

**A FIELD JOURNAL SYSTEM
FOR NATURAL HISTORY OBSERVATIONS**

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INTRODUCTION

The tradition of a naturalist field journal dates back to the late 17th century. From the mid 1700s to the beginning of the 1900s it was simply understood that a naturalist would keep a journal of daily field activities. Linnaeus kept one on his journey to Lapland in 1732. Meriwether Lewis and William Clark, the eminent North American natural history journalists, kept detailed records that have proven invaluable. Charles Darwin, perhaps the most famous naturalist, kept a detailed journal of his voyage on the Beagle and later published it as his first book in 1839. Nineteenth century American naturalists, including many ornithologists and mammalogists who accompanied the extensive railroad surveys, kept journals as part of their official duties. Joseph Grinnell, director of the Museum of Vertebrate Ecology, U.C. Berkeley, continued the journal tradition long after it had begun to die elsewhere.

Grinnell recognized the great value to the future of properly documented scientific investigations and observations. They serve to document presence or absence of species in specific locations or habitats, and they document animal movements relative to plant phenology or weather conditions. Over the long term, trends may appear that otherwise would go unnoticed.

Yet there is another, greater reason for keeping field journals. One might initially believe that the naturalist creates the field journal, but I firmly believe that it's the field journal that creates the naturalist. It forces the development of self-discipline, increases observational skills and awareness, broadens one's perspective, interests and understanding of the interrelationships of organisms and abiotic elements, and improves one's memory as we are forced to think about and write the things we see.

By keeping a field journal, we make the time that we do spend afield far more valuable than it otherwise would be. In a time of computers, remote sensing and radio telemetry as tools for the intensive study of "important" species, we tend to forget that we still don't have accurate species lists for many areas, nor do we accurately know the local distribution of animals. Incidental observations, recorded in field journals, can provide much of the needed information.

The purpose of this document is to provide a simple, convenient and systematic way to record field observations and make those records available and useful to both the author and others.

EQUIPMENT

The following items are needed for taking notes:

ballpoint pen

permanent ink pen
field notebook
paper, (8 1/2 x 5 1/2 to 6 x 9 1/2)
3 ring binder
straightedge

Pens

Almost any ballpoint pen will accomplish the task, although you may find some better than others. The standard U.S. Government issue ballpoint pens work very well. The permanent pen should be either a technical pen or a Tombow rolling writer. The technical pen should have a .3 to .4 mm nib, and must use permanent, black, drawing ink for technical pens. The Tombow pen is recommended because of ease of use and high performance rating (Table 1).

Field Notebook

The field notebook is for storing detailed information until it can be recorded in the field journal. It should have a spiral binding at the top, fit neatly in a shirt pocket so it's readily available, and be of medium weight paper. Twenty pound wood fiber paper is fine. One recommended size is 3 3/4" x 6 1/8". The small U.S. Government issue pads with perforated top (Form 10-51) are not acceptable because the paper is thin and the pages tear out easily reducing its value as a permanent record.

Paper

Bond paper with 50 to 100 percent cotton fiber content is the most durable in the field and has excellent longevity for storage. It should have lines 1/4 inch apart. It should not be smaller than 8 1/2" x 5 1/2". That size is ideal because back-up photocopies can be made with 2 journal pages per copy page. Unfortunately, I'm not aware of a source for lined, high rag content paper of that size. Paper in 6 1/4" x 9" format is available from Carolina Biological Supply. I prefer to purchase plan paper, cut to 8 1/2" x 5 1/2" and drilled for a standard 3-ring binder. I then use a lined page behind to guide my writing. This leaves a very clean, easy to read journal page. Others have complained about handling 2 pages, especially in field situations.

Binder

The 3-ring binder should have a metal hinge, a stiff cover to use as a writing surface and a cryptic color.

Straightedge

This is used for drawing straight lines, such as the horizontal and vertical margins. It should have beveled edges so it won't spread ink and be at least 8 1/2 inches long on one edge. A triangle works nicely and can be held securely to one cover by a stout rubber band.

FORMAT

Margins

A horizontal margin is drawn across the first line at the top of each page. A vertical line is drawn 3 cm from the left edge of the paper, from top to bottom (Figure 1).

Name and Year

The author's initials and last name, and below that the year (all four digits) are printed in the upper left hand box created by the two margin lines.

Title

The appropriate title (journal, species account, catalog, photo catalog) is printed, centered in the upper middle of each page.

Duration and Pagination

A journal is opened on January 1 each year and closed on December 31. An account is closed by drawing a diagonal line through the unused portion of the last page and prominently writing in the words "last entry for 19__". The pages should be numbered consecutively through the life of the observer. Page numbers are printed in the upper right hand corner of each page. Some authors prefer to begin a new sequence of numbers for each year. Since each year's notes are bound separately, this might make sense. Should a years efforts become lost, however, the loss would never be detected unless the pages were numbered through the life of the observer. Once detected, further search could be initiated. In today's job market, it's not inconceivable that an author could be in an office assignment and not make entries for an entire year, adding confusion to how much writing was done.

One Side Only

Authors should write on one side of the paper only. Writing on both sides may show through when copying. Facing pages are also useful for maps and drawings that complement the text on the facing page, yet don't seriously confuse when they slightly show through when copied.

Underlining

Localities are underlined with a straight line. Underline the date whenever it changes. When the locality extends to 2 or 3 lines, underline only from the left margin to the right edge of the paper.

Common names of plants and animals are underlined with a wavy line. Scientific names are underlined with a straight line. Underlining may be omitted in species lists.

Abbreviation

Be frugal with abbreviations. Their meanings become lost with the passage of time or to other workers. Use only the most widely used ones such as N, S, E, W, km, m, cm, and mm. When in doubt, write it out.

Dates

Dates, with one exception, are always written in military format: 12 Jun 1987. The one exception is at the beginning of an entry because the year is recorded at the top of the page. Also, since binding may cause the loss of some information along the left margin, write the month first and digits last, such as June 12.

Time

Times are always written according to international convention. We would record 1400 for 2:00 pm (not 14:00). Midnight is 2400 and 0220 means 2:20 am. Be sure to note changes between Daylight Savings Time and Standard Time in your journal. I regularly use the abbreviation ADT for Alaska Daylight Time following a time entry. Also note whenever you change time zones. Times are very important for natural history observations so carry a watch.

Neatness

The value of neatness is obvious, especially since the journal must be read by others. It can be over emphasized though. Allow your penmanship to improve through practice rather than take the extra time to print. Misspelled words, errors, etc. should be canceled by drawing a single line through them and writing the correct entry above the error. Don't rewrite the page. Do not use white-out, it will crack and peel off with age.

Style

There is no good reason to use paragraphs in the text of a journal, they only waste space. Write entries consecutively, don't start a new page for each entry. Everything written should be directly quotable in a publication. Write in complete sentences. Notes should be detailed, including observations you might think are unimportant at the time. It is not a diary, but a scientific document. It is not a place for fantasy or reverie. Write down everything while it is still fresh. Time will fade your memory. Breath life into your writings to make them interesting to others, and paint a complete picture of the setting. Write as if a stranger were looking over your shoulder.

THE FIELD NOTEBOOK

The field notebook is the primary note receptacle. It should be with you at all times. It's used for recording details like mileages, times, animal behavior, composition counts etc., details you won't remember in the evening. It should be written out at the time of observation and record events chronologically through the day. Often we'll misclassify an animal, plant, or location but find the correct information later. We then can transcribe the correct information into the journal at the end of each field day.

The field notebook is opened by writing your name, permanent address and phone number on the back cover. On the front cover write the opening and closing dates. Every page should be dated and indicate if continued from the previous page. Write with a ballpoint pen, and file them for future reference when completed.

THE JOURNAL

The journal is the nucleus of the field record. It is always written in, ideally in the late afternoon or early evening of the same day of observation. Herman (1986) recommends this dictum: NO JOURNAL THIS DAY, NO SLEEP THIS NIGHT. The following information should be included for each observation: date, location, route, weather, habitat, detailed observations, general comments, species list, and drawings and maps. This information is presented here in outline format which many authors use. You may wish to follow a more chronologically organized narrative format. Either is acceptable as long as all of the appropriate information is included. You may wish to make a checklist to keep in your journal for a reference.

Date

The date of the observation, with the month written out, is placed to the left of the left margin on the first line of observations for that day. It is always underlined with a straight line. For subsequent locations on the same date, do not repeat the date but place a dashed line "-" where the date would go. When one day's observations continue on subsequent pages write the date at the top of each page.

Location

This is a gross description of the route or location of the observation, and always includes the state, and county, borough or equivalent. It is placed at the beginning of every entry starting just right of the left margin and continuing across the page. It should be written general to specific (e.g. AK, Denali National Park, Polychrome Pass) if used with a computer database to facilitate sorting. Traditionally, location was written specific to general. Regardless, be concise without sacrificing accuracy. If traveling, one should indicate start and end points at least. The

location should not exceed three lines, and often will require only one. It is always underlined from the left margin to the right edge of the page with a straight line.

Whenever there is a change in location, it should be recorded and underlined. Some authors rewrite the location at the top of each page for continued pages of the same date, others enter only the date and "(con't)".

Route

It is important to use a map when recording the route of a day's travels. It will provide highway numbers and correct spellings for names of counties, towns, lakes etc. Odometer readings recorded in field notebooks should be converted to mileage distances in the journal to locate places without names. (Vehicle odometers should be checked for accuracy when possible.) Always record arrival and departure times, as well as times at known locations. Describe basecamp locations in detail, providing UTM coordinates if necessary, so others can find the precise location.

Weather

Weather conditions have a great influence on animal activity levels, bird migrations, animal feeding patterns etc. Clouds can be described by the appropriate genus or species name and percent cover. Wind is adequately estimated using the beaufort wind scale, found in most dictionaries. Temperatures should be measured in the shade periodically through the day with an accurate thermometer. The amount and type of precipitation should also be noted.

Habitat

Record the general vegetation type from a recognized list of plant communities if available (e.g. Table 2). Also list the predominant overstory and understory species and other species of interest or felt to be important. Key out unknown plants. Record the proportion of plants in each phenology category: swelling of winter buds, beginning of leaf emergence, first flower seen, degrees of flowering (%), end of flowering, fruit ripening, seed dispersal, changing leaf color, beginning of leaf drop, and all leaves gone.

Topography, soil characteristics, and geologic features may also be important. Elevation should be read from a topographic map. Aspect should be noted. Describe water bodies including height of waterline, general depth of standing water bodies, width, depth and velocity of streams. Maps of drainages or vegetative community juxtaposition could also be useful.

Detailed Observations

Here you want to include the number of each species observed, sex and age, if possible, and behavior. Notes on animal physical condition, necropsies of dead animals found (including fetus counts and measurements), body size measurements, etc. are all important. (See Catalog section

for measurement information.) Molt status, abnormalities, injuries, clutch size, number of young fledged, incubation period and associated behaviors all build important baseline information. Within the text of the journal, the location of individual observations should be detailed most carefully. Use a compass and pace off or measure distances from permanent objects to nests or other important locations. The date and location document species distribution, timing and presence. Records at the limits of distribution are especially important. We often overlook observations of common species. Comments about phenology of nesting, abundance, interspecific behavior, distribution, etc. are important. Observations at regular intervals are very useful. Use the scientific name of each species referenced, at least once in your journal.

Occasionally, data are obtained from other observers. In such cases the date should be the date you were told of the observation. For location write "record from John Doe". The text should include the specific location, date and other appropriate information. Be sure to include the observers full name, address and phone number for future reference.

Accuracy of observations and recording cannot be overemphasized. If you're not sure of an observation, but someone else seems to be, indicate it that way in your journal. Remember, you are responsible for the quality of information in the journal. Occasionally, you may be challenged on an observation. Make note of the identifying characteristics in your journal. Be a careful, accurate and precise observer and recorder.

General Commentary

This section is a catch-all. Include companions first and last names and affiliation and the purpose of the trip. Describe capture or observation methods in detail, number and type of traps used and how they were set, times of operation, bait used, how lake depth was measured, fish caught, which insects were active, etc. Learn the insects at least to order. Record discussions with local residents or visitors who know much of the significant history or have made important observations about the area.

Species List

Many authors make a daily list of species seen, or compile several days observations to make a trip list. I prefer to list species seen in a day but not previously mentioned in the journal, thus it becomes an "Additional Species List" and avoids duplication. Names can be listed in columns or narrative format. Names should be underlined if in narrative form to distinguish from the rest of the text. Plant, mammal, reptile, amphibian and bird lists should be separate. Species observed by others in the party, but not you, should be included for completeness but marked with an asterisk (*) and indicated as such. Include the number of each species seen when possible and indicate if counted or estimated. Actual counts are far superior to estimates. Get in the habit of counting and classifying things.

Drawings and Maps

These go well on the facing page in the journal, opposite the narrative. They complement the text well and are space saving. The best journals include them. Do not use colored pencils because copy machines may not pick them up. Maps give the best description of a location. Even crude drawings may be helpful in identifying species later on, or to document unusual characteristics of a species or individual.

THE SPECIES ACCOUNT

Many authors prefer to open a separate species account for each animal observed, or perhaps for selected species. The species account serves to group all detailed observations of a given species together. It makes the study of a single species more convenient and offers a method of indexing.

Use of a separate species account may not be advantageous if you plan to use a computer program to index your observations. Computers offer a much more versatile indexing system. Species accounts are also more time consuming to keep. Often, observation interests and expected use of the information is more location oriented than species oriented. The species account would obviously be less useful in this case.

If an author prefers, species accounts may be used. However, either species subcodes will need to be used religiously or all species account pages will need to be numbered consecutively for the year, across all species, if a computerized index is used. For example if Clark's nutcracker and mule deer were the first and second species accounts in one's journal, and there were three pages of Clark's nutcracker observations, the first page of the mule deer species account would begin with page number 4. Obviously, pages cannot be numbered until the journal is closed at the end of the year. For a detailed discussion of species accounts, refer to Herman (1986).

THE CATALOG

The catalog provides a permanent record of animal material collected. All items collected should be given to a museum for preservation. Road kills, window killed birds, and natural causes of mortality all provide specimens.

Number the collected items consecutively, beginning with 1 and continuing for the life of the collector (regardless of taxon or nature of specimen (bone, skin, eggs, etc.)). All specimens must be labeled. Labels are available from museums. The National Park Service provides labels for collections within National Park Service units. Labels should include the following information: date of collection, locality of collection, collector's name, and collector's field number. It should include weight (grams) of complete animals and sex, recorded with the appropriate symbol for male, female or ? for unknown. For mammals record total length, tail

length, hind foot length, ear length, tragus height (bats), and forearm length (bats). All measurements should be in millimeters. Record age class, testes length and width, reproductive condition, number of embryos and their crown-rump length and sex. Indicate family group relationships, method of collection and portions preserved.

Date and location precede each entry as described for the journal. Each item included in the catalog should be referenced in detail in the journal. The collector's field number is printed in the margin below the date at the beginning of each entry. Data are listed to the right of the margin.

If a specimen is collected by someone else, include their name in the catalog and on the label in parentheses.

Species names should be listed last in the catalog entry and in pencil, but not necessarily on the label. Proper determination will be made at the museum. If the name is included on the label, it should be written on the side opposite the date and in pencil since it may change. Always provide a copy of the catalog with specimens donated to a museum. Use only scientific names in the catalog.

PHOTO CATALOG

I keep a catalog of photographs taken that follows the same format as a collections catalog. Items are cross-referenced with the journal. Film rolls and frames are numbered in the field and those numbers entered onto the picture when it comes back from processing. In that way permanent records, with detailed background information, are available for each photo.

INDEX

The information in your journal will be of little value if no one knows it's there, or where to find something they do know is there, including yourself. To alleviate this problem, and to simplify record-keeping by eliminating the traditional species account section, a computerized indexing system was developed. The Field Journal Index form is carried with the journal and completed periodically (Figure 2). At the top is a place for the author's name and year. Each entry includes the date (month first), section (J = journal, S = species account, C = catalog), page number, location, subject code, subcode and topic.

Location is recorded general to specific using the two capital letter abbreviation for state, county or borough, and a more specific location descriptor such as "Polychrome Pass". Learn to be consistent in recording location information because a computer can provide indexes sorted on location. If properly entered, all of the Polychrome Pass observations should be grouped together after sorting.

Subject codes group observations by order or family (Appendix A). This level of organization may be adequate if you only make a few observations each year in that category. If you make many observations of multiple species within a family, you should also include subcodes. Some subcodes are listed in the appendix, you may wish to create your own.

Topics should start with the animal or plant name and a brief description of the nature of the observation. For example: "Grizzly bear den" or "Snow Bunting, first spring sighting" or "Golden Eagle nest site location". The computer can provide an indexed listing on topics as well and this format will insure that Golden Eagle observations are grouped together and separately from Grizzly bear observations.

The index form itself provides a chronological listing which is also extremely useful. If you put your index on a computer, indexes sorted by date, location, subject and topic should be filed with each year's journal notes.

MISCELLANEOUS

Data Forms

Often data forms are used for information gathering when specific coded data are recorded for multiple observations. In those cases, summarize the information in the journal and indicate a more detailed data form was completed and where the form will be stored. Try to keep the journal as complete as possible.

Use

Anyone who takes the system seriously and follows it for a number of years will accumulate a record of great value. Although its greatest value may be to those in the future, you should make it useful to you. Reference it before returning to a spot you've been before, make comparisons, or fill in information you've missed previously. Comparisons through time are extremely important. You may want to take portions of old journals with you in the field.

Disposition

Periodically, each author should make two complete copies of their journal, with indexes. One copy should be sent to an appropriate local library such as a National Park Service Research Library. One copy should also be retained in the office files where the employee works. I keep a third copy in my home. This distribution will insure safety and usefulness of the information. Consideration should be given to making the copies on archival paper for long-term storage. Original journals should be kept by the author, unless the employer dictates otherwise. The author should make provision for donating original journals to appropriate museums by the end of their career. Keeping writings from the current year in two binders permits leaving some records home to protect from loss or damage while in the field.

On Getting Behind

Quite often we find ourselves putting in very long, project oriented field days with little time to record detailed observations. Obviously, this document describes the ideal journal entry and the more information recorded the better. However, some information is better than none, and getting behind is an incredible albatross that inhibits future entries. Be consistent about writing every day. If it means an abbreviated account, that's okay.

ACKNOWLEDGEMENTS

Much of the information in this summary is derived from the more detailed discussion by Dr. Steve Herman in his book, The Naturalist's Field Journal. He deserves credit for compiling much of this information, and I encourage each serious student of the field journal methodology to study his work carefully. Mike Webb, Don Ebert and Kerry Grande have adopted the format discussed here and have provided valuable insight into development of this system. Your additional comments, insights, criticisms and experiences will be equally appreciated.

REFERENCES

- DeBlase, A.F. and R.E. Martin. 1974. A manual of mammalogy. Wm. C. Brown Co. Dubuque, Iowa. 329pp.
- Herman, S.G. 1986. The naturalist's field journal. Buteo Books, Vermillion, South Dakota. 200pp.

Table 1. Results of immersion of 5 types of ink, on 50% cotton fiber paper, in 5 solutions for 48 hours.

Ink Source	Formalin (2%)	Formalin w/ Hamburger Grease	Water	Water Plus Detergent	Ethyl Alcohol
Space Pen	2	3	3	2	3
Technical Pen	1	1	1	4	1
Tombow Pen	1	1	1	3	1
Govt. Ballpoint	1	2	1	1	3
Finepoint System	3	2	1	3	5

Rating Scale: 1 = No visible change
 2 = slight change
 3 = Noticeable discoloration
 4 = Faint
 5 = Barely visible
 6 = Complete dissipation

Note: The technical pen used permanent, black drawing ink for technical pens produced by Staedtler-Mars.

<p>J. A. KELLY 1986</p>	<p style="text-align: right;">135</p> <p style="text-align: center;">JOURNAL</p>
<p>DEC 29</p>	<p>(Cont'd - PAGE 2)</p>
<p>DEC 31</p>	<p>CA. YOSEMITE, YOSEMITE VALLEY, YOSEMITE</p>
	<p>ELEMENTARY SCHOOL GROUNDS</p> <p>I left my office at Reindus 1 (the old superintendent's house) at 1645 (P.S.T.) walked through the apple orchard to the school grounds. Weather was calm, 100% overcast with cumulus clouds, temperatures were 46 °F, no precip. and no snow on the ground. The school field is a manicured blue grass lawn with house in Blood Oak (<u>QUERCUS</u> ^{KELLOGGII} KELLOGGII ^{WOODLAND}) on 2 SIDES and mixed conifer forest on 2 sides. At 1653 P.S.T. I observed 8 Mule Deer (<u>ODOCOILEUS HEMIONUS</u>). There were 5 adult ♀♀, 1 fawn and 2 adult ♂♂. The bucks had antler configuration of 4x4 and 2x3. All deer were feeding, no behavioral interactions, nor reproductive behaviors were observed. Additional species seen include 2 <u>coyotes</u> in Cook's meadow at 0800.</p> <p style="text-align: center;">LAST ENTRY FOR 1986</p>

Year: 1992

FIELD JOURNAL INDEX

Author: J. A. KENY

Page: 1

Date	Section	Page	Location	Code	Sub	Topic
JAN 6	J	401	AK, DENALI N.P. + P. HEADQUARTERS	147	7	MOOSE OBS., RADIOS COLLARED
JAN 24	J	402	AK, DENALI N.P. + P.			PARK ROAD THOUGHTS
JAN 31	J	404	AK, DENALI N.P. + P. CARIBOU CR	322		WILSON PARTISAN OBS.
"	"	"	" JENNY CR	358		DIPPER OBS.
FEB 1	J	406	AK, DENALI N.P. + P., CARIBOU CR	125	9	WOLF PARK OBS
"	"	408	" HINES CR	147	7	MOOSE / DOG TEAM INTERACTION
FEB 3	J	409	AK, DENALI N.P. + P., HEADQUARTERS	147	7	MOOSE MORTALITY, FETUS COLLECTION
FEB 5	J	410	AK, DENALI N.P. + P., PARKWIDE	147	3	CARIBOU MORTALITY

SOURCES FOR SELECTED FIELD JOURNAL ITEMS

Bookstore

Evergreen State College
Olympia, WA 98505
(206)-866-6000 ext. 6216

Tombow Pen - \$2.98

Refills, black ink, extra-fine point - \$.69

Field Notebook, 6 1/4" x 3 3/4", - \$1.10

Carolina Biological Supply Co.

Powell Laboratories Division
Gladstone, OR 97027
(800)-547-1733

Field Note Paper

Catalog Number 65-7800

100% Cotton Fiber, ruled and lined for 3-ring binder
size: 6 1/4" x 9"

cost: 500 sheets = \$16.55; 1000 sheets = \$27.65

FIELD JOURNAL INDEX CODES

MAMMALS OF THE WORLD

101	spiny anteaters, platypuses	Monotremata
102	opossums, koalas, macropods	Marsupialia
103	shrews & moles	Insectivora
104	flying lemurs	Dermoptera
105	bats	Chiroptera
106	lemurs, monkeys, apes	Primates
107	anteaters, sloths, armadillos	Edentata
108	scaly anteaters	Pholidota
109	pikas	Ochotonidae
110	rabbits and hares	Leporidae
111	mountain beavers	Aplodontidae
112	n.w. porcupines, pacas etc.	Caviomorphs (s.o.)
113	mice, muskrats, pocket gophers	Myomorpha (s.o.)
114	squirrels and marmots	Sciuridae
115	beavers	Castoridae
116	gundis	Ctenodactylidae
117	scaly-tailed squirrels	Anomaluridae
118	springhaases	Pedetidae
119	old world porcupines	Hystricidae
120	cane rats	Thryonomyidae
121	dassie rats	Petromyidae
122	mole rats	Bathyergidae
123	right & gray whales, rorquals	Mysticeti
124	whales, dolphins, porpoises	Odontoceti
125	coyotes, foxes	Canidae
126	bears	Ursidae
127	raccoons, ringtails	Procyonidae
128	badger, weasel, skunk etc.	Mustelidae
129	civets, genets, and mongooses	Viverridae
130	hyenas, aardwolves	Hyaenidae
131	cats	Felidae
132	sea lions and fur seals	Otariidae
133	walruses	Odobenidae
134	earless seals	Phocidae
135	aardvarks	Tubulidentata
136	elephants	Proboscidea
137	hyraxes	Hyracoidea
138	dugongs, sea cows, & manatees	Sirenia
139	horses, mules	Equidae
140	tapirs	Tapiridae
141	rhinos	Rhinocerotidae

142	wild pig	Suidae
143	javelinas and peccaries	Tayassuidae
144	hippos	Hippopotomidae
145	camels and llamas	Camelidae
146	chevrotains or mouse deer	Tragulidae
147	deer, elk, moose, caribou, etc	Cervidae
148	giraffes, okapis	Giraffidae
149	sheep, bison, goats, antelope	Bovidae

BIRDS OF NORTH AMERICA

301	loons	Gaviidae
302	grebes	Podicipedidae
303	albatrosses	Diomedidae
304	shearwaters, fulmers etc.	Procellariidae
305	storm petrels	Hydrobatidae
306	tropicbirds	Phaethontidae
307	pelicans	Pelecanidae
308	boobies and gannets	Sulidae
309	cormorants	Phalacrocoracidae
310	darters	Anhingidae
311	frigatebirds	Fregatidae
312	herons and bitterns	Ardeidae
313	storks and wood ibises	Ciconiidae
314	ibises and spoonbills	Threskiornithidae
315	flamingos	Phoenicopteridae
316	swans, geese, and ducks	Anatidae
317	american vultures	Cathartidae
318	hawks, kites, harriers, eagles	Accipitridae
319	ospreys	Pandionidae
320	caracaras and falcons	Falconidae
321	guans and chachalacas	Cracidae
322	grouse and ptarmigans	Tetraonidae
323	quails, partridges, pheas	Phasianidae
324	turkeys	Meleagrididae
325	cranes	Gruidae
326	limpkins	Aramidae
327	rails, gallinules, coots	Rallidae
328	jacanas	Jacaniae
329	oystercatchers	Haematopodidae
330	plovers, turnstones, surfbirds	Charadriidae
331	snipe, sandpipers, etc.	Scolopacidae
332	avocets and stilts	Recurvirostridae
333	phalaropes	Phalaropodidae
334	jaegers and skuas	Stercorariidae
335	gulls and terns	Laridae

336	skimmers	Rynchopidae
337	auks, etc.	Alcidae
338	pigeons and doves	Columbidae
339	parrots	Psittacidae
340	cuckoos, roadrunners, anis	Cuculidae
341	barn owls	Tytonidae
342	other owls	Strigidae
343	goatsuckers	Caprimulgidae
344	swifts	Apodidae
345	hummingbirds	Trochilidae
346	trogons	Trogonidae
347	kingfishers	Alcedinidae
348	woodpeckers	Picidae
349	cotingas	Cotingidae
350	tyrant flycatchers	Tyrannidae
351	larks	Alaudidae
352	swallows	Hirundinidae
353	jays, magpies, and crows	Corvidae
354	titmice, verdins, bushtits	Paridae
355	nuthatches	Sittidae
356	creepers	Certhiidae
357	wrentits	Chamaeidae
358	dippers	Cinclidae
359	wrens	Troglodytidae
360	mockingbirds, thrashers	Mimidae
361	thrushes, bluebirds solitaires	Turdidae
362	gnatcatchers, kinglets, etc.	Sylviidae
363	pipits, wagtails	Motacillidae
364	waxwings	Bombycillidae
365	silky flycatchers	Ptilonotidae
366	shrikes	Laniidae
367	starlings	Sturnidae
368	vireos	Vireonidae
369	wood warblers	Parulidae
370	weaver finches etc.	Ploceidae
371	meadowlarks, blackbirds, etc.	Icteridae
372	tanagers	Thraupidae
373	grosbeaks, finches, sparrows	Fringillidae
399	other birds	

AMPHIBIANS AND REPTILES OF NORTH AMERICA

601	salamanders	Caudata
602	frogs & toads	Salientia
699	other amphibians	

701	turtles	Testudines
702	lizards	Lacertilia (s.o.)
703	snakes	Serpentes (s.o.)
799	other reptiles	

FRESHWATER FISHES OF NORTH AMERICA

801	herring	Culpeidae
802	mooneye	Hiodontidae
803	trout	Salmonidae
804	smelt	Osmeridae
805	silversides	Atherinidae
806	minnows	Cyprinidae
807	killifish	Cyprinodontidae
808	sculpins	Cottidae
809	suckers	Catostomidae
810	catfish	Ictaluridae
811	armored catfish	Loricariidae
812	walking catfish	Clariidae
813	characin	Characidae
814	cichlid	Cichlidae
815	sunfish	Centrarchidae
816	perch	Percidae
817	pike	Esocidae
818	temperate bass	Percichthyidae
819	pirateperch	Aphredoderidae
820	troutperch	Percopsidae
821	stickleback	Gasterosteidae
822	bowfin	Amiidae
823	gar	Lepisosteidae
824	needlefish	Belonidae
825	paddlefish	Polyodontidae
826	sturgeon	Acipenseridae
827	sleeper	Eleotridae
828	livebearer	Poeciliidae
829	freshwater eels	Anguillidae
830	lamprey	Petromyzontidae
831	cod	Gadidae
832	drum	Sciaenidae
833	mullet	Mugilidae
834	tarpon	Elopidae
835	snook	Centropomidae
899	other fish	

MISCELLANEOUS

999	other animals	
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FIELD JOURNAL INDEX SUBCODES

CANIDAE

125	1	coyote	<i>Canis latrans</i>
125	2	dog, bush	<i>Speothos venaticus</i>
125	3	dog, domestic	<i>Canis familiaris</i>
125	4	fox, arctic	<i>Alopex lagopus</i>
125	5	fox, gray	<i>Urocyon cinereoargenteus</i>
125	6	fox, island gray	<i>Urocyon littoralis</i>
125	7	fox, red	<i>Vulpes vulpes</i>
125	8	fox, swift and kit	<i>Vulpes velox</i>
125	9	wolf, gray	<i>Canis lupus</i>
125	10	wolf, red	<i>Canis rufus</i>

URSIDAE

126	1	black bear	<i>Ursus americanus</i>
126	2	grizzly/brown bear	<i>Ursus arctos</i>
126	3	polar bear	<i>Ursus maritimus</i>

MUSTELIDAE

128	1	badger	<i>Taxidea taxus</i>
128	2	ermine	<i>Mustela erminea</i>
128	3	ferret, black-footed	<i>Mustela nigripes</i>
128	4	fisher	<i>Martes pennanti</i>
128	5	grison	<i>Galictis vittata</i>
128	6	marten	<i>Martes americana</i>
128	7	mink	<i>Mustela vison</i>
128	8	mink, sea	<i>Mustela macrodon</i>
128	9	otter, river	<i>Lutra canadensis</i>
128	10	otter, southern river	<i>Lutra longicaudis</i>
128	11	otter, sea	<i>Enhydra lutris</i>
128	12	skunk, hog-nosed	<i>Conepatus mesoleucus</i>
128	13	skunk, hog_nosed eas	<i>Conepatus leuconotus</i>
128	14	skunk, hog-nosed str	<i>Conepatus semistriatus</i>
128	15	skunk, hooded	<i>Mephitis macroura</i>
128	16	skunk, striped	<i>Mephitis mephitis</i>
128	17	skunk, spotted	<i>Spilogale putorius</i>
128	18	skunk, spotted, pygmy	<i>Spilogale pygmaea</i>
128	19	tayra	<i>Eira barbara</i>
128	20	weasel, least	<i>Mustela nivalis</i>
128	21	weasel, long-tailed	<i>Mustela frenata</i>
128	22	wolverine	<i>Gulo luscus</i>

FELIDAE

131	1	bobcat	<i>Lynx rufus</i>
131	2	cat, house	<i>Felis catus</i>
131	3	cat, little spotted	<i>Felis tigrina</i>
131	4	cat, margay	<i>Felis wiedii</i>
131	5	jaguar	<i>Felis onca</i>
131	6	jaguarundi	<i>Felis yagouaroundi</i>
131	7	lynx	<i>Lynx canadensis</i>
131	8	mountain lion	<i>Felis concolor</i>
131	9	ocelot	<i>Felis pardalis</i>

CERVIDAE

147	1	brocket, brown	<i>Mazama gouazoubira</i>
147	2	brocket, red	<i>Mazama americana</i>
147	3	caribou	<i>Rangifer tarandus</i>
147	4	deer, mule	<i>Odocoileus hemionus</i>
147	5	deer, white-tailed	<i>Odocoileus virginiana</i>
147	6	elk or wapiti	<i>Cervus elaphus</i>
147	7	moose	<i>Alces alces</i>

BOVIDAE

149	1	bison	<i>Bison Bison</i>
149	2	cattle	<i>Bos</i>
149	3	goat, mountain	<i>Oreamnos americanus</i>
149	4	muskox	<i>Ovibos moschatus</i>
149	5	pronghorn	<i>Antilocapra americana</i>
149	6	sheep, Dall's	<i>Ovis dalli</i>
149	7	sheep, domestic	<i>Ovis aires</i>
149	8	sheep, mountain	<i>Ovis canadensis</i>

VEGETATION CLASSIFICATION GUIDE

Denali National Park and Preserve

- Forest:** Trees > 3m height and $\geq 10\%$ canopy cover
- Conifer:** $\geq 75\%$ of trees are coniferous
 - Broadleaf:** $\geq 75\%$ of trees are deciduous
 - Mixed:** 25-75% of trees coniferous or deciduous
 - Closed:** 60-100% cover
 - Open:** 25-59% cover
 - Woodland:** 10-24% cover
 - White Spruce
 - Black Spruce
 - Black Spruce - White Spruce
 - Balsam Poplar
 - Paper Birch
 - Aspen
 - Birch - Aspen
 - Aspen - Balsam Poplar
 - Spruce - Birch
 - Spruce - Birch - Aspen
 - Aspen - Spruce (successional to spruce)
 - Poplar - Spruce (successional to spruce)
- Scrub:** $\geq 25\%$ shrub cover or $\geq 10\%$ dwarf trees cover
- Dwarf Tree:** $\geq 10\%$ dwarf tree cover
 - Closed:** 60-100% cover
 - Open:** 25-59% cover
 - Woodland:** 10-24% cover
 - Tall scrub:** shrubs > 1.5m tall
 - Low scrub:** shrubs 0.2 to 1.5m tall
 - Closed:** $\geq 75\%$ canopy
 - Open:** 25-74% canopy
 - Dwarf Scrub:** shrubs < 0.2m tall
 - Dryas:** Dryas spp. dominant
 - Ericaceous:** Ericaceous spp. dominant
 - Willow:** Willow spp. dominant
- Herbaceous:** < 25% shrub cover and < 10% tree cover
- Graminoid Herbaceous:** graminoids dominant
 - Forb Herbaceous:** forbs dominant
 - Dry:** dry, well drained sites
 - Mesic:** moist, without standing water
 - Wet:** standing water part of year
 - Bryoid Herbaceous:** moss and lichen dominant
 - Bryoid Moss:** mosses dominant
 - Bryoid Lichen:** lichens dominant
 - Aquatic Herbaceous:** plants submerged or floating, not emerging
- None:** no vegetation present

INSTRUCTIONS: Each Level is represented by its relative position. Use the finest delineation you can discern. On data forms, enter the bold-faced letter for the appropriate categories (e.g. FCC for forest, conifer, closed). Note that contiguous elements of one level relate to all contiguous levels immediately preceding it. (Closed and Open refer to Tall and Low Scrub but have a different definition than that for Dwarf Tree.) (from Vierek et al. 1986).

