Land Mollusk Fauna of Montana

Biogeography, Conservation Status, and Prospects
Thanks for the Support

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Land Mollusks of Montana

- Montana: surveys, distribution patterns, conservation status
- Regional context: species richness and conservation status patterns
- Future work and information needs
Focal Habitats for Surveys

Talus

Old Growth Moist/Mesic Forest

Limestone Outcrop

Riparian with Rock Outcrops

Cottonwood/Aspen Stands
Approximately 350 sites surveyed during 2005-2009

Elevation ranged from 1900-8750 feet

East = 46.3 ± 30 min
West = 58.8 ± 26.8 min

Two-sample T-test:
\[ t = 3.76, \ P < 0.001 \]
Site Richness by Region

East: per site range = 1 to 7 species

West: per site range = 1 to 13 species

Wilcoxon Rank Sum Test: P < 0.0001
Site Species Richness and Search Effort

Number of Species

\[ y = 2.1304 \ln(x) \]

\[ R^2 = 0.3 \]
Land Mollusk Fauna of Montana

Two Mollusk Biogeographic Provinces
(about 67 native species: 58 snails, 9 slugs)

1) Washingtonian (west of Continental Divide)

2) Rocky Mountain (east of Continental Divide)
Global (G) Rank Definitions

**G1**: at high risk (= IUCN Red List Critically Endangered or Endangered)

**G2**: at risk (= IUCN Vulnerable)

**G3**: potentially at risk (= IUCN Near Threatened)

**G4**: apparently secure (= IUCN Least Concern)

**G5**: common (= IUCN Least Concern)
Montana Native Land Mollusks
One-sample Proportion Test (corrected): distribution of G1 to G3:
Z = 2.91, P = 0.0037
Global Ranks of Montana SOC Land Animals

Montana SOC Land Animals: Global Ranks

Proportion of Species

1 5 9 3 2 1

61 28
**Euconulus fulvus**
Brown Hive (G5)
Elevation range (feet):
2210 - 8255

**Vitrina pellucida**
Western Glass-snail (G5)
Elevation range (feet):
2750 - 8740
Allogona ptychophora
Idaho Forestsnail
(G5)
Elevation range (feet):
2550 - 5735

Prophysaon humile
Smoky Taildropper
(G3)
Elevation range (feet):
2215 - 5635
Land Mollusks Endemic to Montana

Discus brunsoni
Lake Disc (G1)
Elevation range (feet): 3500-3600

Oreohelix alpina
Alpine Mountainsnail (G1)
Elevation range (feet): 7100 - 9400
Land Mollusks Endemic to Montana

*Oreohelix amariradix*
Bitterroot Mountainsnail
(G1G2)
Elevation range (feet):
3450-4590

*Oreohelix carinifera*
Keeled Mountainsnail
(G1)
Elevation range (feet):
4010 - 5630
Land Mollusks Endemic to Montana

Oreohelix elrodi
Carinate Mountainsnail
(G1)
Elevation range (feet):
3500 - 8000
# Distribution of Montana Native Slugs

One Sample Proportion Test (corrected):
\[ Z = 2.00, \ P = 0.046 \]

<table>
<thead>
<tr>
<th>Species</th>
<th>GRank</th>
<th>East</th>
<th>West</th>
</tr>
</thead>
<tbody>
<tr>
<td>Derocerus laeve</td>
<td>5</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Hemphillia camellus</td>
<td>4</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Hemphillia danielsi</td>
<td>2,3</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Kootenaia burkei</td>
<td>2</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Magnipelta mycophaga</td>
<td>3</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Prophysaon andersoni</td>
<td>5</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Prophysaon humile</td>
<td>3</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Udosarx lyrata</td>
<td>2</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Zacoleus idahoensis</td>
<td>3,4</td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>
Montana Survey Highlights

Native Taxa New to Montana

- Hemphillia camelus (G4)
- Kootenaia burkei (G2)
- Prophyseaon andersoni (G5)
- Zoogenetes harpa (G5)

Native Taxa GRank Changes

- Hemphillia camelus: G3G4 to G4
- Hemphillia danielsi: G1G3 to G2G3
- Kootenaia burkei: G1G2 to G2
- Magnipelta mycophaga: G2G3 to G3
- Polygyrella polygyrella: G2G3 to G3
- Prophyseaon humile: G2 to G3
- Radiodiscus abietum: G3 to G4
Regional Context: Primary Checklist Sources


Regional Context: Land Mollusk Faunas

151 total species, 124 native species
only 13 native species present in all geopolitical units
Regional Context:
Native Land Mollusk Species

<table>
<thead>
<tr>
<th>Total Native Species</th>
<th>72</th>
<th>97</th>
<th>97</th>
<th>99</th>
<th>8</th>
</tr>
</thead>
</table>
Regional Context: Global Ranks
(G1 = 22, G2 = 13, G3 = 21)
Data Priorities

**Additional surveys**: fill distribution gaps esp. for G1 – G3s, “island” mountain ranges, non-USFS public lands

**Phylogeographic/genetic studies**: coastal-interior sister taxa (like amphibians), *Oreohelix* complex, “island” mountain range fauna

**Response to environmental alterations**: fire, timber harvest, climate, non-natives