

Appendix II. Gastropods - Multi-species Baseline Initiative

Lucid, M.K., L. Robinson, and S.E. Ehlers. 2016. Multi-species Baseline Initiative project report. 2010-2014. Idaho Department of Fish and Game, Coeur d'Alene, Idaho, USA.

Appendix IIa: Protocols, Datasheets, and Supply Lists

Appendix IIb: Target Species Detection Data

Appendix IIc: Character Key

Appendix IIa: Protocols, Datasheets, and Supply Lists

Terrestrial Survey Protocol: 1st Visit to Site

TRANSECT LOCATION/DIRECTION

- 1) Travel to the assigned waypoint for the grid. If it is impossible to set transect up at site (cliff face, in water) move 50 meters north. If you can't go north go east, south, then west. If you cannot setup the transect 50 meters from assigned point; move 50 meters again as above. Continue until suitable spot is located.
- 2) Find a suitable tree within 40 meters of assigned point for climate logger (>12" diameter, a conifer, not whitebark pine, and in shady location). Place logger on north side of this tree. *If no trees, do not deploy logger.*
- 3) Write cell number in dry erase marker on 'begin' card. Take a picture of the paper. While standing at climate logger tree take three pictures facing 45°, 180°, and 315°, including notecard with bearing (write cell # on card) in photo. Label pictures C, cell #, P, bearing.

CLIMATE DATA LOGGER

- 1) **Record 10 digit serial number of data logger. DO NOT PRESS START button. If no logger is to be placed, still attach plastic cup to tree.**
- 2) Use aluminum nails to attach radiation shield cover to north side of tree about 5 feet off the ground.
- 3) Use 4" zip tie to attach data logger to top of 2 plate shield fairly tight.
- 4) Use three 8" zip ties to suspend the 2 plate shield from cover.
- 5) Photograph the radiation shield. Photo should show the surroundings of the shield. Label photo: C, cell #, P, T.
- 6) Use aluminum nail to place 9oz plastic cup to tree immediately above radiation shield.
- 7) Waypoint station and tie flag around tree above it. Label flag with cell #.

GASTROPOD TRAPS

- 1) Use compass to face 45° and run transect along this bearing.
- 2) The gastropod transect will begin 5 meters from the assigned waypoint (unless moved, then from the new point).
- 3) Use a zip lock bag to soak each trap in 12 oz. of natural ice beer.
- 4) Place traps 10 meters apart, corrugation down.
- 5) Pull leaf litter from floor, place trap directly on soil, put litter back on trap to retain moisture. Do not move litter more than a few inches to place on top of trap.
- 6) Waypoint only the first trap in transect, but flag each set.

BEETLES

- 1) One pitfall between each gastropod trap (3 total), 10 meters from each other/5 meters from gastropod traps).
- 2) Ensure top of pitfall is level with leaf litter surface (not soil surface), place bug strip in each pitfall.
- 3) Hang size 8 funnel trap from tree at end of transect 10meters from last pitfall. Hang about 10 feet high & away from tree trunk. Place bug strip in white collection container of funnel trap. Note species of tree you hang it on. If you don't know the species write unknown. If you know it's a fir, but not what kind of fir, write 'fir'.
- 4) Flag each pitfall and the funnel trap. Waypoint the funnel trap (taxa abbreviation IF) but not the pitfalls.

TIMED SEARCH

- 1) Conduct search within 50 meters of temp logger.

- 2) Spend 15 minutes searching for gastropods. Collect all gastropods in one vial.
- 3) Use pencil and designated paper to create label: 'C, xxx, GTS, Visit #', Date, Observer ex: **C142GTSV1, 15 JUNE 13, JJJ** = cell142, GTS, collected on 15 June 2011 by Jim John Jones on the first visit to the cell.
- 4) Pour water into each vial and allow to stand for at least 1 hour or until samples are dead.
- 5) Pour water off, being careful not to lose specimens, and fill vial with enough 70% Ethanol to cover samples.
- 6) Collect a tissue sample from the first two individuals of each amphibian species you encounter. Clip one digit (digit 3 or 5 is best) from hind foot. Between each sample wipe scissors with bleach. Use alcohol wipe to clean hands before handling amphibian.

INCIDENTAL OBSERVATIONS

- 1) If bumblebees are encountered during survey spend 5 minutes attempting to photograph individuals. If *western* bumble bee is seen spend up to 15 minutes attempting to photograph.
- 2) Watch and listen for other target animals as you conduct the survey. Note as directed on data sheet.

AT END OF SURVEY WRITE THE CELL NUMBER ON 'END' LAMINATED CARD. TAKE A PICTURE. THIS SHOULD BE THE LAST PICTURE YOU TAKE AT THE CELL.

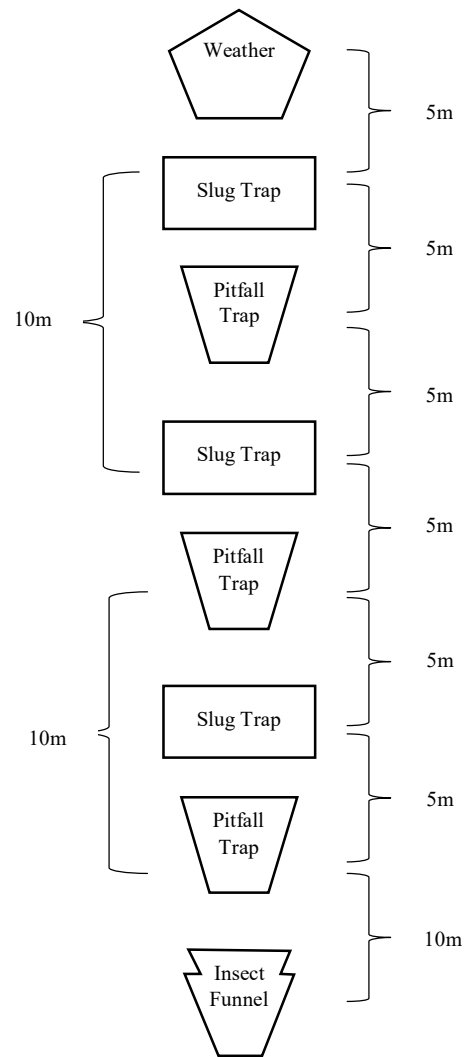


Figure 1: Schematic of Terrestrial Trap Transect

Terrestrial Survey Protocol: 2nd Visit to Site

CLIMATE STATION

- 1) Carefully remove cup from tree. Measure amount of water by pouring through strainer into graduated cylinder.

SLUG TRAP TRANSECT

- 1) Use hand lens to examine each trap. Remove all gastropods from each trap to a single glass vial.
- 2) Each trap gets its own vial. ***There will be up to 3 vials for the entire transect.***
- 3) Label vial twice. Use sharpie to label lid and glass.
Label will be as follows: C, xxx, Gastropod, trap type (M = micro, Na = naty ice a, Nb = naty ice b), Date, observer. Ex: **C142GM, 15 JUNE 13, JJJ** = cell142, Microbrew trap, collected on 15 June 2013 by Jim John Jones
- 4) On data sheet, note if trap is missing/unusable.
- 5) Pour water into each vial and allow to stand until samples are dead (usually about 1 hour).
- 6) Pour water off, being careful not to lose specimens, and fill vial $\frac{3}{4}$ full with 70% Ethanol. Use slip of cotton paper and pencil to create label to be placed inside vial at this time.

PITFALL TRANSECT

- 1) Remove pitfalls from ground, remove bug strip (place in zip lock bag for future use), and pour all samples into strainer. Use tweezers to remove samples from pitfalls if necessary.
- 2) Place samples into a single envelope and name sample as follows:
C, xxx, Pitfall ex: **C142PB** = samples from the pitfalls from cell142
- 3) Complete all envelope blanks. Allow envelopes to dry quickly as possible, keep in rigid container while in field.
- 4) Place any mammals in a vial and label **C142PM**. Preserve in 70% ethanol.
- 5) Place any gastropods in a vial and label **C142PG**. Preserve in 70% ethanol.

FUNNEL TRAP

- 1) Remove white collection chamber from trap and place bug strip in zip lock bag for re-use.
- 2) Place samples into a single envelope and name sample as follows:
 - a. FIA, xxx, Funnel ex: **FIA142IF** = samples collected from the funnel trap in cell 142
- 3) Fill in all blanks on envelope. Make sure to fill out Latitude and Longitude.
- 4) Allow envelopes to dry as quickly as possible and store in rigid container while in field.

LEAF LITTER SAMPLES

- 1) Sample 3 sites in the 5 meters adjacent to each slug trap.
- 2) Use trowel to dig 10cm into the leaf litter and put about 1/3 of a quart of litter into quart Ziploc.
- 3) Do **not** collect soil. If litter is not 10cm use trowel to scrape enough litter together to collect 1/3 quart.
- 4) After sampling 3 sites, you will have a nearly full **QUART** Ziploc bag, label it as follows:
 - a. C, xxx, LL, Date, Observer, ex: **C142LL, 15 June 13, JJJ**
- 5) Write sample name ***directly on bag with sharpie and on piece of paper inside baggie.***
- 6) Keep protected from heat and sun while in field. Place in freezer when you return from the field.

TIMED SEARCH

- 1) Conduct search within 50 meters of temp logger.
- 2) Spend 15 minutes searching for gastropods. Collect all gastropods in vial.
- 3) Use pencil and designated paper to create label: 'C, xxx, GTS, Visit #', Date, Observer ex: **C142GTSV2, 15 JUNE 13, JJJ** = cell142, GTS, collected on 15 June 2013 by Jim John Jones on the second visit to the cell.

- 4) Pour water into each vial and allow to stand for at least 1 hour or until samples are dead.
- 5) Pour water off, being careful not to lose specimens, and fill vial with enough 70% Ethanol to cover samples. Use slip of cotton paper and pencil to create label to be placed inside vial at this time.
- 6) Collect a tissue sample from the first two individuals of each amphibian species you encounter. Wipe hands with alcohol before handling. Clip one digit (digit 3 or 5 is best) from hind foot. Between each sample wipe scissors with cotton (your shirt) then a bleach wipe.

INCIDENTAL OBSERVATIONS

- 1) If bumblebees are encountered during survey spend 5 minutes attempting to photograph individuals. If *western* bumble bee is seen spend up to 15 minutes attempting to photograph.
- 2) Watch and listen for other target animals as you conduct the survey. Note as directed on data sheet.

IF YOU TAKE PHOTOS AT THE SITE BEGIN AND END YOUR SERIES WITH A PHOTO OF A PIECE OF PAPER WITH: C, CELL NUMBER, BEGIN OR END.

Terrestrial Survey Data Sheet: 1st Visit to Site

Cell: _____ Date (e.g. 15 June 2013): _____ Start Time: _____ Observer(s): _____

Weather (circle one): Sunny Mostly Sunny Partly Sunny Overcast Light Rain Heavy Rain Snow

Plot Photo IDs (CxxxP bearing): 45° _____ 180° _____ 315° _____

Directions to Plot:

Weather Station

Type of weather station (circle one): TRIX8 HAXO8 none

Waypoint Name (CxxxT): _____ Weather Station Photo ID (CxxxPT): _____

Lat. _____ Long. _____ (WGS 84, decimal degrees)

Serial Number: _____ **DO NOT PRESS START BUTTON!**

Logger Height (cm): _____ Shade metric (1-4): _____

Slug n Bug Transect

(WGS 84, Decimal Degrees)

Waypoint ID (CxxG), (CxxIF)	Latitude	Longitude
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1st Slug Trap: _____ _____ _____

Size 8 Funnel Trap: _____ _____ _____

Tree Species Funnel Trap Hung on _____

Type of Micro-brew _____

Slug traps placed in following order? Microbrew, Natural Ice, Natural Ice? 1st trap way-pointed?

Pitfalls:

3 pitfalls placed 10 meters apart (in between slug traps)?

15 Minute Timed Search

Sample name (CxxxGTSV1: write none if no sample collected) _____

Snails ____ # Slugs ____

Incidental Observations

Observed - Yes or No - do not take photo

Spotted Knapweed: _____

Tansy: _____ Devil's Club: _____

Whitebark Pine: _____

Observed - record number detected (0 if not detected) - do not take photo

E. Racer: _____ Rubber Boa: _____

W. Skink: _____ N. Alligator Lizard: _____

Red Squirrel: _____ T. Garter Snake: _____

C. Garter Snake: _____ Hoary Marmot: _____

Golden Mantled G.S.: _____

Yellow-bellied Marmot: _____ Pika: _____

Bumblebee Observed? (Y/N) _____

Western Bumblebee Observed? (Y/N) _____

PhotoID: FIA, Cell#, P, letter

Species	Photo ID

Observed - Yes or No

Rare Moonwort: _____

Fill in table for each location species is observed.

PhotoID: FIA, Cell#, P, letter

Species	Latitude	Longitude	Photo ID

Amphibians Detected? Yes or No (circle one)

Tissue Samples

Sample ID: FIA, Cell#, T, Letter

Species	Stage	Sample ID

Terrestrial Survey Data Sheet: 2nd Visit to Site

Cell: _____ Date (e.g. 15 June 2013): _____ Start Time: _____ Observer(s): _____

Weather (circle one): Sunny Mostly Sunny Partly Sunny Overcast Light Rain Heavy Rain Snow

Slug n Bug Transect

	Label*	OK? Y/N	# Slugs	# Snails
Slug A				
Slug B				
Slug C				
Pitfall - Bugs				
Pitfall - Gastropods				
Pitfall -Mammal				
Insect Funnel				
Time Search - Gastropod				
Time Search - Amphibian				
Tissue Sample				

*C, xxx, GM/GNa/GNb/PB/PG/PM/IF/GTSV2/T,letter, Date ex: C142Ta, 15 JUNE 13, JJJ = cell142, Tissue sample, first one, 6/15/2013 by Jim John Jones. Write NONE in label column if no specimens collected.

Leaf Litter

Ziploc Label: _____ (C, xxx, LL, Date, Observer) ex: C142LL, 15 June 13, JJJ

Precipitation: _____

Observed - Yes or No - do not take photo
Spotted Knapweed: _____
Tansy: _____ Devil's Club: _____
Whitebark Pine: _____

Observed - record number detected (0 if not detected) - do not take photo
E. Racer: _____ Rubber Boa: _____
W. Skink: _____
N. Alligator Lizard: _____ Red Squirrel: _____
T. Garter Snake: _____ C. Garter Snake: _____
Hoary Marmot: _____ Golden Mantled G.S. _____
Yellow-bellied Marmot: _____ Pika: _____

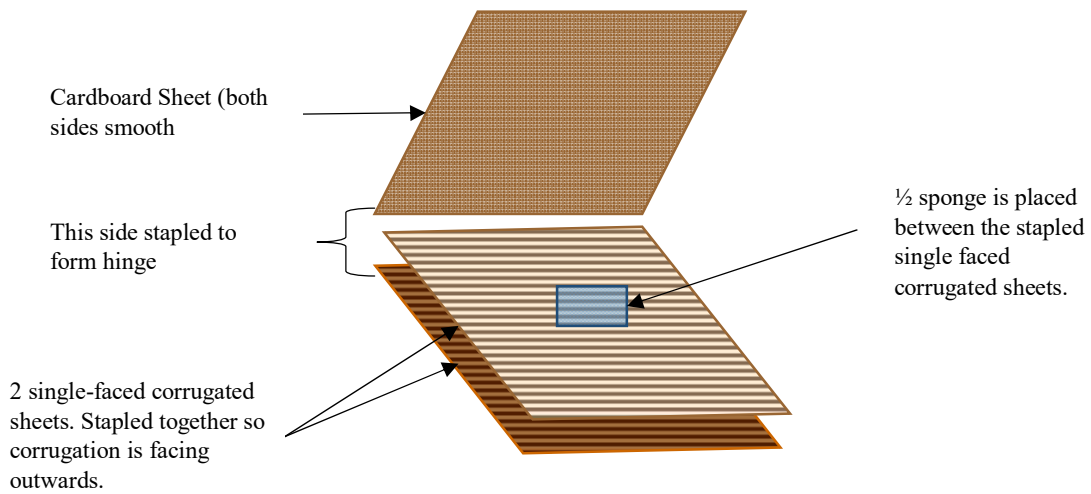
Observed - Yes or No								
Rare Moonwort: _____								
Fill in table for each location species is observed.								
Photo ID: C, xxx, P, letter								
<table border="1"> <thead> <tr> <th>Species</th> <th>Latitude</th> <th>Longitude</th> <th>Photo ID</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Species	Latitude	Longitude	Photo ID				
Species	Latitude	Longitude	Photo ID					

Bumblebee Observed? (Y/N) _____						
Western Bumblebee Observed? (Y/N) _____						
Photo ID: C, xxx, P, letter						
<table border="1"> <thead> <tr> <th>Species</th> <th>Photo ID</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>	Species	Photo ID				
Species	Photo ID					

Terrestrial Survey Supply List

Cardboard Gastropod Traps

Item	Number/ trap	Supplier	Item #	Web Page
12x12 single wall corrugated cardboard	1	Boxforless	Css-1212	http://www.boxforless.com/
12x12 single face corrugated cardboard	2	Papermart	2631212	http://www.papermart.com/HOME
Sponges	½ sponge	Buythecase		Out of Business
2 Gallon zip top bags	1 per site	StockPkg	3675A	https://stockpkg.com/
Beer	1 (12 oz)			
Stapler/staples				



2 Diagram of Gastropod Cardboard Trap

Adapted from: Hawkins, J. W., M. W. Lankester, and R. R. A. Nelson. "Sampling terrestrial gastropods using cardboard sheets." *Malacologia* 39, no. 1-2 (1998): 1-9.

Pitfall Traps

Item	Number/trap	Supplier	Item #	Web Page
9oz plastic cups	1	Buythecase		Went out of business
No Pest Fumigant strip	1/8	Bioquip	1196	https://www.bioquip.com
Trowel	1 per person			

Insect Funnels

Item	Number/site	Supplier	Item #	Web Page
Lindgren Funnel Trap 8 unit	1	Contech, Forestry Distributing		https://www.contech-inc.com/ , http://www.forestrydistributing.com/en/v

Other Supplies for terrestrial surveys

Item	Number/site	Supplier	Item #	Web Page
2 oz. glass vials	6	Carolina Biological Supply		http://www.carolina.com/
Vial Lids	6	Carolina Biological Supply		http://www.carolina.com/
Ethanol Laboratory grade 70%		Carolina Biological Supply	861285	http://www.carolina.com/
Cloth Paper (labels)				

Appendix II-b. Target Terrestrial SGCN Locations by Site. Location precision in meters. 1000 meter precision sites were fuzzed to comply with Memorandum of Agreement with US Forest Service. All detections occurred from 2010-2014. *OMG: Oh My Gastropod incidental detection.

State	Site ID	Latitude	Longitude	Precision	State	Site ID	Latitude	Longitude	Precision
<i>Cryptomastix mullani blandi</i>					Fir Pinwheel (<i>Radiodiscus abietum</i>)				
ID	C1009	48.9239	-116.50269	10	ID	FIA56T	48.3928	-117.002243	1000
WA	C28	48.5769	-117.09885	10	ID	FIA62T	48.6624	-116.997219	1000
Kingston Oregonian (<i>Cryptomastix sanburni</i>)					ID	FIA63T	48.7081	-117.002552	1000
ID	C957T	47.9147	-116.46076	10	ID	FIA66T	48.8465	-116.999516	1000
ID	C994T	47.9737	-116.41179	10	ID	FIA67T	48.8916	-116.996843	1000
ID	C996T	48.0469	-116.44926	10	ID	C67	48.9033	-116.97359	10
ID	FIA1039T	48.9747	-116.387862	1000	ID	FIA75T	48.5310	-116.935999	1000
ID	FIA1082T	47.9872	-116.265985	1000	ID	FIA79T	48.7072	-116.927113	1000
ID	C1083T	47.9086	-116.27842	10	ID	CBIRDD	48.7462	-116.91903	10
ID	FIA1086T	48.2543	-116.262228	1000	ID	C82	48.8675	-116.95735	10
ID	C1130T	47.8885	-116.22249	10	ID	FIA85T	48.9747	-116.942999	1000
ID	C1133T	48.0274	-116.19963	10	ID	FIA102T	48.4447	-116.797587	1000
ID	C1177T	47.8655	-116.16472	10	ID	FIA106T	48.6193	-116.797559	1000
ID	C1179T	47.9884	-116.17278	10	ID	C110	48.8239	-116.82346	10
ID	C1219T	47.7468	-116.09742	10	ID	C113	48.9455	-116.81918	10
ID	C1224T	47.9513	-116.10488	10	ID	C114	48.9833	-116.79994	10
ID	C1226T	48.0783	-116.10866	10	ID	C115	48.3074	-116.71515	10
ID	C1267T	47.8657	-116.02312	10	ID	FIA120T	48.5306	-116.728839	1000
ID	C1268T	47.9290	-115.99995	10	ID	C121	48.5798	-116.74548	10
ID	C1397T	47.4766	-115.78541	10	ID	C124	48.7090	-116.7362	10
ID	C1787T	47.1511	-115.27139	10	ID	C126	48.8008	-116.74927	10
Pale Jumping Slug (<i>Hemphillia camelus</i>)					ID	C128	48.9175	-116.72707	10
ID	C60	48.5688	-116.98012	10	ID	C130	48.9926	-116.70847	10
ID	C68	48.9474	-117.01467	10	ID	C131	48.5157	-116.61585	10
ID	FIA83T	48.8878	-116.93711	1000	ID	C132	48.5577	-116.62994	10
ID	C97	48.9961	-116.83905	10	ID	C134	48.6485	-116.62385	10
ID	C113	48.9455	-116.81918	10	ID	C135	48.6673	-116.62968	10
ID	CBIRDA	48.9585	-116.80732	10	ID	C136	48.7304	-116.63422	10
ID	C114	48.9833	-116.79994	10	ID	FIA137T	48.7830	-116.683394	1000
ID	C128	48.9175	-116.72707	10	ID	C137	48.7682	-116.62206	10
ID	C130	48.9926	-116.70847	10	ID	C138	48.8376	-116.63816	10
ID	C137	48.7682	-116.62206	10	ID	C140	48.9147	-116.64793	10
ID	C138	48.8376	-116.63816	10	ID	C142	48.9660	-116.64256	10
ID	C139	48.8617	-116.63552	10	ID	C144	48.5163	-116.5836	10
ID	FIA140T	48.8868	-116.663248	1000	ID	CBIRDH	48.5292	-116.56847	10
ID	C147	48.6504	-116.55515	10	ID	C146	48.5764	-116.60416	10

ID	C150	48.7780	-116.5812	10	ID	C147	48.6504	-116.55515	10
ID	C151	48.8051	-116.59937	10	ID	FIA148T	48.6634	-116.593183	1000
ID	C154T	48.9663	-116.62474	10	ID	C148	48.6816	-116.57518	10
ID	CBIRDF	48.7925	-116.52968	10	ID	C153	48.9083	-116.59852	10
ID	C164	48.8428	-116.51527	10	ID	C157	48.5712	-116.49681	10
ID	C167	48.6317	-116.46842	10	ID	C158	48.6024	-116.49074	10
ID	C798	47.2795	-116.71259	10	ID	C159	48.6330	-116.4845	10
ID	C833T	47.0849	-116.65096	10	ID	C160	48.6870	-116.54466	10
ID	C1009	48.9239	-116.50269	10	ID	C161	48.7229	-116.535	10
ID	FIA1105T	48.9509	-116.341147	1000	ID	C162	48.7894	-116.54322	10
ID	C1107	48.9911	-116.32935	10	ID	C170	48.7581	-116.46786	10
ID	C1110T	46.9743	-116.18865	10	ID	C171	48.8258	-116.47504	10
ID	FIA1152T	48.9346	-116.25041	1000	ID	C658T	48.2721	-117.01922	10
ID	C1152	48.8509	-116.23873	10	ID	C679T	47.4620	-116.92207	10
ID	C1155	48.9910	-116.23191	10	ID	C687T	47.8255	-116.95383	10
ID	C1245	48.9083	-116.12762	10	ID	C696T	48.2027	-116.96566	10
ID	C1246	48.9461	-116.09825	10	ID	C714	47.2439	-116.83273	10
ID	C1256T	47.3666	-116.00431	10	ID	C718T	47.3964	-116.883	10
ID	C1290	48.9009	-116.08475	10	ID	C734T	48.1403	-116.92153	10
ID	C1291	48.9634	-116.05133	10	ID	C755	47.2827	-116.80269	10
ID	FIA1294T	47.1732	-115.947742	1000	ID	C803T	47.5257	-116.72869	10
ID	FIA1343T	47.3342	-115.835433	1000	ID	C835	47.1754	-116.61438	10
ID	FIA1436T	47.1317	-115.743606	1000	ID	C846T	47.6946	-116.6487	10
ID	FIA1439T	47.4923	-115.745087	1000	ID	C850T	47.8516	-116.65674	10
ID	C1489T	47.0888	-115.65327	10	ID	C885T	47.8603	-116.58985	10
ID	FIA1539AT	47.0360	-115.554751	1000	ID	FIA897T	48.3961	-116.661916	1000
ID	FIA1539BT	47.0769	-115.551759	1000	ID	C914T	47.5662	-116.54099	10
ID	C1693T	47.1595	-115.3912	10	ID	FIA915T	47.5874	-116.533017	1000
ID	C1743T	47.1730	-115.32325	10	ID	C917G	47.6956	-116.53991	10
ID	OMG	48.9733	-116.56651	10	ID	FIA925T	48.0382	-116.536107	1000
ID	OMG	48.8846	-116.75512	10	ID	C927	48.1451	-116.52519	10
ID	OMG	48.9733	-116.56651	10	ID	C929T	48.2278	-116.56417	10
WA	C1B	48.6838	-117.29301	10	ID	C933	48.4721	-116.6181	10
WA	C2	48.7118	-117.31126	10	ID	FIA946T	47.4089	-116.471491	1000
WA	C4	48.7958	-117.32204	10	ID	FIA952T	47.7211	-116.467897	1000
WA	C5	48.8394	-117.32135	10	ID	C957T	47.9147	-116.46076	10
WA	C8	48.7662	-117.25974	10	ID	C962T	48.1570	-116.5023	10
WA	C14	48.6774	-117.21956	10	ID	C963T	48.1842	-116.47749	10
WA	C16	48.7497	-117.20182	10	ID	C964T	48.2505	-116.50533	10
WA	C17	48.8197	-117.18701	10	ID	C968T	48.4226	-116.53223	10
WA	C19	48.8777	-117.18568	10	ID	C970	48.9992	-116.5194	10

WA	C20	48.9508	-117.21635	10	ID	FIA984T	47.6241	-116.401276	1000
WA	C31	48.7320	-117.08286	10	ID	C986T	47.6027	-116.38471	10
WA	C32	48.7798	-117.09828	10	ID	FIA987T	47.8054	-116.387315	1000
WA	C32T	48.7627	-117.10503	10	ID	FIA991T	47.8564	-116.404743	1000
WA	C35	48.8863	-117.14512	10	ID	FIA992T	46.9931	-116.277376	1000
WA	C48	48.7677	-117.06012	10	ID	C997T	48.1015	-116.42627	10
WA	C50	48.8546	-117.08501	10	ID	C1000T	48.2544	-116.43076	10
WA	C52	48.9185	-117.05728	10	ID	C1002	48.3045	-116.42525	10
WA	C541T	48.5838	-117.26717	10	ID	C1003	48.3777	-116.41978	10
WA	C584	48.5648	-117.19656	10	ID	C1009	48.9239	-116.50269	10
WA	C584B	48.5873	-117.1638	10	ID	C1010	48.9153	-116.48537	10
MT	C1335	48.9102	-115.98798	10	ID	FIA1014T	47.1794	-116.34097	1000
MT	C1336	48.9783	-116.01607	10	ID	C1019	47.1895	-116.32082	10
MT	C1380	48.8791	-115.90718	10	ID	C1028T	47.6062	-116.30997	10
MT	C1381	48.9392	-115.91329	10	ID	C1030T	47.7027	-116.30411	10
MT	C1382	48.9566	-115.91598	10	ID	FIA1034T	47.9982	-116.339345	1000
MT	C1428	48.8929	-115.83614	10	ID	C1035T	47.9018	-116.31297	10
Pygmy Slug (<i>Kootenaia burkei</i>)					ID	C1037T	47.9987	-116.33989	10
ID	C67	48.9033	-116.97359	10	ID	C1047	48.4688	-116.34369	10
ID	C68	48.9474	-117.01467	10	ID	FIA1064T	47.6717	-116.257195	1000
ID	C70	48.3189	-116.91289	10	ID	C1065T	47.1207	-116.26398	10
ID	C78	48.6826	-116.90975	10	ID	FIA1084T	48.0791	-116.266486	1000
ID	FIA79T	48.7072	-116.927113	1000	ID	C1085T	48.0226	-116.29716	10
ID	CBIRDD	48.7462	-116.91903	10	ID	C1088T	48.1290	-116.25661	10
ID	C82	48.8675	-116.95735	10	ID	C1093	48.3582	-116.31252	10
ID	FIA83T	48.8878	-116.93711	1000	ID	FIA1095T	48.5686	-116.317224	1000
ID	C85	48.9750	-116.93735	10	ID	C1114T	47.1477	-116.18073	10
ID	C100	48.3726	-116.79894	10	ID	C1118	47.3384	-116.15659	10
ID	FIA102T	48.4447	-116.797587	1000	ID	C1121T	47.4663	-116.17677	10
ID	C107	48.6922	-116.78345	10	ID	C1124T	47.6023	-116.18623	10
ID	CBIRDA	48.9585	-116.80732	10	ID	C1130T	47.8885	-116.22249	10
ID	C114	48.9833	-116.79994	10	ID	FIA1131T	48.2607	-116.191294	1000
ID	FIA120T	48.5306	-116.728839	1000	ID	C1132T	47.9822	-116.20507	10
ID	C124	48.7090	-116.7362	10	ID	C1133T	48.0274	-116.19963	10
ID	C126	48.8008	-116.74927	10	ID	C1135T	48.1076	-116.23762	10
ID	C133	48.6038	-116.643	10	ID	FIA1139T	48.5485	-116.229559	1000
ID	C136	48.7304	-116.63422	10	ID	FIA1145T	48.8386	-116.253738	1000
ID	CLONG	48.7820	-116.64278	10	ID	FIA1154T	47.0373	-116.07569	1000
ID	C138	48.8376	-116.63816	10	ID	C1177T	47.8655	-116.16472	10
ID	C143	48.4675	-116.59398	10	ID	FIA1178T	48.0293	-116.133979	1000

ID	C148	48.6816	-116.57518	10	ID	C1179T	47.9884	-116.17278	10
ID	C160	48.6870	-116.54466	10	ID	FIA1180T	48.2128	-116.124813	1000
ID	C658T	48.2721	-117.01922	10	ID	FIA1184T	48.3941	-116.192476	1000
ID	C687T	47.8255	-116.95383	10	ID	C1184	48.2114	-116.12885	10
ID	C693T	48.0792	-116.94012	10	ID	FIA1192T	48.7977	-116.185529	1000
ID	C801T	47.4312	-116.69407	10	ID	C1193	48.5983	-116.18767	10
ID	C804T	47.5350	-116.72623	10	ID	FIA1202T	47.1325	-116.077887	1000
ID	C808T	47.7338	-116.72274	10	ID	C1202	48.9863	-116.20116	10
ID	C817T	48.1387	-116.73561	10	ID	C1212T	47.4406	-116.06655	10
ID	C819T	48.2396	-116.77639	10	ID	FIA1217T	47.7006	-116.045439	1000
ID	C858T	48.2129	-116.6684	10	ID	FIA1220T	48.0329	-116.060846	1000
ID	C874	47.3654	-116.5549	10	ID	C1223T	47.9380	-116.07764	10
ID	C880T	47.6280	-116.58997	10	ID	FIA1225T	48.3026	-116.125201	1000
ID	C881T	47.7006	-116.62127	10	ID	FIA1234T	48.6187	-116.120983	1000
ID	C916T	47.6322	-116.5072	10	ID	C1237	48.5799	-116.08052	10
ID	C919T	47.7672	-116.51242	10	ID	C1237T	48.5603	-116.13025	10
ID	C921T	47.8536	-116.52312	10	ID	FIA1238T	48.6609	-116.121494	1000
ID	C928	48.1637	-116.54263	10	ID	FIA1242T	48.8407	-116.107903	1000
ID	C949T	47.5526	-116.45592	10	ID	FIA1259T	47.6752	-116.002594	1000
ID	C950T	47.6011	-116.48174	10	ID	C1261T	47.6029	-116.00623	10
ID	C951T	47.6690	-116.45661	10	ID	FIA1262T	47.0849	-115.881463	1000
ID	C955T	47.8269	-116.46606	10	ID	C1265T	47.7855	-116.02386	10
ID	C960T	48.0502	-116.45396	10	ID	C1266T	47.8504	-115.98571	10
ID	C961T	48.1178	-116.4933	10	ID	C1268T	47.9290	-115.99995	10
ID	C965T	48.2620	-116.49352	10	ID	C1283	48.6014	-116.06094	10
ID	FIA984T	47.6241	-116.401276	1000	ID	C1296	47.1736	-115.9111	10
ID	C989T	47.7408	-116.4172	10	ID	C1298	47.2747	-115.93307	10
ID	FIA992T	46.9931	-116.277376	1000	ID	C1299	47.3124	-115.92746	10
ID	C1031T	47.7216	-116.31543	10	ID	C1302T	47.4178	-115.90134	10
ID	FIA1032T	47.8996	-116.329311	1000	ID	C1304T	47.5275	-115.91911	10
ID	C1035T	47.9018	-116.31297	10	ID	C1306T	47.6228	-115.90109	10
ID	C1047	48.4688	-116.34369	10	ID	FIA1308T	47.1311	-115.879618	1000
ID	C1059	48.9861	-116.37689	10	ID	C1309T	47.7440	-115.94732	10
ID	FIA1079T	47.8130	-116.270498	1000	ID	C1310T	47.7909	-115.93855	10
ID	FIA1105T	48.9509	-116.341147	1000	ID	FIA1341T	47.2216	-115.877568	1000
ID	C1107	48.9911	-116.32935	10	ID	C1344	47.2509	-115.83355	10
ID	C1112T	47.0634	-116.18683	10	ID	C1349T	47.4713	-115.88203	10
ID	FIA1127T	47.9435	-116.197681	1000	ID	C1350T	47.5204	-115.88264	10
ID	C1129T	47.8317	-116.19109	10	ID	C1352T	47.5979	-115.88216	10
ID	C1135T	48.1076	-116.23762	10	ID	C1389T	47.1224	-115.75038	10
ID	C1146	48.5810	-116.23035	10	ID	FIA1392T	47.3112	-115.821424	1000

ID	FIA1159T	47.8509	-116.133505	1000	ID	FIA1393T	47.4149	-115.786339	1000
ID	C1172T	47.6591	-116.15993	10	ID	C1393	47.2883	-115.7742	10
ID	FIA1180T	48.2128	-116.124813	1000	ID	C1395T	47.3840	-115.75822	10
ID	FIA1188T	48.4384	-116.193092	1000	ID	FIA1399T	47.7422	-115.805664	1000
ID	FIA1189T	48.5239	-116.183467	1000	ID	C1401T	47.6732	-115.79839	10
ID	C1212T	47.4406	-116.06655	10	ID	C1402T	47.7076	-115.82514	10
ID	FIA1213T	47.5864	-116.082996	1000	ID	FIA1403T	46.9887	-115.695993	1000
ID	FIA1216T	47.6737	-116.071336	1000	ID	FIA1436T	47.1317	-115.743606	1000
ID	C1223T	47.9380	-116.07764	10	ID	C1441T	47.2289	-115.69434	10
ID	C1237	48.5799	-116.08052	10	ID	FIA1447T	47.0378	-115.624768	1000
ID	C1245	48.9083	-116.12762	10	ID	C1487T	46.9871	-115.67793	10
ID	C1261T	47.6029	-116.00623	10	ID	FIA1539BT	47.0769	-115.551759	1000
ID	C1264T	47.7341	-115.98169	10	ID	FIA1540T	47.0298	-115.478148	1000
ID	C1290	48.9009	-116.08475	10	ID	C1542	47.1508	-115.56616	10
ID	C1306T	47.6228	-115.90109	10	ID	FIA1589T	47.0618	-115.506545	1000
ID	C1352T	47.5979	-115.88216	10	ID	FIA1590T	47.1739	-115.545041	1000
ID	FIA1436T	47.1317	-115.743606	1000	ID	FIA1592T	46.9852	-115.284586	1000
ID	C1487T	46.9871	-115.67793	10	ID	C1593T	47.1977	-115.51135	10
WA	C10	48.8391	-117.26163	10	ID	C1642T	47.1572	-115.47832	10
WA	C20	48.9508	-117.21635	10	ID	C1692T	47.1433	-115.40511	10
WA	C28	48.5769	-117.09885	10	ID	C1693T	47.1595	-115.3912	10
WA	C29	48.6335	-117.10287	10	ID	FIA1739T	47.0360	-115.293171	1000
WA	C31	48.7320	-117.08286	10	ID	C1787T	47.1511	-115.27139	10
WA	C42	48.4978	-117.05083	10	ID	OMG	48.3273	-116.17237	10
WA	C47	48.7198	-117.0612	10	ID	OMG	48.8846	-116.75512	10
WA	C540	48.5469	-117.24764	10	WA	C8	48.7662	-117.25974	10
WA	C580T	48.3994	-117.17341	10	WA	C9	48.8148	-117.23873	10
MT	C1336	48.9783	-116.01607	10	WA	C10	48.8391	-117.26163	10
Magnum Mantleslug (<i>Magnipelta mycophaga</i>)					WA	C11	48.8685	-117.28815	10
ID	C66	48.8277	-116.98394	10	WA	C17	48.8197	-117.18701	10
ID	C68	48.9474	-117.01467	10	WA	C18	48.8372	-117.19253	10
ID	CBIRDD	48.7462	-116.91903	10	WA	C29	48.6335	-117.10287	10
ID	C95	48.9181	-116.85373	10	WA	C31T	48.7187	-117.09787	10
ID	C112	48.9163	-116.77692	10	WA	C32	48.7798	-117.09828	10
ID	C113	48.9455	-116.81918	10	WA	C35	48.8863	-117.14512	10
ID	FIA121T	48.5744	-116.732293	1000	WA	C48	48.7677	-117.06012	10
ID	C128	48.9175	-116.72707	10	WA	C53	48.9830	-117.06632	10
ID	C129	48.9475	-116.74129	10	WA	C642T	47.5681	-116.98241	10
ID	C133	48.6038	-116.643	10	WA	C644T	47.6382	-117.02593	10
ID	C134	48.6485	-116.62385	10	WA	C650T	47.9202	-117.02599	10
ID	FIA137T	48.7830	-116.683394	1000	MT	C1273	48.1766	-115.98653	10

ID	CLONG	48.7820	-116.64278	10	MT	C1279	48.4224	-116.02926	10
ID	C147	48.6504	-116.55515	10	MT	C1285	48.6926	-116.02207	10
ID	FIA148T	48.6634	-116.593183	1000	MT	C1320	48.2428	-115.96619	10
ID	C154T	48.9663	-116.62474	10	MT	C1333	48.8251	-115.94769	10
ID	C580	48.3975	-117.13629	10	MT	C1364	48.1590	-115.90681	10
ID	C885T	47.8603	-116.58985	10	MT	C1370	48.4316	-115.84741	10
ID	C896T	48.3695	-116.66483	10	MT	C1372	48.5324	-115.91415	10
ID	FIA952T	47.7211	-116.467897	1000	MT	C1373	48.5819	-115.87946	10
ID	C989T	47.7408	-116.4172	10	MT	C1380	48.8791	-115.90718	10
ID	FIA1064T	47.6717	-116.257195	1000	Lyre Mantleslug (<i>Udosarx lyrata</i>)				
ID	C1139	48.2835	-116.20629	10	ID	C674	47.2376	-116.8829	10
ID	C1144T	48.5273	-116.20406	10	ID	C689T	47.8886	-116.97224	10
ID	FIA1145T	48.8386	-116.253738	1000	ID	C712T	47.1555	-116.85187	10
ID	FIA1152T	48.9346	-116.25041	1000	ID	C713	47.1870	-116.85194	10
ID	FIA1188T	48.4384	-116.193092	1000	ID	C753	47.1917	-116.76272	10
ID	C1190	48.4700	-116.13657	10	ID	C754	47.2515	-116.75932	10
ID	FIA1191T	48.5547	-116.153473	1000	ID	C835	47.1754	-116.61438	10
ID	FIA1216T	47.6737	-116.071336	1000	ID	C837	47.2839	-116.67767	10
ID	FIA1234T	48.6187	-116.120983	1000	ID	C858T	48.2129	-116.6684	10
ID	C1237	48.5799	-116.08052	10	ID	C869G	47.1577	-116.59408	10
ID	C1349T	47.4713	-115.88203	10	ID	C870	47.1948	-116.56056	10
ID	FIA1436T	47.1317	-115.743606	1000	ID	FIA904T	47.0876	-116.48072	1000
ID	C1489T	47.0888	-115.65327	10	ID	FIA938T	47.0439	-116.421016	1000
ID	FIA1539AT	47.0360	-115.554751	1000	ID	C973T	47.0075	-116.38773	10
ID	FIA1592T	46.9852	-115.284586	1000	ID	C974T	47.0694	-116.34711	10
ID	C1691T	47.0887	-115.36108	10	ID	FIA1014T	47.1794	-116.34097	1000
ID	OMG	48.1318	-116.49004	10	ID	C1015T	47.0087	-116.28539	10
ID	OMG	48.3273	-116.17237	10	ID	C1016T	47.0503	-116.28071	10
ID	OMG	47.1577	-115.47729	10	ID	C1017T	47.1136	-116.29388	10
WA	C25	48.4590	-117.11486	10	ID	FIA1064T	47.6717	-116.257195	1000
WA	C31T	48.7187	-117.09787	10	ID	C1067	47.2107	-116.27134	10
MT	C1280	48.4492	-116.04379	10	ID	C1112T	47.0634	-116.18683	10
MT	C1333	48.8251	-115.94769	10	ID	C1114T	47.1477	-116.18073	10
MT	C1335	48.9102	-115.98798	10	ID	FIA1118T	47.5800	-116.213552	1000
MT	C1336	48.9783	-116.01607	10	ID	C1160T	47.1263	-116.12373	10
Humped Coin (<i>Polygyrella polygyrella</i>)					ID	C1198	48.8387	-116.1681	10
ID	C1128T	47.7915	-116.1981	10	ID	FIA1296T	47.7153	-115.946517	1000
ID	C1129T	47.8317	-116.19109	10	ID	FIA1341T	47.2216	-115.877568	1000
ID	FIA1213T	47.5864	-116.082996	1000	ID	C1387T	47.0172	-115.7489	10
ID	C1260T	47.5687	-115.99232	10	ID	FIA1436T	47.1317	-115.743606	1000

ID	C1302T	47.4178	-115.90134	10	ID	FIA1439T	47.4923	-115.745087	1000
ID	C1304T	47.5275	-115.91911	10	ID	C1489T	47.0888	-115.65327	10
ID	C1390	47.1702	-115.7882	10	ID	FIA1539AT	47.0360	-115.554751	1000
ID	C1400T	47.6106	-115.78926	10	ID	C1541T	47.1318	-115.58344	10
ID	FIA1447T	47.0378	-115.624768	1000	ID	C1545	47.3142	-115.5918	10
ID	C1542	47.1508	-115.56616	10	ID	FIA1590T	47.1739	-115.545041	1000
ID	FIA1592T	46.9852	-115.284586	1000	ID	C1689T	47.0021	-115.35719	10
ID	C1644T	47.2474	-115.48832	10	ID	C1690T	47.0572	-115.35349	10
ID	C1693T	47.1595	-115.3912	10	ID	C1692T	47.1433	-115.40511	10
ID	C1694T	47.2005	-115.38288	10	ID	C1743T	47.1730	-115.32325	10
ID	C1741T	47.0660	-115.31906	10	ID	C1787T	47.1511	-115.27139	10
Thinlip Tightcoil (<i>Pristiloma idahoense</i>)					ID	C1816T	47.0484	-115.18311	10
ID	FIA79T	48.7072	-116.927113	1000	Sheathed slug (<i>Zacoleus idahoensis</i>)				
ID	C97T	48.9850	-116.84513	10	ID	C98	48.2784	-116.79324	10
ID	C914T	47.5662	-116.54099	10	ID	FIA106T	48.6193	-116.797559	1000
ID	FIA952T	47.7211	-116.467897	1000	ID	C106	48.6273	-116.80315	10
ID	FIA991T	47.8564	-116.404743	1000	ID	FIA116T	48.3491	-116.72512	1000
ID	FIA1032T	47.8996	-116.329311	1000	ID	C132	48.5577	-116.62994	10
ID	C1065T	47.1207	-116.26398	10	ID	CLONG	48.7820	-116.64278	10
ID	C1070	47.3457	-116.23877	10	ID	C138	48.8376	-116.63816	10
ID	C1114T	47.1477	-116.18073	10	ID	C144	48.5163	-116.5836	10
ID	FIA1118T	47.5800	-116.213552	1000	ID	CBIRDH	48.5292	-116.56847	10
ID	C1128T	47.7915	-116.1981	10	ID	FIA150T	48.7525	-116.594798	1000
ID	C1173T	47.6904	-116.12543	10	ID	FIA153T	48.8934	-116.588304	1000
ID	FIA1178T	48.0293	-116.133979	1000	ID	C153	48.9083	-116.59852	10
ID	FIA1189T	48.5239	-116.183467	1000	ID	C156	48.5157	-116.48119	10
ID	FIA1205T	47.4907	-116.069193	1000	ID	C161	48.7229	-116.535	10
ID	FIA1392T	47.3112	-115.821424	1000	ID	C172T	48.8733	-116.44377	10
ID	FIA1436T	47.1317	-115.743606	1000	ID	C674	47.2376	-116.8829	10
ID	FIA1539BT	47.0769	-115.551759	1000	ID	C679T	47.4620	-116.92207	10
WA	C31T	48.7187	-117.09787	10	ID	C683T	47.6394	-116.908	10
WA	C36	48.9194	-117.14945	10	ID	C687T	47.8255	-116.95383	10
WA	C48	48.7677	-117.06012	10	ID	C695T	48.1969	-116.97225	10
Blue-grey Taildropper (<i>Prophysaon coeruleum</i>)					ID	C722T	47.5961	-116.86637	10
ID	C720T	47.5210	-116.85044	10	ID	C723T	47.6371	-116.88074	10
ID	C880T	47.6280	-116.58997	10	ID	C773T	48.0888	-116.80051	10
ID	FIA1127T	47.9435	-116.197681	1000	ID	C780T	48.6441	-116.8296	10
Smokey Taildropper (<i>Prophysaon humile</i>)					ID	C818T	48.1666	-116.75741	10
ID	C674	47.2376	-116.8829	10	ID	C837	47.2839	-116.67767	10
ID	C675	47.3013	-116.8946	10	ID	C849T	47.8235	-116.66644	10

ID	C683T	47.6394	-116.908	10	ID	C874	47.3654	-116.5549	10
ID	C714	47.2439	-116.83273	10	ID	C881T	47.7006	-116.62127	10
ID	C717	47.3511	-116.864	10	ID	FIA883T	47.7654	-116.593964	1000
ID	C720T	47.5210	-116.85044	10	ID	C886T	47.9376	-116.58742	10
ID	C722T	47.5961	-116.86637	10	ID	C887T	47.9535	-116.59103	10
ID	C727T	47.8115	-116.90598	10	ID	C894G	48.2921	-116.63564	10
ID	C753	47.1917	-116.76272	10	ID	C895	48.3298	-116.60914	10
ID	C754	47.2515	-116.75932	10	ID	C923T	47.9801	-116.56992	10
ID	C765T	47.7217	-116.82491	10	ID	C927	48.1451	-116.52519	10
ID	C796	47.1808	-116.7375	10	ID	C928	48.1637	-116.54263	10
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MT	C1322	48.3353	-115.94783	10	MT	C1369	48.3955	-115.89881	10
MT	C1325	48.4645	-115.94023	10	MT	C1370	48.4316	-115.84741	10
MT	C1366	48.2251	-115.85452	10	MT	C1373	48.5819	-115.87946	10
					MT	C1374	48.6238	-115.9148	10
					MT	C1377	48.7367	-115.88433	10
					MT	C1424	48.6772	-115.81552	10
					MT	C1425	48.7350	-115.85207	10
					MT	C1427	48.8176	-115.84995	10

Appendix IIc: Character Key

Author: Tom Burke

The following tables were prepared by Tom Burke who worked as a gastropod taxonomy specialist on the MBI project. The characters detailed in the tables indicate characters he used to differentiate selected similar species. Characters used to differentiate additional species can be found in Burke 2013.

Table II-c-1. Characteristics of North Idaho *Cryptomastix*

Species	Width (Whorls) ^a	Proportion Umbilicus Covered	Apertural Lip ^b	Apertural Teeth (Parietal; Basal; Outer or Palatal)	Notes
<i>C. mullani mullani</i>	13-15	> ½ cov.	revolute	P, B, & small outer	outer tooth may be quite small
<i>C. mullani hemphilli</i>	13-17	Mostly to nearly cov.	revolute	P, B, no outer	
<i>C. mullani olneyae</i>	11-19	≤ ½ cov.	revolute	P, B, no outer	
<i>C. mullani blandi</i>	13-13.5 (very low spire)	About ½ cov.	narrow revolute	small P & very small mid-basal cusp	
<i>C. magnidentata</i> ^c	10.8 (4¾ W)	About ½ cov.	revolute reflected	P, B, O; teeth very large	strong dark brown; more loosely coiled buff to medium brown; more tightly coiled
<i>C. sanburni</i>	10-12 (5¼-6 W)	Little to < ½ cov.	& recurved reflected	P, B, O; teeth very large	
<i>C. hendersoni</i> ^c	14.5-16 (5½ W)	About ¼ cov.	& recurved	no teeth or only a very small parietal	
<i>C. populi</i> ^c	To 17 mm wide	< ½ cov.	revolute	no teeth	glossy shell w/ wide aperture

^a Number of whorls is significant for *C. magnidentata* and *C. sanburni*. *C. sanburni* is more tightly coiled and has more whorls on a shell of similar size.

^b There is sometimes little distinction between a revolute lip and one that is strongly recurved at its edge. The revolute or recurved edge may be broken away, so close examination may be required.

^c Species not known to occur in the MBI study area, but occur farther south in Idaho.

^d Shells which keyed out to this species were identified during the MBI study. See chapter 2 for details.

Table II-c-2. Characteristics of North Idaho Microsnails

Species	Whorls	Size ^a	Umbilicus	Aperture	Spire	Ribs
<i>Planogyra clappi</i>	~3 ½	2x1.1-1.2	funnelform	slightly higher than wide	nearly flat	high, well spaced cuticular ribs
<i>Paralaoma servilis</i>	4¼	1.5-2.1x0.9-1.3	¼+ D; expanding regularly	slightly wider than high	low to moderate	moderately high, well-spaced cuticular ribs w. ribs between
<i>Punctum californicum</i>	3½-4⅓	1.5-1.9x1.05-1.25	larger ¼ to ⅓ D; expanding rapidly	roundly lunate	low to moderate	fine, close-set rather solid riblets
<i>Punctum minutissimum</i>	~4	1.1-1.5x0.7-0.95	medium ¼ to ⅓ D; expanding near aperture	roundly lunate	low to moderate	uneven, closely spaced riblets
<i>Punctum randolphi</i>	~4	1.1-1.4x0.73-0.95	smaller ¼ to ⅓ D; expanding little	obovately lunate (not distinctly)	moderate to domed	closely-spaced cuticular riblets with radial & spiral striae between

^a Shell width range x height range (mm)

Table II-c-3. Sole Characteristics of Pacific Northwest Slugs

Tripartite Soles	Undivided Soles
<i>Limax maximus</i>	<i>Prophysaon</i> spp.
<i>Deroceas</i> spp.	<i>Ariolimax</i> spp.
<i>Arion</i> spp. ^a	<i>Hemphillia</i> spp.
<i>Arion subfuscus</i> (faintly tripartite)	
<i>Udosarx lyrata</i>	
<i>Zacoleus idahoensis</i>	

^a *Arion subfuscus* is only faintly tripartite.

A tripartite (divided in three parts) or undivided sole characterizes genera and species as describe above.

Table II-c-4. Characteristics Used to Differentiate *O. strigosa* and *A. kochi*

<i>Oreohelix strigosa</i>	<i>Anguispira kochi</i>
Shell usually heavier, more calcareous.	Shell thinner, not as calcareous.
Periostracum usually light brown when present; often quite thin or lacking.	Periostracum usually dark brown, covering entire whorls, sometime sloughing off in patches.
Dark peripheral bands usually present, sometimes lacking: Lower band just below the periphery, Upper band near mid-dorsally. The area between the bands may be the normal color of the shell or it may be distinctly white.	Dark peripheral bands sometimes appear as those of <i>Oreohelix</i> , but they are usually wider and the lower band is usually on or just above the periphery. The norm is a yellowish band just above the periphery with dark areas above and below it that may be distinct bands or may extend onto the dorsal and/or basal whorl.
The aperture nearly round, slightly wider than high; the outer insertion attached to the penultimate whorl at an approximate right angle or slightly descending; the columellar insertion approximately vertical.	The Aperture is obliquely obovate; the outer insertion entering the penultimate whorl at an upward angle; the columellar insertion approximately vertical.
Whorls of young sharply angled at the periphery; the angle often still apparent in front of the aperture on mature or near mature specimens.	Whorls of young somewhat shouldered but not sharply angular. Periphery is round on nearly mature specimens.
Umbilicus narrowly tapering funnelform descending at a slight angle to the apex.	The umbilicus narrowly tapering funnelform descending straight toward the apex.
Sculpturing around the apex is very fine, sharp, rib-like collabrally arranged (at the angle of the aperture). However, the early whorls may be badly eroded so the sculpturing may not be discernible.	Apex sculpturing may be wider, wave-like ribbing, either collabral or more radially arranged. However, the early whorls may be badly eroded so the sculpturing may not be discernible.