Pack River Stressor Identification Process

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Stressor Identification Process

- A formal and rigorous process to identify stressors causing biological impairments in aquatic ecosystems and
- a structure for organizing the scientific evidence supporting the conclusions
# Streams Needing Pollutant Determination in the Pack River Drainage

<table>
<thead>
<tr>
<th>Water Body Name</th>
<th>Assessment Unit No.</th>
<th>Impairment Boundaries</th>
<th>Pollutant of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid Lightning Creek</td>
<td>ID17010214PN033_03</td>
<td>Rapid Lightning Creek – Trapper Creek to Pack River. Third order portion of Rapid Lightning Creek.</td>
<td>Cause Unknowna</td>
</tr>
<tr>
<td>Gold Creek</td>
<td>ID17010214PN034_02</td>
<td>Gold Creek – Source to Pack River. First and second order portions of Gold Creek.</td>
<td>Cause Unknowna</td>
</tr>
<tr>
<td>Upper Pack River</td>
<td>ID17010214PN041_02</td>
<td>Upper Pack River – source to Lindsey Creek. First and second order portions of Pack River, West Branch Pack River, Zuni Creek, Martin Creek, Homestead Creek and Lindsey Creek, Pearson Creek, Youngs Creek, Thor Creek, Beehive Creek, Slide Creek.</td>
<td>Cause Unknowna</td>
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<tr>
<td>McCormick Creek</td>
<td>ID17010214PN042_02</td>
<td>McCormick Creek – Source to Pack River. First and second order portions of McCormick Creek.</td>
<td>Cause Unknowna</td>
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<tr>
<td>Hellroaring Creek</td>
<td>ID17010214PN044_02</td>
<td>Hellroaring Creek – source to Pack River. First and second order portions of Hellroaring Creek</td>
<td>Cause Unknowna</td>
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<tr>
<td>Sand Creek</td>
<td>ID17010214PN049_02</td>
<td>First and Second order portions, source to Schweitzer Creek</td>
<td>Cause Unknowna</td>
</tr>
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<td></td>
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<td>Sand Creek – Source to Schweitzer Creek. Third order portion of Sand Creek.</td>
<td>Cause Unknowna</td>
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Data Used in the SI Process

- BURP data
  - Fish and Macroinvertebrates
  - Habitat Information

- Cumulative Watershed Assessment Reports

- Nutrient Data

- GIS coverages

- Channel Survey data

- TMDLs, FS reports, personal communication
**Sources**

- Channelization
- Timber Harvest
- Forest Roads
- Natural Landslides
- Mining
- Agricultural practices
- Rural Development

**Stressors**

- Altered Stream Morphology, Decreased sinuosity,
- Increased Sediment Delivery, Increased fines
- Naturally low Nutrient Concentration
- Increased flood frequency and maximum stream flows, lower base flows
- Increased Metal Concentrations
- Increased Nutrients
- Reduction in Riparian cover, shift in riparian plant species, lower quality shade

**Effects**

- Shift in the Fish or Benthic Community Structure
  - 1. Sampling or Assessment Error
  - 2. Increased Sediment Delivery, Increased fines
  - 3. Increased flood frequency and maximum stream flows, lower base flows
  - 4. Increased Metal Concentrations
  - 5. Increased Nutrients
  - 6. Reduction in Riparian cover, shift in riparian plant species, lower quality shade
  - 7. Naturally low Nutrient Concentration

Findings
McCormick Creek

- Increased nutrients and high metal concentrations were eliminated as potential stressors based on available information from investigation of current and historic land use practices. It was determined that the most likely causes for the poor macroinvertebrate and fish scores were low nutrients and sampling/assessment problems.

- We do not recommend the development of a Total Maximum Daily Load (TMDL) at this time.
McCormick Creek cont.
Increased nutrients and high metal concentrations were eliminated as potential stressors based on available information from investigation of current and historic land use practices. We determined that the likely stressor was excessive sediment.

We recommend the development of a sediment Total Maximum Daily Load (TMDL) for the lower portion of the Upper Pack River watershed.
Upper Pack River (2nd order section) cont.
Increased nutrients and high metal concentrations were eliminated as potential stressors based on available information from investigation of current and historic land use practices. We concluded that the likely causes of impairment are from increased sediment delivery, low nutrients and, to a lesser extent, stream temperature. We recommend that a sediment Total Maximum Daily Load (TMDL) be developed for the Hellroaring Creek Watershed.
Hellroaring Creek cont.
Gold Creek

- High metal concentrations was eliminated as a potential stressor based on available information from investigation of current and historic land use practices. We concluded that the likely causes of impairment are high percent fines and thermal modification.

- We recommend that sediment and temperature Total Maximum Daily Loads (TMDLs) be developed for the watershed and that monitoring for determination of the nutrient status be undertaken to determine existing nutrient loading to the system.
Rapid Lightning Creek

- Increased nutrients and low nutrient levels were eliminated as potential stressors based on available information from investigation of current and historic land use practices. We determined that the likely stressor was excessive coarse to fine grained sediment within the stream channel but that sufficient data do not exist to recommend a Total Maximum Daily Load (TMDL).
- We recommend that the watershed be modeled to determine if the amount of sediment being delivered to the system is significantly higher than background.
- We also recommend the collection of instream metal data from both Flume and Rapid Lightning Creeks to determine if metal loadings are an issue. Thermal modification is also likely to be stressing the aquatic community and additional information should be collected to confirm this supposition.
Rapid Lightning Creek cont.
Low nutrients was eliminated as a potential stressor based on available information from investigation of current and historic land use practices. The remaining six potential causal agents were evaluated. We determined that high percent fines was a likely stressor but we were unable to determine if this was a natural condition or human induced.

We recommend that the watershed be modeled to allow comparison of natural load to current load.

We recommend the collection of additional temperature and nutrient data. These two candidate causes could be contributing factors, but sufficient data do not exist to determine this with any degree of certainty.
## Summary Table

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<td>Sediment – TMDL recommended if watershed modeling supports it.</td>
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<td>Gold Creek</td>
<td>ID17010214PN034_02</td>
<td>Gold Creek – Source to Pack River. First and second order portions of Gold Creek.</td>
<td>Sediment/Possibly Nutrients and Temperature</td>
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<td>Upper Pack River – source to Lindsey Creek. First and second order portions of Pack River, West Branch Pack River, Zuni Creek, Martin Creek, Homestead Creek and Lindsey Creek, Pearson Creek, Youngs Creek, Thor Creek, Beehive Creek, Slide Creek.</td>
<td>Sediment – Portions impacted by Sundance Fire and subsequent salvage operations.</td>
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<td>McCormick Creek</td>
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<td>McCormick Creek – Source to Pack River. First and second order portions of McCormick Creek.</td>
<td>Low Nutrients – No TMDL</td>
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<td>Sediment – TMDL recommended if watershed modeling supports it. Sediment loads may be natural.</td>
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