

Accessory Publication

THE OLYMPIC MARMOT SURVEY PROTOCOL

Survey dates (preferable survey dates):	Jun 1–Sep 15 (Jul 1–Aug 31)
Time of the day to conduct surveys:	From 1 hour after dawn to 1 hour prior to dark, except 11:00-16:00
Survey duration at each polygon:	Until marmots presence is confirmed or entire polygon is checked (~0.5–2 hours depending on a polygon size)
Number of visit per polygon:	1 if presence of marmots was confirmed during first visit, 2 otherwise
Weather conditions:	All except precipitation and heavy fog

A.1 Training workshop for observers

All observers are required to attend a training workshop. The workshop should consist of two parts: indoor, and outdoor. During the first part volunteers should be briefly familiarized with marmot ecology, monitoring purposes, survey data sheets, park backcountry rules and safety issues. During outdoor workshop observers will be familiarized with marmots, their burrows (occupied and abandoned), pellets and calls. Observers should see a variety of burrows e.g. under

rocks, in sedge (*Carex* spp.) clumps etc. It is also important to show mountain beaver burrows as they can be confused with marmot burrows. Observers should also have an opportunity to learn how to use GPS units and locate their position on the map.

A.2 Surveys

Preferably, surveys should be conducted by two-person teams. Before beginning the survey at each polygon, the observer should first find his position on the map with GPS to confirm his location within the polygon to be surveyed. The observer should traverse the polygon looking for marmots, signs of marmot presence and listening for marmot calls. Clues for likely marmot burrows include distinctive clumps of tall sedge and spots with bare soil (possibly an effect of marmot digging activity). It is also useful to check for burrows under big boulders especially if surrounded by sedge. If burrows are located, observer should next carefully look for marmot pellets around the entrances. The survey should be continued until marmot presence is confirmed or entire polygon is checked (but not longer than two hours). If survey is conducted by a two-person team, observers should work independently (surveys on separate routes). During rain, snow and heavy fog (visibility less than 100 meters) surveys should be postponed until weather conditions improve. On polygons where marmot presence was not detected, survey should be repeated during the same or on the other trip. It is recommended to repeat the survey in different time of the day than the first survey. The second survey should be conducted following the same protocol.

During each polygon survey the observer should complete the data sheet with all required information: polygon number, date, start and end time, weather category, polygon status, number of marmots seen, marmot presence signs found (burrows, pellets, calls). If marmot or burrows

are found, the observer should record UTM coordinates for each marmot or burrow up to a total of 7 (if more than one marmot or burrow found, UTM coordinates should be spread around the polygon).

Also it is recommended to record all predator sightings.

A.2.1 Polygon status categories:

- **Occupied:** Preferably confirmed by marmot sightings and detection of fresh marmot pellets. A polygon may also be designated occupied if marmot calls are heard within the polygon or active burrows are detected with numerous confirmations of use (see below for active burrows description).
- **Abandoned:** Abandoned burrows detected (see below).
- **Null:** No signs of marmot activity detected.

A.2.2 Burrow status categories:

- **Occupied burrow:** one or more of the following conditions: marmot pellets, fresh digging, trampled vegetation by the entrance, paths in vegetation between burrows, marmot smell, flies.
- **Abandoned burrow:** none of the above, could be collapsed and with vegetation in the entrance tunnel.

A.2.3. Differentiation between marmot and mountain beaver burrows

- **Marmot burrows** usually have entrances over 20 cm wide. Main burrows have flat porches made of dirt and located on the downhill side, used by marmots for resting and watching.

- **Mountain beaver burrow** systems are often located in wet places, near running water. They have many closely located entrances, usually 10-20 cm in diameter. Cone-shaped piles of loose dirt are sometimes present by entrances, and especially in late summer, bundles of clipped vegetation.

A.2.4 Sky conditions categories:

- Clear or a few clouds
- Partly cloudy or variable sky
- Cloudy or overcast
- Slight fog
- Drizzle

A.2.5 Wind conditions categories:

- No wind
- Slight wind
- Moderate wind
- Strong wind

A.3 Equipment

Each observer should have the following equipment:

1. binoculars with power range from 7 to 10 and light from 40 to 50;
2. handheld GPS units;
3. survey sheets and 3 pencils;

4. GIS maps with polygons delineated;
5. hiking map;
6. walkie-talkie radio;
7. first aid kit;
8. park radio (optional).

A.4 Proposed survey data sheet

THE OLYMPIC MARMOT SURVEY DATA SHEET

Cluster name:	Polygon #:	Date:	Polygon status: <input type="checkbox"/> Occupied <input type="checkbox"/> Abandoned <input type="checkbox"/> Null		
Observer's name:			Start time:	End time:	
Sky condition: <input type="checkbox"/> Clear <input type="checkbox"/> Partly cloudy <input type="checkbox"/> Cloudy <input type="checkbox"/> Slight fog <input type="checkbox"/> Drizzle					
Wind conditions: <input type="checkbox"/> No wind <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Strong					
MARMOTS SEEN: <input type="checkbox"/> Yes <input type="checkbox"/> No			Total # of marmots seen:		
Marmot calls: <input type="checkbox"/> Yes <input type="checkbox"/> No			Marmot and burrow locations		
Burrows status: <input type="checkbox"/> Active <input type="checkbox"/> Abandoned			Marmot / Burrow	UTM E	UTM N
Active burrows confirmation: <input type="checkbox"/> pellets <input type="checkbox"/> fresh digging <input type="checkbox"/> trampled vegetation by the entrance <input type="checkbox"/> paths between burrows <input type="checkbox"/> marmot smell					
Predator sightings:					
Comments:					