpin

- Data indicates small dam may be acting as a barrier to fish movement
Clam River Plume Assessment

• Characterizing the greenish brown color of Clam River

• Water Quality Parameters:

<table>
<thead>
<tr>
<th>Chlorophyll A</th>
<th>Dry Weight Phytoplankton</th>
<th>Dissolved Organic Carbon</th>
<th>Total Phosphorus</th>
<th>Nitrogen</th>
</tr>
</thead>
</table>


Clam River Plume

- Study led to a better understanding of the organic matter and algae that compose the plume.
Fish Shelters

- MDEQ permitted 82 sites
- 19 sites installed so far
- Three shelters per site
Fish Shelters

Deployed In Five Lakes:
1. Elk - Six
2. Torch - Three
3. Clam - Three
4. Intermediate - Four
5. Bellaire - Three
Public Awareness

• Antrim County Fair
• “Got Fish?”
  Alden Depot 6/19
• “AC Underground”
  Alden Depot 8/14
• Facebook
• Newspaper
• Website
• E-letters
Conclusions

- Fish Shelters are working
- Aquatic Plants have been mapped within the 3 lakes
- Shocking – fish would get bigger if dam removed
- Macroinvertebrae – Continue monitoring
- Plume – many things contribute
- Stormwater Flow – development contributes to erosion and sedimentation with opportunities for improvements
- Public Education is paramount. Multi media is necessary to reach all generations
Thinking of our Future
Acknowledgements

- Heather Hettinger
- Becky Norris
- Fred Sittel
- Dean Branson
- Doug Morse
- Tina Norris
- Trish Narwold
- Beth Dole
- Art Hoadley
- Gary Bockerman
- Cheryl Fields
- Sue Reck

- Dennis Fitzpatrick
- Jim Argo
- Leah Varga
- Leslie Meyers
- Lorna Harrell
- Tom Edens
- Kevin O’Mera
- Larry Schwab
- Gordy Shafer
- Jack Norris
- Arlene Westhoven
- Sue Sittel