

A Field Journal for Naturalists

This short essay will describe one way of keeping a naturalists' field journal. Broadly speaking, there are two broad categories of naturalist journals. First, a naturalist might keep a journal to please themselves and their friends. Such a journal might contain written descriptions of field trips, drawings, diagrams, thoughts and musings. This type of journal might also be used to work out how to identify species of interest, or in some other way “learns their trade” as a naturalist. Let's call this first type of naturalist's journal a “nature journal.”

Second, a naturalist might keep a journal as a way to organize and share the information they collect with the wider community of naturalists and scientists. I'll call this second type of naturalist's journal a “field journal.”

The first type of journal can be extremely useful to the individual naturalist. The second type of journal may be more important, albeit more difficult to maintain. Why is it more important? We still lack basic knowledge about most species of non-human organisms on earth. Over and over again, you'll see comments in reference books like these: “There is much to be learned about the distribution, habits, and behavior of western reptiles and amphibians” (Stebbins and McGinnis, 2018); “Every species [of mammal] described in this volume would amply repay additional close study” (Whitaker and Hamilton, 1998). And ornithologist J. V. Remsen said, “Perhaps the greatest overall significance is the value your field notes will have 10, 25, 50, and 100 years from now” (Remsen, 1977). Remsen's statement takes on special significance given that we appear to be facing a major extinction event in the coming years. With that in mind, it may be very important indeed to record your careful observations of living organisms in a format that is easily shared with others.

This essay will focus on the second type of journal. There are many excellent guides describing how to keep a nature journal, both online and in many published books. However, it's more difficult to find guides on keeping the second type of journal, the naturalist's field journal. Perhaps it's presumptuous for me to try to tell you how to keep a naturalist's field journal; my formal training as a naturalist consists the California Naturalist certification, and a non-credit semester course in field ornithology. But I think this essay is justified by the lack of guides on keeping a naturalist's field journal. — Dan Harper, 2021

The Grinnell System

There are many ways to keep a naturalist's field journal. Perhaps the best known naturalist's field journal is Henry Thoreau's late journal. Thoreau began his journal as a place for philosophical musing, but starting in the early 1850s his journal increasingly focused on close observation of the natural world. His precise observations of plant phenology are still useful to researchers today. However, in spite of the fact that Thoreau indexed the later volumes of his journal, it is cumbersome for later researchers trying to find observations of specific species of plants.

A system that originated at the Museum of Vertebrate Zoology of the University of California in the early twentieth century solves the problem of how to make a field journal more useful to other researchers. This system originated with Joseph Grinnell, first director of the Museum, so it's usually called the Grinnell System. The classic Grinnell System field journal has three parts: Journal, Species Accounts, and Catalogue. The real strength of the system lies in the species accounts, because all observations of a given species are grouped together, as described later in this essay.

The Grinnell System was developed for keeping a handwritten journal. Smartphones now offer another way to record your field observations—see “Smartphones, Computers, and the Grinnell System” below—potentially making your observations even more accessible to other researchers. Whether you collect data on paper or with your smartphone, the basic principles are the same. I'll begin this essay outlining the classic method of keeping handwritten notes, offer some possibilities for using smartphones and computers to accomplish the same purposes, and conclude with some suggestions for books and articles where you can learn more about keeping a field journal.

Journal

The Journal section in the Grinnell System is used to record “the most important aspects of the field day” according to Steven Herman. Herman goes on to add: “Written properly, it will be easily read and will provide an introduction to the more detailed records in your species accounts and catalogue.”

Herman suggest the following checklist for your journal entries:

- | | | |
|-----------------------------------|--|---|
| <input type="checkbox"/> date | <input type="checkbox"/> weather | <input type="checkbox"/> general commentary |
| <input type="checkbox"/> locality | <input type="checkbox"/> habitats (incl. topography) | <input type="checkbox"/> species lists |
| <input type="checkbox"/> route | <input type="checkbox"/> vegetation | <input type="checkbox"/> other |

Each of these items is important. The locality and route enable other naturalists or researchers to go back exactly to where you made observations. Weather seems obvious, but remember that conditions may affect organisms in specific ways that are important to record; for example, herpetologists may records the temperature an inch above the surface, to know the temperature a reptile or amphibian actually experiences. Climate notes are also important. Notes on habitats and vegetation might include dominant plants and major plant communities; general phenology of plants; topography, soil, and other geologic features; etc. General commentary is what Herman calls a “catch-all” category, and might include overall purpose of the trip, full names of any companions, information about locals that supply natural history information to you, etc. A species list might be prefaced by the words, “Species seen [and/or heard] today,” followed by columns with species observed; for some organisms (e.g., birds) the numbers of each species observed will ideally be given as well. (Some naturalists make a copy of this checklist to remind them what should go into a journal entry.)

When writing your field journal by hand, there are some general conventions you may wish to observe, to make your data easier to use. Three straightforward conventions are:

- Underline common names (i.e., English names) with a wavy line: American Robin
- Underline scientific names (i.e., Latin names) with a straight line: Turdus migratorius
- Avoid abbreviations, except for the most common abbreviations like “N” for north

For other conventions, let’s look at this excerpt from Steven Herman’s field journal (Herman, 1986):

S. Herman 1958	Journal
May 10	<u>Strawberry Canyon, Berkeley, Alameda Co., California</u> Route: From parking lot opposite Bowles Hall up canyon road about 3/4-1 mile, then off on a trail to the right, across creek, and up the other side of the canyon. Weather: Cloudy, but fairly warm 75±°F. Wind 0-5 W, sometimes increasing to 10± mph. Sun threatened to break through, but never made it. Habitat: Largely <u>Live Oak</u> canyon, some riparian woodland and grassland. Vegetation: <u>Snow-berry</u> blooming. <u>Monkey-flower</u> and <u>Forget-me-not</u> blooming. <u>Poison Oak</u> finishing up, with the berries beginning to form. General: Insect activity moderate— <u>Coccinellids</u> active but that’s about all. Several students picked up ticks. Water is still prevalent everywhere—it seeps even from the grassy hillsides and the creek is going strong.

Notice several conventions which are used to make it easy to find information in this hand-written journal. There’s a 3 cm margin ruled on the left of each page, and dates are always written to the left of the margin, so it’s easier to find a specific date. The main text goes to the right of the margin. In the top left-hand corner of every page, the naturalist writes two pieces of critical information: their name and the year. The word “Journal” appears centered at the top of each page, making it clear that this is not a Species Account. For each date, a line is ruled across the page to separate this journal entry from the previous one; the location (including state and county) appears on this line to the right of the margin.

Every page in your Journal should have your name and the year in the upper left corner, and “Journal” centered at the top of the page. Journal entries for one date often continue over more than one page, and the date and locality should be repeated at the top of each new page.

To show some possible features of a species list, here's part of a page from a Journal entry by ornithologist J. V. Remsen, Jr. (Remsen, 1977):

Remsen, J. V. 1976	Journal
Jan. 25	Salton Sea, Imperial Co., Calif.
Area: Finney Lake, Ramer Lake, Wister Unit, N. land, Davis Rd., Red Hill, Salton Sea NWR, adjoining lands. Time: 0700-1730. Observers: Jon Dunn, Guy McCaskie, Roger Higgson. Temp. 40-75. Sky: sunny. Wind: 0.	
Species:	
<u>Arctic Loon</u> (sp. acct.)	2
Horned Grebe	1
Eared Grebe	1000
Western Grebe	8
Pied-billed Grebe	10
Double-crested Cormorant	2
Great Blue Heron	10
Green Heron	1
Cattle Egret	<u>1500</u>
Snow Egret	20
White-faced Ibis	75
Canada Goose	1000
Snow Goose	2000
Ross' Goose	<u>121</u>
	Am. Avocet 300
	<u>Yellow-footed Gull</u> (sp. acct.) 1
	Herring Gull 35
	Rig-billed Gull 1000
	<u>Mew Gull</u> 1
	Rock Dove 50
	Mourning Dove 250
	Ground Dove 15
	Greater Roadrunner 2
	Burrowing Owl 2
	White-throated Swift 2
	Common Flicker 7
	Red-naped Sapsucker 1
	Ladder-backed Woodpecker 2

Remsen's species list is arranged in taxonomic order (as it was understood for birds in 1976). When a bird is covered in a species account in the field journal, that's noted on the species list, so it's easy to then look at the species accounts. Note that Remsen uses underlining to emphasize unusual observations, e.g., the occurrence of the Yellow-footed Gull, or the large number of Cattle Egrets.

The following excerpt from A. M. Weidemann's field journal (Herman, 1986) provides another example of a journal entry. Journal entries appear on the right-hand pages, leaving the left-hand pages open in case other information needs to be provided; in this case, Weidemann drew a fairly accurate sketch map of the site described in the Journal entry.

Weidemann 1978	Journal
22 Jan.	Bush Remnant, Spearwood, West Australia
On site 0630. Overhead band thin clouds, 25% cov., light SE wind, 19°C. I walked in a large circle in bush around dump (see map). Two automobiles at dump site—not quite sure what the people were doing. Very quiet, especially the bush W of cross road. Not much calling till at least 0700—then it gets pretty active, but still not much seen. In addition to the <u>sacred kingfishers</u> I saw only one other bird—an unidentified <u>whistler</u> -sized bird that flew off the ground. At 0745 I crossed the cross track near the N edge into the burn area. There are multistemmed <u>Xanthorrhoea's</u> in this area. As I walked up over the ridge toward the S I heard a <u>kookaburra</u> call—just one long “laughing” call and no more. I did see the bird. On this ridgetop the fire cleared all the understory vegetation, and regeneration has begun—shrubs sprouting from the base and epicormic growth on <u>banksias</u> and <u>eucalyptus</u> . Left the sit 0845. <u>Bushflies</u> no problem at first but got increasingly annoying.	

Species Accounts

As its name implies, a species account is a collection of your observations of one species. In the species account section, records for just one species would appear on a page; as you filled a page with observations, you'd then add another page. The field journal is stored in a ring-type binder, to make it possible to add pages to species accounts. Below are three examples of what might appear in a species account.

(1) An excerpt from ornithologist Steven Herman's field journal (Herman, 1986):

S. G. Herman 1979	Horned Grebe
January 25	Mud Bay, S end of Eld Inlet, Thurston Co., Washington
January 26	Perhaps 4. None of those I looked at showed evidence of plumage change. 1/3 mile N of Mud Bay Bridge, Mud Bay, Eld Inlet, Thurston Co., Wash.
—	2 or 3 of these diving in the open water Squaw Pt., Eld Inlet, Thurston Co., Washington ~4 visible from Pt., at least 2 of them fairly close to shore in sheltered water.
February 21	Fiddlehead Marina, Budd Inlet, Olympia, Thurston Co., Washington
	These were fairly abundant. I counted 16 in the sheltered water just N of the marina dock. All were in solid white winter plumage.

Notice that these observations are necessarily brief. Herman wrote up a species account for every species observed on any day in the field. As an ornithologist, Herman might see many species in a day in the field, so his observations are brief, while remaining as accurate as possible.

Notice, too, that the margins and headings are the same as that in the Journal pages.

(2) An excerpt from herpetologist Robert Stebbins's field journal (Stebbins and McGinnis, 2018):

Stebbins, R. 1964	Black-tailed Rattlesnake (<u>Crotalus molossos</u>)
Aug. 11	Southwestern Research Station, 5400 ft., Chiricahua Mts., Cochise Co., Arizona 2:00 p.m. Large adult found by my son and Bill Miller, about 100 yds. south of the laboratory under a piece of tin. Snake was stretched out as though going somewhere. Caught in butterfly net. Rattled some but not vigorously. Again I gain the impression this is a rather docile snake. Capture site in oak-juniper woodland, along dry stream bottom.
Aug. 13	2-1/2 mi. W Southwestern Research Station, 7500 ft., Chiricahua Mts., Cochise Co., Arizona 10:00 a.m. Bob Drake saw an adult black-tail in the canyon bottom. The snake rattled briefly, only once, then remained quiet. Mont Cazier got one in same general area but higher—probably around 8000 ft.

Stebbins offers more information about behavior, presumably a research interest of his. Note that in the second entry, Stebbins includes information from others. Information from others may sometimes be recorded in a field journal, e.g., when it comes from reliable observers or from locals who know the region better than the person keeping the journal. One minor quibble: I think it would have been better to use 24 hour time—1000, not 10:00 a.m.

(3) An excerpt from botanist A. M. Wiedemann’s field journal (Herman, 1986):

Wiedemann 1977	<u>Cytisus scoparius</u>
1 Feb.	Southeast corner of “old field,” junction of Driftwood R. and Library Service Rd., The
	<u>Evergreen State College, Thurston Co, WA</u> Plants are bright green, leafless, with a few old pods still hanging. Leaf buds about 1 mm long.
9 Feb.	<u>Evergreen Campus, as above</u>
26 Feb.	Terminal buds opening, 3-4 mm of leaf visible. Lateral buds 2 mm long, splitting. <u>Carter Lake Campground, 8 mi. S of Florence on US 101, Douglas Co., OR</u>
28 Feb.	Flowering in the “popcorn stage”—a few scattered flowers, 1-5%. <u>Evergreen Campus, as above</u>
	Lateral buds 4-5 mm, 1 plant has 2 flowers (towards SE corner). Another plant has large lateral purple flower buds—10 mm long. This plant is located just N of the first <u>alder</u> to the E of the trail.

Although the Grinnell System was developed for vertebrate biology, it works well for plants, too, as seen in the above species account of Scotch Broom by botanist A. M. Wiedemann. You should now be familiar with the underlining convention used: when the common name (English name) of a species is used, it is underlined with a wavy line; when the scientific name (Latin name) is used, it is underlined with a straight line.

Species Accounts are written only on the right-hand pages. This allows pages to be re-arranged in the ring binder as needed.

It’s also important to note that in both Journal entries and Species accounts, you will want to save space as much as possible. The writing should continue to within a centimeter or less of the right edge of the paper. You should not indent paragraphs. New entries always begin on the next line below the previous entry (with one exception: if there’s only one line on the page below an entry, turn to the next page to write the date and locality, then begin the new entry).

If you make a mistake while writing, simply draw a line through the error and continue writing.

Catalog

When the Grinnell System was first developed, naturalists typically killed specimen animals and prepared the skins for museum collections. The Catalog section would record basic information about every specimen collected, including descriptions of soft parts (eyes, etc.) which could not be preserved.

Now it’s illegal to collect specimens of birds, the organism I’m most interested in, so I’ve never learned how to keep the Catalog section. Indeed, most amateur naturalists no longer collect specimens. These days, those who do collect specimens generally only do so if the specimens will go into the collection of an established scientific institution. In that case, the amateur naturalist should follow whatever recording conventions are required by the scientific institution. Therefore, the format for the Catalog is well beyond the scope of this brief overview.

It may ethical for amateur naturalists to make collections of some organisms. If that’s true of organisms that you’re interested in, you should learn from an established authority both the ethics of collecting and the conventions for making a catalog of your collections. For example, if you would like to collect lichens, you could join the California Lichen Society to learn how to ethically collect specimens and then identify, label, and catalog a collection.

Procedure for Keeping Field Notes

Once you know how the field journal is structured, the process for taking notes in the field becomes pretty straightforward.

When you're out in the field, you keep a notebook handy in your pocket. This pocket notebook is called the *field notebook* to distinguish it from the *field journal*. Everyone seems to have their own preferences for what type of notebook is best, but it doesn't really matter as long as you have easily accessible paper that you can write on, and that you're not going to lose. Plan to keep your field notebooks permanently, in case you ever need to refer to them again.

Your field *notebook* doesn't have to be particularly neat, it just has to be readable by you. You should make notes in your field notebook about everything that you know you're going to want to write up in your field journal—date and time, locality, route, weather, habitats, vegetation, general commentary, lists of species seen. I've found it's important to get in the habit of being as specific and accurate as possible when makes notes in the field notebook. A note that says, "Saw a Great Blue Heron" is not very useful, whereas "Great Blue Heron, preening, 1045, at 1.3 mile marker" will make it much easier for you to write up the species account later that day.

Steven Herman (1986) states that you should keep a species account for every single species you see in a day. That's good advice for scientists, but we amateurs may not have the time to do that. In my field journal, I started by keeping species accounts for half a dozen species; I'm gradually adding more as I become a more adept field observer. When I see one of these species in the field, I try to stop and make notes about it in my field notebook. Then when I get home at night, I transfer the information about each species I'm interested in from the field notebook into the appropriate species account. After I write up the species accounts in my field journal, then I write up the journal entry for that day.

How long does all this journaling take? While in the field, I stop regularly to take notes, and I probably spend 10 minutes per hour in the field writing. After six hours in the field, when I get home it usually takes me an hour to write up the species account and journal entry in my field journal.

The field journal is further organized in calendar years. If you're using a handwritten notebook, at the end of the year, you assemble all the Journal pages (in the front), and all the Species Accounts (in the back). Steven Herman (1986) recommends sending the year's journal pages to a bindery to be permanently bound into book form, but for an amateur naturalist this seems an unnecessary expense, and it seems adequate for us amateurs to store our field journals in a ring binder.

The Mechanics of Keeping a Handwritten Field Journal

Write up your field journal entries before bed: You should write your field journal from your field notebook on the same day you took the notes. If you wait until the next day, you will forget important details. Steven Herman (1986) says, "NO JOURNAL THIS DAY, NO SLEEP THIS NIGHT."

A5 paper (or something close to that) is a good size: A5 sized paper is about 5-7/8 by 8-1/4 inches. This is big enough to fit a lot of information, but small enough so you can carry your field journal easily when you go on multi-day field trips.

Write on one side of the paper: In the Journal section, write the text on the right hand pages. If you want, you can add sketch maps or other visuals on the left hand pages. For the Species Accounts, write *only* on the right hand pages; this is because you're continually adding pages to species accounts, and if you put something on a left hand page, it may not appear opposite the correct right hand page.

Use archival paper and ink: Use acid-free or archival paper, and an archival ring binder. In addition, you should use a pen with archival ink. Yes, you need to do this. I was an art student thirty years ago, and made a number of drawings with ballpoint pens on notebook paper; over the years the ink has bled into the paper and become less legible, and the paper has become fragile. You want paper and ink that will last, and remain fully legible for decades.

Use a ring binder: You need to be able to add pages to the species accounts, so a ring binder is essential. There are no longer many suppliers of ring binders and archival paper in smaller sizes. I use A5

Kokuyo Color Palette Binders with 20 rings, with archival-grade Kokuyo Campus A5 paper 6 mm ruled. One supplier is JetPens.com.

Write your field journal with a technical pen: I use Pigma Micron technical pens. I prefer their 02 size (0.3 mm line thickness). These may be purchased from JetPens.com. If you prefer a refillable pen, there are several options available from JetPens.com, or from drafting supply companies. However, many refillable technical pens require you to clean the nib after every use to prevent clogging; Steven Herman (1986) admits this can be a problem if you're in the field on an extended field trip.

Smartphones, Computers, and the Grinnell System

All the above comments apply to the traditional handwritten field journal. But Stebbins and McGinnis (2018) point out that we no longer have to write out all our field observations by hand. Their comments are worth quoting at length:

“Today, smartphones and tablets provide an alternate way to record field observations. With these you may photograph an animal along with the surrounding vegetation and terrain, including GPS coordinates and elevation, in the photo. The ‘voice memo’ utility is a convenient way to record other observations. Trail-tracking applications that record your field pathway and observation points along it are also available. The one thing a smartphone can’t tell you is the ambient temperature, so you may wish to carry a thermometer. By transferring information from your field outings to a computer for permanent storage and final organization of accounts of species encountered, information can be recorded in searchable form such as a text file, spreadsheet, database, or all three. Such a collection of highly detailed data will be immensely useful as data accumulates—and provide much enjoyment as well.”

The purpose of keeping a field journal is to make your observations more widely available, so storing your observations on a computer make sense.

As an example, a botanist might keep their field journal on iNaturalist.org, a Web-based app already used by biologists to gather data. For Species Accounts, the botanist could upload geo-tagged photographs of plants to iNaturalist, adding any text they wished as a comment. For Journal entries, iNaturalist has a Journal function where the botanist could type notes about route, weather, habitats, and vegetation, along with general commentary and species lists. However, for a naturalist whose primary interest is vertebrate biology, iNaturalist might be less useful, since it's not always possible to get a good photo or audio recording of every species they might observe. iNaturalist was actually designed as a social media platform, and a custom-designed spreadsheet or database would serve better as a serious field journal; however, since biologists are already mining the data on iNaturalist, whatever data is uploaded is more likely to get used by other researchers.

It's also worth noting that a maintaining a computer-based field journal still can take a fair amount of time. Observations made in the field still have to be transferred from smartphone and field notebook to the computer-based field journal, then organized in some fashion. All of the existing naturalist apps I've used—iNaturalist, Nature's Notebook, or eBird—all take significant time to maintain, and none of them functions particularly well as a serious field journal. I suspect a more promising approach would be to build a custom spreadsheet-based field journal hosted in the cloud, e.g. on Google Drive; this would still require time to maintain, but if designed properly it would be less time-consuming than trying to make iNaturalist function as something it's not; furthermore, since all data would be stored in the cloud it would be easy to share that data with others.

We can only hope that some day a team of biologists and software developers turn their talents toward creating a serious field journal app. Such an app would allow both Journal entries and Species Accounts; it would serve naturalists who study many different types of organisms, including plants, animals, etc.; and it would allow researchers to easily access data from the field journals of others. In the mean time, naturalists looking for a computer-based field journal must either adapt an existing app such as iNaturalist, or create their own custom field journal.

Why You Should Keep a Field Journal

(1) If you're serious about being an amateur naturalist, I'd like to suggest that it's your duty to keep a field journal in some form. From 2005 to 2009, I lived near New Bedford Harbor in Massachusetts, and in the winter I'd walk out the causeway across the harbor and count how many birds of the many different wintering species on the harbor. At some point, I wrote about watching birds on New Bedford harbor online, and an ornithologist contacted me, wanting to see my field notes. This ornithologist was looking for historical data on bird populations to determine if a wind turbine installation would harm bird populations there. Sadly, I had no field notes, so my observations were useless. Had I kept a field journal, my observations could have contributed to making New Bedford Harbor safer for birds. You never know who's going to need your observations in the future.

(2) Keeping a field journal will help you become a better observer, and a better naturalist. As I write up my notes in the evening after a day in the field, I realize all the things I forgot to observe—what time did I see that Turkey Vulture soaring along the sea coast bluffs? what was the surface texture of that broken Great Blue Heron egg I saw on the ground? exactly how many Swainson's Thrushes did I hear singing in that riparian corridor? Accumulating information in species accounts is especially helpful, as it allows me to easily track my observations of one species; slowly I begin to learn what to look for next time I'm in the field.

References, and Further Reading

Herman, Steven G, *A Naturalist's Field Journal: A Manual of Instruction Based on a System Established by Joseph Grinnell*, Vermillion, S.D.: Buteo Books, 1986.

A comprehensive book on keeping a field journal. For those interested in birds, Herman's chapter on field ornithology is incredibly useful. The sections on botany by A. M. Wiedemann are also helpful. Sadly, this book is extremely difficult to find, and online booksellers may charge hundreds of dollars for a copy. Though some of the information is now dated, this remains the most comprehensive introduction to keeping a field journal that I've yet found.

Remsen, J. V., Jr., "On Taking Field Notes," *American Bird*, Sept., 1977.

This article is an excellent short summary of how to keep a field journal, from the point of view of an ornithologist. PDFs of this article have been posted in several places on the Web.

Stebbins, Robert, and Samuel McGinnis, *Peterson Field Guide to Western Reptiles and Amphibians*, 4th ed., Boston: Houghton Mifflin Harcourt, 2018.

In a few short pages, this book tells how amateur herpetologists can keep a field journal. This is also probably the best introduction to using computer-based field journals.

Thoreau, Henry David, ed. Sandra Henry Petruionis, *Journal*, vol. 8: 1854, Princeton Univ., 2002.

Thoreau obviously does not use the Grinnell System; nevertheless, the clarity of his writing serves as a useful model for naturalists today.

United States Fish and Wildlife Service, Prairie Wetlands Learning Center, "Nature Journaling," <https://fws.gov/uploadedFiles/NatureJournal.pdf> accessed 9 June 2021, n.d.

This lesson plan for elementary grades on how to keep a *nature journal* (not a field journal) is the best short summary of nature journaling I've found online.

Whitaker, John, and William Hamilton, *Mammals of the Eastern United States*, Cornell Univ. Press, 1998.

Though they don't use the Grinnell System, the authors provide much useful information on recording mammal observations.