

Inventory & Monitoring Protocols – Medium-sized Territorial Carnivores

Survey Level	Questions	Methods	Products
Preliminary (office-oriented)	<ul style="list-style-type: none"> • What species are known to occur, or could potentially occur, in the unit? • What areas/features potentially provide habitat for the various species? 	<ul style="list-style-type: none"> • Conduct literature and database searches (1, 2, 3) • Consult with knowledgeable persons (park maintenance and other staff, etc.) and agencies such as Cal. Fish and Game for hunting records • Review any existing documents on previous studies in or near the park (Unit data file) 	<ul style="list-style-type: none"> • A list of species that occur, or could occur, in the unit based upon their habitat affinities and ranges, and an idea of where habitat might be located.
Reconnaissance (field-oriented)	<ul style="list-style-type: none"> • What medium-sized territorial carnivores exist in the unit and where are high use areas? • Is there indication of functional travel corridors between adjacent wildlands? • Does the predator/prey relationship seem out of balance? 	<ul style="list-style-type: none"> • Walk-through, drive-by, or fly-over to look for the presence of carnivores and their apparent health. • Determine potential use areas by looking for sign (tracks, trails, beds/dens, kills, scat) along drainages, ridgelines, saddles, and constricted corridors. (4, 6, and track identification guide books) • Check condition of biocorridors (changes in adjoining lands, length, width, height, substrate of underpasses, condition of approach to corridor, such as changes in vegetation, fences, etc.) • Also assess if prey seem overly abundant. 	<ul style="list-style-type: none"> • Completed annual inspection & questionnaire • Rapid assessment of carnivore presence and their apparent health, and apparent functionality of biocorridors.
Baseline (field-oriented)	<ul style="list-style-type: none"> • What species are currently present? • Which travel corridors are being used and by what species? 	<ul style="list-style-type: none"> • Methods outlined in the Preliminary Level plus: • Conduct snow tracking surveys (in units where possible) on all or a sample of roads and trails. Record species, latency time to detection (mile/km-days until species detected), and map locations where observed (GPS). (5, 6, and track identification guide books and training) • Conduct detection station surveys in spring or fall (i.e. bait/scent stations with sooted track plates, sifted lime or similar substrate, cameras, and or hair snares) set at high use sites or potential corridors. Checked every other day for a 12-day period (weekly for 28 days for 35-mm cameras) or until species detected. Minimum of six track stations 0.5 mi apart and/or two 35-mm camera stations 1 mi apart per 4 mi². (4, 5, 6, track identification guide books and training) • Conduct den searches for badgers. (5, 6) • Use Global Positioning System (GPS) to create a map of survey locations, detection locations, and functional biocorridors. • Have experts verify the identification of tracks/sign that are in question. • Repeat the above periodically and compare results to previous years (Monitoring).. 	<ul style="list-style-type: none"> • Confirmation of species currently present in park and latency of detection. • Relative abundance possible from snow tracking. Debate as to whether indices from bait stations reliable for determining relative abundance of carnivores. • Evidence of use of biocorridors and by which species.
Comprehensive	<ul style="list-style-type: none"> • What is the estimated relative abundance between habitat types, or areas? 	<ul style="list-style-type: none"> • Methods outlined in the Baseline Level, except sampling design considerations more important at this 	<ul style="list-style-type: none"> • Products of the Preliminary Level plus: Relative abundance by habitat type or area.

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Survey Level	Questions	Methods	Products
(field-oriented)	<ul style="list-style-type: none"> • What are the changes in relative abundance or use of biocorridors over time? 	<p>level. Make sure sampling effort is the same and concurrent in the habitats/areas to be compared. (4, 5, 6)</p> <ul style="list-style-type: none"> • Repeat the above periodically and compare results to previous years (Monitoring). 	<ul style="list-style-type: none"> • Detect changes and trends in the above.
Intensive (field- & laboratory-oriented)	<ul style="list-style-type: none"> • What is the estimated absolute abundance of species in the park, habitat type or area? • What is the home range size and use patterns of particular species? • Questions related to demographics or genetics. • Does habitat use or abundance appear to be affected by visitor use, operations or management? • What are changes in any of the above over time? 	<ul style="list-style-type: none"> • Trap, mark, and recapture/resight (4, 6, a focused literature search for trapping target taxa) • Radio-tracking to determine home range and movements • Focus studies to address specific management issues or interrelated factors. Methods will be dependent upon the nature of the question and the taxon. Standard protocols, when available and applicable, should be employed. • Collecting Permit Required for Capture, Mark and Radio-tracking, esp. if sensitive species. 	<ul style="list-style-type: none"> • Estimates of absolute abundance in focus habitats or management areas • Estimates of demographic parameters • Home range size and movements • Detailed and intensive studies and reports on an attribute of interest with regard to a particular sensitive species or occurrence. • Indications of visitor/operations/management effects on species. • Changes and trends detected in any of above.

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References:

- 1) Brylski et al. In Prep. *Mammal Species of Special Concern in California*. Not yet available, but watch for it from California Department of Fish and Game.
- 2) California Natural Diversity Database (CNDDDB). California Department of Fish and Game. Sacramento, CA 95814 or visit the California Department of Fish and Game, Wildlife and Habitat Data Analysis Branch website at: <http://www.dfg.ca.gov/whdab/html/cnddb.html>
- 3) California Wildlife Habitat Relationship (CWHR). California Department of Fish and Game. Sacramento, CA 95814 or visit the California Department of Fish and Game, Wildlife and Habitat Data Analysis Branch website at: <http://www.dfg.ca.gov/whdab/html/cwhr.html>
- 4) Wilson, D.E. et al. (Eds.) 1996. *Measuring and Monitoring Biological Diversity: Standard Methods for Mammals*. Smithsonian Institution Press, Washington D.C. ISBN 1-56098-637-9. Book available from on-line bookstores, etc.
- 5) Province of British Columbia. 1999. *Inventory Methods for medium-sized territorial carnivores: coyote, red fox, lynx, bobcat, wolverine, fisher & badger*. Standards for Components of British Columbia's Biodiversity, No. 25. Resources Inventory Committee. Download from <http://www.for.gov.bc.ca/ric/pubs/TEBIODIV/>
- 6) Zielinski, W. J. and T. E. Kucera. 1995. *American martin, fisher, lynx, and wolverine: survey methods for their detection*. USDA, Forest Service, Pacific Southwest Research Station, PSW-GTR-157. Available at http://www.psw.fs.fed.us/Tech_Pub/gtrs.html or by contacting Richard Schneider at rschneider@fs.fed.us, or 970 498-1392/1393; (FAX) 970 498 1396.