CATEGORY 4C: PROCESSES AND EXAMPLES OF SUCCESSFUL IMPLEMENTATION IN MONTANA
Category 4C
History of 4C

• Generalized beneficial use assessment or Best Professional Judgement to determine impairments

• "Windshield Surveys"

• This led to a considerable amount of historical or legacy listings that could be “viewed” from the ‘80s and early ‘90s

• Listings were welcomed as a tool for 319 grant eligible cleanup
Late ‘90s Changes

• Legislation changed the way MT completes assessments
• Language added to the Montana Water Quality Act requiring sufficient credible data and the development of database and Assessment Methods
• Pollutants vs. Pollution
  • MT DEQ's monitoring program focused on pollutants due to TMDL litigation during 2000’s
  • Most historic 4C listings seemed to continue to generally hold true and were carried forward
  • Addressed 4C within TMDL planning by addressing pollution with pollutant TMDLs
Current Status

• Sediment/Habitat are linked in current Assessment Method
  • Habitat listing route in the Sediment AM
• A new, more robust Habitat AM in development
  • Instream fish habitat
  • Riparian health
• Case by case for flow alteration and fish passage barrier assessments with just cause for listing/delisting –
• Converting all Algae/Chl. a to cat 5 in 2024 IR – nutrient related
Six attributes are the principal determinants of the physical habitat structure provided by a stream (EPA, 2021):

- Stream size and channel dimensions
- Channel gradient
- Channel substrate size and type
- Habitat complexity and cover
- Vegetation cover and structure in the riparian zone
- Channel-riparian interactions
Exclusive vs. Co-listed Impairments

EPA CALMS Guidance: If States have data and/or information that a water is impaired due to a pollutant, it would need to be reported in Category 5 (with added 4a).

AKA: Don’t only chase pollution if pollutants are also a problem.
MT Stream Stats: Exclusive vs. Co listings

- 4C Only: 1,838 miles
- 4C/5: 7,650 miles
- 5 only: 3,608 miles
- Statewide streams: 59,400 miles
- Stream AUs with use support determination: 20,832 miles

**Table 7. Common Causes and Cause Groups**

<table>
<thead>
<tr>
<th>Cause or Cause Group</th>
<th>Total River Mileage Impaired by Cause</th>
<th>% of River Miles that have been Assessed that are Listed as Impaired by Cause*</th>
<th>% of Perennial Rivers Excluding ORW and Tribal Waters that are Listed as Impaired by Cause*</th>
<th>Total Lake Acreage Impaired by Cause</th>
<th>% of Lake Acres that have been Assessed that are Listed as Impaired by Cause*</th>
<th>% of Named Lakes 5 Acres or Larger Excluding ORW and Tribal Waters that are Listed as Impaired by Cause*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habitat (4C)</td>
<td>10,226</td>
<td>49%</td>
<td>21%</td>
<td>9,446</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Metals</td>
<td>7,524</td>
<td>36%</td>
<td>15%</td>
<td>392,132</td>
<td>78%</td>
<td>66%</td>
</tr>
<tr>
<td>Mercury</td>
<td>1,663</td>
<td>8%</td>
<td>3%</td>
<td>311,192</td>
<td>62%</td>
<td>52%</td>
</tr>
<tr>
<td>Nutrients</td>
<td>7,231</td>
<td>35%</td>
<td>15%</td>
<td>111,479</td>
<td>22%</td>
<td>19%</td>
</tr>
<tr>
<td>PCBs</td>
<td>75</td>
<td>0.36%</td>
<td>0.15%</td>
<td>60,622</td>
<td>12%</td>
<td>10%</td>
</tr>
<tr>
<td>Salinity</td>
<td>2,919</td>
<td>14%</td>
<td>6%</td>
<td>16,191</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Sediment</td>
<td>8,220</td>
<td>40%</td>
<td>17%</td>
<td>10,948</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Temperature</td>
<td>2,717</td>
<td>13%</td>
<td>5%</td>
<td>0</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

*An assessed AU is an AU with at least one use support determination.*
CATEGORY 4C: SUCCESSFUL IMPLEMENTATION IN MONTANA

CATEGORY 4C: PROCESS AND EXAMPLES OF SUCCESSFUL RESTORATION
4C IMPAIRMENTS

- Habitat Alterations:
  Streamside/Littoral Vegetative Cover and Physical Substrate

- Flow Regime Modifications:
  Low Flow and Fish Passage Barriers
4C IMPAIRMENT SOURCES

- **Habitat Alterations:**
  - Streamside/Littoral Vegetative Cover and Physical Substrate
    - Riparian Vegetation Removal
    - Channelization
    - Overwidening

- **Flow Regime Modifications:**
  - Low Flow and Fish Passage Barriers
    - Water withdrawals and diversions
    - Dams (large and small)
    - Stream crossings and culverts
ADDRESSING 4CS IN TMDL DOCUMENTS

- Common associated pollutants
  - Sediment
  - Temperature
  - Nutrients
# Addressing 4Cs in TMDL Documents

## Table 1-1. Water Quality Impairment Causes for the Beaverhead TPA Addressed within this Document

<table>
<thead>
<tr>
<th>Waterbody &amp; Location Description</th>
<th>Waterbody ID</th>
<th>Impairment Cause</th>
<th>Pollutant Category</th>
<th>Impairment Cause Status</th>
<th>Included in IR 2012 Integrated Report*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beaverhead River, Clark Canyon Dam to Grasshopper Creek</td>
<td>MT41B001_010</td>
<td>Low flow alterations</td>
<td>Not Applicable; Non-Pollutant</td>
<td>Partially addressed</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alteration in streamside or littoral vegetative covers</td>
<td>Not Applicable; Non-Pollutant</td>
<td>Addressed via restoration plan (see Sections 6 and 7)</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sedimentation/Siltation</td>
<td>Sediment</td>
<td>Sediment TMDL completed</td>
<td>Yes</td>
</tr>
<tr>
<td>Beaverhead River, Grasshopper Creek to mouth (Jefferson River)</td>
<td>MT41B001_020</td>
<td>Physical substrate habitat alterations</td>
<td>Not Applicable; Non-Pollutant</td>
<td>Addressed by sediment TMDL</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low flow alterations</td>
<td>Not Applicable; Non-Pollutant</td>
<td>Partially addressed</td>
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<td>Addressed by sediment TMDL</td>
<td>Yes</td>
</tr>
</tbody>
</table>
ADDRESSING 4CS IN TMDL DOCUMENTS

- Addressed through TMDL targets (% riparian cover, W/D ratios, etc)

- Addressed in implementation recommendations (native riparian vegetation restoration, management actions, etc)

<p>| Table 5-15. Existing Sediment-Related Data for Blacktail Deer Creek Relative to Targets |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|</p>
<table>
<thead>
<tr>
<th>Reach ID</th>
<th>Assessment Year</th>
<th>Main BMW (Y)</th>
<th>Erosion Factor Type</th>
<th>Pebble Size (mm)</th>
<th>Grid Type</th>
<th>Channel Form</th>
<th>Instream Habitat</th>
<th>Riparian Health</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BUC 03-08</td>
<td>2010</td>
<td>C4/E4</td>
<td>28</td>
<td>20</td>
<td>19</td>
<td>17</td>
<td>8.9</td>
<td>1.6</td>
<td>48</td>
</tr>
<tr>
<td>BUC 03-14</td>
<td>2010</td>
<td>C4/F</td>
<td>22</td>
<td>17</td>
<td>3</td>
<td>17</td>
<td>1.8</td>
<td>1.3</td>
<td>42</td>
</tr>
<tr>
<td>BUC 03-90</td>
<td>2010</td>
<td>C4</td>
<td>22</td>
<td>16</td>
<td>18</td>
<td>22</td>
<td>7.1</td>
<td>1.3</td>
<td>69</td>
</tr>
</tbody>
</table>

Values that do not meet the target are in bold.
ADDRESSING 4CS IN TMDL DOCUMENTS

- Addressed through TMDL targets (% riparian cover, W/D ratios, etc)

- Addressed in implementation recommendations (native riparian vegetation restoration, management actions, etc)
IMPLEMENTATION

Restoration
- Channel morphology and floodplain restoration
- Riparian vegetation restoration
- Dam removal

Management Actions
- Dam operations
- In-stream flow leasing
- Drought management plans
IMPLEMENTING 4C RECOMMENDATIONS FROM TMDL DOCUMENTS

Example: Beaverhead Sediment TMDL
Pollutant Impairment: Sediment
Associated 4Cs: Low flow, streamside vegetative cover, physical substrate
Recommendation: Dam operations
Time flushing flow to move sediment on the Beaverhead River, near Dillon MT

Photo: BWC
In certain years, limited releases in spring have resulted in large depositions of fine sediment in the upper segment of the Beaverhead River.
DAM OPERATIONS

Reservoir releases From Clark Canyon Dam not timed to correlate with tributary sediment discharges into the Beaverhead River.
Flushing flow study and MOU for Clark Canyon Creek and the Beaverhead River
Example: Ninemile Creek
Pollutant impairment: Sediment
Associated 4Cs: Low flow
Recommendation: Restore channel morphology
Increasing floodplain access, water storage, in-stream flows, streamside vegetation, and aquatic habitat in Ninemile Creek, MT
FLOODPLAIN RESTORATION

Heavily impacted by historical placer mining

- Channelized
- Disconnected floodplain
- High eroding banks
- High peak runoff
FLOODPLAIN RESTORATION

Restoration
- Remove tailings piles
- Restore stream geometry
- Restore riparian habitat
- Create wetland habitat

Phases
- 5 complete
- 6th in progress
- Spaced out to minimize disturbance in watershed
- Highly specialized crew needed
FLOODPLAIN RESTORATION

Results

- Increased early season water storage
- Decreased peak discharge
- Increase in late-season base flow
- Increase in wildlife and streamside habitat returning (beaver dams, etc)
- Reduced sediment load by 860 tons/year

Collaboration

- 319 money
- FEMA PDM Grant
- Other state agencies
- Wide range of issues addressed in one project
Flow on Rattlesnake Creek

The historical drinking water supply for the city of Missoula came from the Rattlesnake Dam. The dam was considered inoperable after Giardia was discovered in the reservoir and the city switched to a groundwater aquifer. The dam was the source of the aquatic life impairment due to flow regime modifications.

**Restoration**

- Remove all infrastructure
- Restore approximately 1,200 feet of stream channel
- Add in natural floodplain features and wetlands

**Results**

- Increase floodplain function and water storage
- Mitigate flooding hazard
- Reconnect 26 miles of stream
- Add recreational opportunities
- Will move out of Category 4C
Sed/Hab and Fish Passage in Bitterroot Headwaters

- Forest roads and silviculture activities were identified as the primary source of all impairments
  - Alteration in stream-side or littoral vegetative covers
  - Fish Passage Barriers
  - Sedimentation/Siltation
- Land transfer prompted restoration work
  - Replaced 37 culverts and decommissioned over 60 miles of forest roads
    - Assess if restoration activities have helped meet TMDL/303d sediment, fish passage and fish habitat/riparian habitat goals
    - More wholistic approach than just siltation/spawning
MT views 4c as a useful tool for:

- Provides a communication tool about sources and pathways when linked to pollutants
- Addresses local habitat conditions that affect aquatic life and fish along with pollutant loading during watershed planning and restoration
- Better buy-in and coordination with natural resource managers because of wholistic approach
THANK YOU

CATEGORY 4C: PROCESSES AND EXAMPLES OF SUCCESSFUL IMPLEMENTATION IN MONTANA

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