Appendix H: Natural History Collections

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Appendix H: Natural History Collections

A. Overview

1. *What information can I find in this appendix?*

This appendix contains a general overview of the management of natural history collections. It includes information on:

- the importance of natural history collections to the NPS
- who makes and uses natural history collections
- policies and regulations that cover natural history collections
- the NPS research permitting system
- documenting natural history collections
- taxonomy and classification of natural history specimens
- working with partner repositories
- associated documentation for natural history specimens
- natural history specimen labels

2. *What are natural history collections?*

Natural history collections consist of specimens taken from the living and non-living components of the natural world. Often these items are collected as part of a scientific research project in order to:

- serve as vouchers documenting research
- document an area's natural features
- provide a better understanding of a natural process
- document changes in the environment over time
- manage park resources

Natural history collections have scientific value. A natural history specimen records the occurrence of a particular natural resource at a specific location, at a specific time. Specimens can fall into three broad categories:

- biological organisms (non-living specimens)
- geological materials such as rocks and minerals
- fossils, both body and trace

Additionally, some natural history specimens may also have cultural significance. They may be the raw materials from which people make cultural items such as stone tools and clay pots. They may be plants harvested for medicinal purposes. They may also have historical significance because of their association with an eminent figure or as part of a cultural landscape.

Note: The NPS is developing a system for tracking living biological specimens.

3. *Why does the NPS collect and maintain natural history collections?*

The NPS maintains natural history collections primarily to voucher, or document, the presence of plants, animals, fossils, rocks, minerals, and other resources in a park at a particular place and time. Researchers and resource managers use this information for science and resource management decisions. Parks use research results and specimens in exhibits and as the basis for education and interpretive programs. Natural history collections and their associated records, which are managed as archival collections, document the park's:

- natural environment
- geological history
- current conditions
- changes over time

For example, the collections can:

- form the basis for resource management decisions, such as eradication or restoration of species
- provide evidence of environmental change, such as in water or air quality
- document the occurrence of environmental toxins, such as DDT or mercury

4. *Why are natural history collections important?*

Natural history collections are integral to resource management, science, and education in the parks. Director's Order #24: NPS Museum Collections Management, states that NPS museum collections inform and enhance every aspect of park work.

Natural history specimens with appropriate documentation provide the basis to verify and to authenticate the presence and diversity of biological, geological, and paleontological resources found in the park.

Natural history collections provide:

- baseline documentation
- vouchers for research, documenting the existence of a species at a given place and time
- a foundation for science, resource management, and interpretation

- reference specimens for comparison to aid in the identification of similar specimens or to confirm new discoveries of these natural resources in the park (also referred to as synoptic reference samples)

Note: Synoptic is defined as affording a general view of a whole. A synoptic reference collection is made to provide a set of examples of:

- a specific group of natural history specimens
- parts of specimens in order to serve as a reference to aid in the identification of other specimens

Such a collection documents the presence and variety of these specimens in the park. A synoptic collection may not have been made to address a specific research or resource management question.

Examples include:

types of igneous rocks
types of dragonflies
examples of each of the major groups of fossil brachiopods
cones of each type of conifer

In addition, individual specimens and groups of specimens may have special significance or use. These include specimens that are:

- holotypes (individual specimens used to formally describe a new taxon)
- extirpated, rare, endangered or extinct species
- of special historical value
- rare to museum collections
- indicators of ecological health
- collected specifically for destructive sampling or for interpretive programs (not accessioned into the museum collection)

5. *What determines how NPS natural history collections are used?*

Natural history collections provide a foundation for management of park natural resources. Collections use depends on:

- available documentation and access venues, such as ICMS, Web Catalog, Index Herbariorum
- the specimens or parts available
- available expertise
- methods of preservation

- preservation quality

Researchers may use natural history collections to document:

- species occurrence
- gender variation
- variations among individuals and age groups
- seasonal variation
- habitat variation
- geographic variation and distribution
- ecological relationships and associations

6. *Where can I find further information on NPS natural history collections?*

For more information on NPS natural history collections, see:

- NPS *Management Policies 2006*, Chapter 4, Natural Resource Management http://www.nps.gov/policy/mp/policies.html
- Reference Manual 77: *Natural Resource Management*
- Director's Order #77-7: *Integrated Pest Management Manual*
- NPS-75, Natural Resources Inventory and Monitoring
- NPS Park Museum Management Program. *Museum Handbook*, Part I, Museum Collections:
  - Appendix Q: Curatorial Care of Natural History Collections
  - Appendix T: Curatorial Care of Biological Collections
  - Appendix U: Curatorial Care of Paleontological and Geological Collections

  http://www.nps.gov/history/museum/publications/
- NPS Park Museum Management Program , *Conserve O Gram* series, Section 11: Natural History Collections http://www.nps.gov/history/museum/publications/conserveogram/cons_toc.html

Note: Additional references on the care of specific types of natural history collections are found in the bibliography at the end of this appendix.

B. NPS Natural History Collections

1. *What kinds of specimens are commonly found in NPS natural history collections?*

NPS natural history collections are divided into three categories:

- Biological Collections: plants, fungi, insects, arachnids, other invertebrates (such as snails), reptiles, amphibians, fish, bird, and mammal specimens and related derivatives

- Geological Collections: rocks, minerals, surface process samples, and soils

- Paleontological Collections: plant, animal, and trace fossils

2. *What characterizes NPS biological collections?*

Park biological collections may consist of all of the kingdoms of life collected within park boundaries. These include: Animalia, Chromista, Fungi, Monera, Plantae, and Protozoa.

Taxonomic experts are currently reviewing changes to the Kingdoms. The list will be updated when ITIS (see Section K) contains the changes.

Assembled and managed collections of plant, fungi, monera, and protista are called herbaria. Most parks have a herbarium as part of their museum collection.

Note: Major park herbaria are listed in the Index Herbariorum, which the New York Botanical Garden maintains at http://sciweb.nybg.org/science2/IndexHerbariorum.asp.
Including park herbaria in the index increases worldwide accessibility to park collections.

Biological collections document the non-human biology of the park at a given time and place. When researchers make observations about the park environment, they often collect voucher specimens to vouch for, or testify to, their observations. If these specimens are not destroyed or consumed in analysis, they become part of the park's collection.

The NPS has an ongoing Inventory and Monitoring (I&M) program to inventory and monitor living resources in the parks. This program generates many specimens for the museum collections.

Many park biological collections are on loan to partner repositories for management.

3. *Why are NPS biological collections important?*

Biological collections can inform park planning, natural resource management, cultural landscape management, and interpretive programs.

Over time, NPS biological collections can also document changes in the park environment and changes in species. For example, the Yosemite National Park collection has 50 specimens of the foothill yellow-legged frog, *Rana boylii*. The Yosemite Field School collected these specimens in the 1930s. This frog has now been extirpated from the region. The decline of frog and toad fauna is among the most serious and urgent conservation concerns in the Yosemite region today.

Natural History collections made from the same location at different times can document patterns of change in ecosystems. These collections can provide baseline data on species diversity and abundance prior to a disturbance such as a fire, volcanic eruption, flood, or insect infestation. Such data may guide restoration efforts and aid in documenting patterns of how invasive species may enter an area after a disturbance.

4. *What kinds of specimens are found in NPS biological collections?*

Specimens in NPS biological collections include:

- pressed plants mounted on herbarium sheets
- specimens mounted on microscope slides (such as algae and pollen)
- seeds collected specifically as museum specimens and not for propagation
- bones (osteological collections)
- eggs and nests
- animal skins
- animal tissues or whole animals or plants preserved in liquid
- mounted or freeze-dried animal specimens
- marine and fresh water shells
- insects mounted on pins or in vials
- casts of tracks and tunnels

5. *What are some examples of NPS biological collections?*

Examples of park biological collections include:

- herbarium at Yellowstone National Park
- tree snail collection at Everglades National Park
- specimens from Great Smoky Mountains National Park documenting the park's All-Taxa Biodiversity Inventory

6. *What characterizes NPS geological collections?*

Geological specimens document all aspects of the geology of the park. These specimens document the processes that formed them and their origins. For example, in a rock specimen, the mineral composition, structure, and texture reveal the origin of the unit from which it came (such as a granitic pluton). The surface may show the physical processes of its most recent history (such as glacial striations). Its chemical alteration may record the weathering process through the breakdown of feldspars and oxidation and hydration of other minerals.

7. *Why are NPS geological collections important?*

Geological collections can inform park planning and development, natural and cultural resources management, and interpretation. For example, knowledge of rock types helps planners select sites for buildings. Soil analysis may explain the abandonment of an archeological site. Geological specimens also allow scientists to reconstruct past environments from rocks, such as wind-deposited sandstone.

8. *What kinds of specimens are found in NPS geological collections?*

Specimens in NPS geological collections include:

- rocks
  - igneous (volcanic rocks, such as obsidian, lava, ash)
  - sedimentary (rocks formed as a result of wind and water action, such as shale, sandstone, limestone)
  - metamorphic (rocks transformed under heat and pressure, such as marble and gneiss)
- mineral specimens (such as iron oxide, malachite, and crystals)
- surface process materials, such as evidence of desert varnish or glacial action
- ores (often associated with historical mines in parks)
- samples of cave formations
- soils
- samples from quarries that produced building stones
- extraterrestrial materials, such as meteorites
- environmental samples (such as air and water)

9. *What are some examples of NPS geological collections?*

Examples of park geological collections include:

- agate, chalcedony, and quartz specimens at Badlands National Park
- sandstone and basalt specimens at Zion National Park
- slate, quartz, and schist specimens at Bering Land Bridge National Preserve
- calcite, gypsum, and limestone specimens at Mammoth Cave National Park
- granite, marble, and ore sample specimens at Sequoia and Kings Canyon National Parks

10. *What characterizes NPS paleontological collections?*

Paleontology specimens are fossils of plants and animals and naturally occurring tracks, impressions, and casts. They record past life on earth. In addition, the collections often include human-made molds and casts of specimens. Fossils range in size from microscopic pollen and spores, studied with scanning electron microscopes, to dinosaurs 100 feet in length.

The primary NPS paleontological collections reflect the resources in parks that were established specifically for their paleontological significance. However, paleontological specimens are important in parks throughout the system.

11. *What kinds of specimens are found in NPS paleontological collections?*

NPS paleontological collections cover the entire span of geological time and represent all kingdoms of life (Monera, Protista, Fungi, Plantae, and Animalia). Most paleontological collections are identified as:

- vertebrates
- invertebrates
- plants

Fossils can be divided into two main categories—body fossils and trace fossils, as follows:

Body Fossils	**Trace Fossils**
Petrified wood	Tracks
Fossil bones	Trails
Fossil shells	Burrows
Fossil plants	Borings
Fossil tissue	Gnaw or bite marks
Fossil pollen	Coprolites (fossilized feces)

In both body and trace fossils, the original specimen or track won't often be preserved, and only an impression will be left in the rock. This impression may be secondarily filled by sediments producing a natural cast or copy of the original.

12. *Why are NPS paleontology collections important?*

The science of paleontology studies the history of life on earth. It documents the world's past biodiversity and how it:

- has responded to climatic and environmental change
- contributes to the development of new ideas about evolution and ecology

Fossils are the foundation of this knowledge, along with the associated data that provides both a geographic and geologic context for the specimens. These collections contribute to the science of paleontology and provide the tangible evidence of this resource and its distribution within a park. The information from paleontological collections can aid managers in making decisions regarding the management of this park resource. Fossils may also be used in exhibits to inform park visitors about the history of past life in the park and its geological context.

The NPS protects unique geological features, such as Halfdome, and biological features, such as Sherman Tree. Some parks/monuments, such as Petrified Forest, were created specifically to preserve unique fossil resources. Since the same erosional forces that expose fossils eventually destroy them, some types of fossils cannot be left in place. They must be brought into the museum for protection. This not only ensures their long-term preservation but supports good science as well. Since science must be testable and repeatable, the curation of fossil collections is crucial to the science of paleontology. The discipline must satisfy those criteria and permit other researchers to confirm any conclusions based on a fossil.

13. *What are some examples of NPS paleontological collections?*

Examples of park paleontological collections include:

- Sauropod (a dinosaur and the largest land animal) specimens at Dinosaur National Monument
- fish at Fossil Butte National Monument
- insects and leaves at Florissant Fossil Beds National Monument
- "petrified" logs at Petrified Forest National Park
- camel, rhinoceros, and sloth specimens at John Day Fossil Beds National Monument
- mastodon, saber-toothed cat, and horse specimens at Hagerman Fossil Beds National Monument
- sponges, brachiopods, and trilobites at Guadalupe Mountains National Park

C. Collecting Natural History Specimens

1. *Who collects natural history specimens in the parks?*

Collectors can be:

- individuals qualified and experienced to conduct scientific studies
- representatives of scientific or educational institutions
- representatives of federal, tribal, or state agencies
- contract employees
- park employees

2. *What are some of the purposes for collecting?*

There are multiple reasons for collecting natural history collections.

Researchers in biology, geology, or paleontology collect specimens as primary information to answer basic scientific questions in these disciplines.

Biologists and paleontologists collect living organisms or fossils to better understand the taxonomy and relationships of organisms or to study their ecology or paleoecology.

Geologists collect rock samples in order to better understand the geology of the park and its geological history.

Resource managers may need to collect environmental samples to provide baseline data for specific types of park resources. These samples may help resource managers document changes in the resource, the cause of the change, and the rate of change, and provide guidance on ecosystem restoration after a natural or man-made disturbance.

3. *Why is the long-term preservation of specimens important?*

Long-term preservation of specimens in a museum collection:

- enables future researchers or resource managers to re-examine the original specimens and their associated data that were used as the basis for the conclusions reached in original studies
- provides the basis of replicability, the cornerstone of science
- may have legal value to support resource management decisions

4. *What has driven recent growth of NPS natural history collections?*

In the latter part of the 20th century, the NPS became concerned that it lacked adequate documentation, vouchers, and data from the many research projects on park lands. These projects had collected important baseline data. Yet parks often did not know where or how to access it. In response, NPS established a new regulation (36 CFR 2.5g) that became effective April 30, 1984. It required that all specimens collected in parks and retained in museum collections:

- have NPS labels
- be cataloged in the NPS National Catalog

In addition, the permitting system was standardized in 2001. Both these requirements have contributed significantly to the ability of parks to track and use research information and specimens. The permit system is extremely important for tracking research projects and data.

Many projects conducted under the auspices of the Inventory and Monitoring Program (I&M), BioBlitz projects, and All-Taxa Biodiversity (ATBI) projects have generated natural history collections. See questions C.5, C.6, and C.7 in this appendix for additional information on these projects.

Note: Despite the growth of natural history collections, they still represent only two percent of the total NPS museum collections reported on the annual Collection Management Report. However, the continued growth of natural history collections represents more impact on park museum programs than the 2% figure indicates. Specimens often require more curation and catalog effort per item than other disciplines. Time is also needed for the continued management of loans and for providing researcher access.

5. *What is the Inventory and Monitoring Program (I&M)?*

In 2000, under the Natural Resource Challenge, the NPS initiated the NPS Inventory and Monitoring Program (I&M). I&M is a long-term ecological monitoring program that provides NPS managers with the information and expertise needed to maintain ecosystem integrity. NPS scientists are currently conducting baseline inventories of basic biological and geophysical natural resources for all natural resource parks. These inventories may result in both collections of specimens and corresponding data, in various forms. The program has focused primarily on vertebrates and vascular plants in parks, since it’s fiscally and logistically impossible to initially inventory and monitor all biological organisms within each park.

The I&M Program consists of 32 eco-regional networks and includes those parks that share a common ecology. Each park belongs to a specific I&M network depending on its ecology.

I&M is part of the NPS effort to "improve park management through greater reliance on scientific knowledge." A primary role of I&M is to collect, organize, and make available natural resource data. The program contributes to the Service's institutional knowledge by facilitating the transformation of data into information through analysis, synthesis, and modeling. For more information on the program, go to http:/science.nature.nps.gov/im/.

The primary goals of the I&M Program are to:

- inventory the natural resources under NPS stewardship to determine their nature and status
- monitor park ecosystems to better understand their dynamic nature and condition and to provide reference points for comparisons with other, altered environments
- establish natural resource inventory and monitoring as a standard NPS practice that transcends traditional program, activity, and funding boundaries
- integrate natural resource inventory and monitoring information into NPS planning, management, and decision making
- share NPS accomplishments and information with other natural resource organizations and form partnerships for attaining common goals and objectives

6. *What is an All-Taxa Biodiversity Inventory (ATBI)?*

The purpose of an All-Taxa Biodiversity Inventory (ATBI) is to inventory as many species of living organisms as possible found in a defined area. Many parks have started ATBIs to build on the work done by the I&M Networks. An ATBI will develop checklists, reports, maps, databases, and natural history profiles that describe the biology of the park. Some of the data collected may be in hard copy and placed in the park's archives. Another portion of the data may be provided to NPSpecies for inclusion in the database they maintain for the park. Other data may serve as a data layer in the park's GIS database to aid resource management decisions.

Knowledge of species level biological diversity is central to the ATBI. Documenting the taxonomic diversity in a specific ecosystem also provides a broader ecological and conservation context for the park's biodiversity. An ATBI encourages understanding of an ecosystem at multiple levels of organization such as species associations and their possible interaction. In addition, DNA analysis of the collected specimens provides data on the genetic variation within a species.

ATBIs can potentially generate large numbers of natural history specimens that will need curation. Long-term care of these specimens and their associated records is critical to the success of the ATBI and the park's management of natural resources. These specimens and associated records are the primary documentation for the presence of a species within a park. They may have significant impact on natural resource management decisions in the future. Therefore, all ATBIs should have a curation plan.

It's critical that the park curator and/or regional curator work closely with the ATBI coordinators. The curator must be involved in:

- planning for the long-term preservation of the specimens and any associated records resulting from the ATBI
- evaluating whether the specimens can be properly curated at the park
- evaluating and recommending outside repositories for specimens that can't be curated at the park
- ensuring that sufficient funding is included in the project budget to cover associated curation costs and cataloging

> ***Usually organisms removed from an ecosystem will not be consumed in analysis. Each time specimens are collected, even taxa already present in the park's museum collections, they provide a unique snapshot in time. They represent the status of a resource that can never be repeated. Always consider their potential contribution to future science or resource management decisions. Not to preserve specimens in the park collections because of expediency is wrong and irresponsible management and runs counter to D.O. #24 and 36 CFR 2.5g. Even for large collections, preserving at least a sample or a subset of the larger sample is desirable***.

7. *What is a BioBlitz?*

A BioBlitz is a 24-hour inventory of living organisms in a given area. The term "BioBlitz" was coined by NPS naturalist Susan Rudy while assisting with the first BioBlitz at Kenilworth Aquatic Gardens, Washington, D.C. A BioBlitz often includes teams of scientists, volunteers, and community members. Participants collaborate to find, identify, and learn about as many local plant and animal species as possible. The BioBlitz has the dual aims of both establishing the degree of biodiversity in an area and popularizing science. Like an ATBI, planning for a BioBlitz should include the long-term preservation and curation of the specimens that are collected. Even if no specimens are collected, all field data and records resulting from the BioBlitz should be placed in the park archives.

8. *Must all specimens in a collection be collected within park boundaries?*

Most specimens in park natural history collections come from within park boundaries. However, ecosystems, both living and fossil, and geological features extend beyond park boundaries. It's sometimes necessary to include specimens that originate outside park boundaries to aid in better understanding the park's natural resources. Items collected from outside the park should fall within the definition of collections identified in the park's Scope of Collections (SOC).

The curator should work closely with the investigator when specimens are collected from outside the park. The investigator must ensure that the specimens are collected with permission of the land owner. Place copies of all permits and permissions in the accession file, including signed donation forms from the landowner.

Note: Specimens from outside a park's boundaries must be accessioned as gifts, purchases, transfers, or exchanges. They aren't field collections.

9. *What laws and regulations apply to collecting natural history specimens in parks?*

Appendix A, Section C, in this handbook contains a list of the laws, regulations, and conventions that apply to natural history collections.

10. *Are there other laws or mandates that may require additional permits for collecting natural history specimens in parks?*

Yes. Many species of animals and plants are protected by specific federal and state laws. Researchers working with these protected species must have permits from the agencies that are responsible for enforcing these laws. It's the researcher's responsibility to get ALL of the necessary permits from the appropriate regulatory agencies before beginning the research. NPS staff are also required to get the necessary permits. Include copies of the permits in the accession folder for any protected species or parts of protected species that are specified in these laws:

- **Bald and Golden Eagle Protection Act (16 USC 668), 50 CFR 22**
  - Permits are issued by the U.S. Fish and Wildlife Service.

- **Marine Mammal Protection Act (16 USC 1361) 50 CFR 18 and 216**
  - The National Marine Fisheries Service in the Department of Commerce exercises authority over whales, porpoises, seals, and sea lions.
  - The Secretary of the Interior is responsible for manatees, walruses, polar bears and sea otters. Administered through NOAA Fisheries.

- **Endangered Species Act (16 USC 1531 et seq.) 50 CFR 14, 17, and 23. The list of ESA protected species is in Title 50 of the Code of Federal Regulations: Endangered or threatened wildlife 50 CFR 17.11. Endangered or threatened plant life 50 CFR 17.12.**
  - Permits are issued by the U.S. Fish and Wildlife Service.

- **Migratory Bird Treaty Act [16 USC 703 et. Seq.] [50 CFR 10, 20, 21]. Enacted in 1918**
  - Permits are issued by the U.S. Fish and Wildlife Service.

Note: See Appendix A in this handbook for additional information on laws, regulations, and conventions related to NPS natural history collections.

A city, county, or state may also require a permit to collect certain specimens. In such cases, the researcher is expected to check with the state, county, or city to find out whether the federal permit is sufficient. The NPS isn't responsible for non-NPS researchers who don't get all the necessary permits. This situation would typically arise in parks:

- where there is concurrent jurisdiction--such as Golden Gate NRA

- if collecting occurred along a park road with a right-of-way under the jurisdiction of the state, county, or city

11. *What are Threatened and Endangered species?*

According to the Endangered Species Act (ESA), species may be listed as either "endangered" or "threatened." Endangered is defined as a species that is in danger of extinction within its native range. Threatened is defined as a species that is likely to become endangered, potentially in the near term, within part or a majority of its native range. All species of plants and animals, except pest insects and non-native species, can be listed as endangered or threatened.

As of August 2012, the U.S. Fish and Wildlife Service (FWS) has listed 2,018 species worldwide as either endangered or threatened. Currently, 1,400 of these species are found in the United States. See http://www.fws.gov/endangered/factsheets/ESA_basics.pdf

In addition to T&E Species there are also Species of Special Concern (SSC) recognized by states. SSC is an administrative designation and carries no formal legal status. The intent of designating SSCs is to:

- focus attention on animals at conservation risk by the Department; other state, local and federal governmental entities; regulators; land managers; planners; consulting biologists; and others
- stimulate research on poorly known species
- achieve conservation and recovery of these animals before they meet Endangered Species Act criteria for listing as threatened or endangered

12. *Does the museum have to track living specimens?*

No. Live specimens including specimens collected for propagation, are specifically excluded from being managed as museum specimens. A collections management system for living collections, including microorganisms, is under development.

D. Natural History Collecting Permits

1. *How does the NPS authorize the collection of natural history specimens and determine their disposition?*

Parks encourage and permit scientists to collect specimens to further the park mission and provide the scientific basis for resource management decisions. Specimen collection is governed by 36 CFR, Section 2.5 and the Research Permit and Reporting System (RPRS).

Specimens collected on park lands and not consumed in analysis are permanently retained. They remain federal property and become part of the park museum collection, as stated in:

- Title 36 of the Code of Federal Regulations, Chapter 1, Part 2, Section 2.5 (revised 1984) www.nps.gov/history/museum/laws/specimens.html
- NPS General Permit Conditions https://science1.nature.nps.gov/research/ac/html/AppFAQ (Intranet) or (Internet)
- https://science.nature.nps.gov/research/ac/html/AppFAQ

The sampling strategy for a project is determined by the:

- research question asked
- collecting techniques used
- size of the sample needed to provide the data to answer the question

Some collecting techniques may result in more specimens than are needed to provide the required data. In such cases, only a small subset of the total sample may need to be placed in the park museum collection. The researcher and park resource managers should determine the sample size and whether to retain the entire sample or only a subset. The cost of curation is determined by the sample size. Include this cost in the project budget.

2. *What does 36CFR 2.5 require?*

Section 2.5g, requires that specimen collection permits contain the following conditions:

- specimens placed in exhibits or collections will have official NPS museum labels and be cataloged in the NPS National Catalog
- specimens and data derived from consumed specimens will be made available to the public and reports and publications resulting from a research specimen collection permit will be filed with the superintendent

Place unpublished reports and data related to research projects in the park archives. The project may or may not include data on consumed specimens or specimens placed in the park's museum collections. Place copies of formal publications derived from the project either in the archives or the park library.

3. *What is the Research Permit and Reporting System (RPRS)?*

The RPRS is an online system for research applications. Researchers generating scientific specimens and associated documentation use RPRS to apply for and receive a permit. RPRS can be accessed at: https://science.nature.nps.gov/research/ac/ResearchIndex

4. *What are the goals of the RPRS?*

The RPRS is designed to enable potential investigators to:

- apply for permission to conduct natural resource or social science field work within a specific NPS unit
- review permit application requirements and field work restrictions before applying for permission to conduct a study
- review the objectives and findings of previously conducted scientific studies before formulating plans for a new study
- search and review the types of research activities park managers are most interested in attracting

The RPRS also provides an easy way for investigators to provide annual accomplishment reports. A park may also request other comprehensive annual reports or publications as part of the park-specific conditions.

The RPRS is designed to enable NPS staff to:

- review applications for permits to conduct natural resource or social science field work
- issue permits with park-specific conditions
- review Investigator's Annual Reports or other comprehensive annual reports specified by the park

Parks can add park-specific curatorial conditions that apply to all permits so that researchers must take those conditions into consideration when applying for a permit.

5. *Who is required to have a permit?*

All non-NPS researchers are required to apply for a permit using RPRS. This includes researchers in other federal agencies that conduct cooperative research with the NPS, such as USGS or FWS.

6. *Must NPS employees use RPRS?*

The answer depends on the park. Some park superintendents require a permit for all research. Some superintendents may authorize NPS staff to conduct routine inventory, monitoring, research, and related duties without requiring a Scientific Research and Collecting Permit. The authorization should be in writing. Place a copy in the accession folder for each accession that was collected under that authority. However, as per NPS *Management Policies 2006,* 4.2., NPS staff must comply with:

- all laws, regulations, policies, and professional standards pertaining to survey, inventory, monitoring, and research
- the General Conditions for Scientific Research and Collecting Permit
- general and park-specific research and collecting permit conditions

Superintendents are strongly encouraged to have a policy that requires park staff to use RPRS. This policy helps to keep track of all research in the park and any specimens or data produced by the research. It also ensures compliance with the above regulations.

7. *Where can I find the General Conditions for the Scientific Research and Collecting Permit?*

The general conditions are under "Admin Info, Conditions" in RPRS. Collections managers should be familiar with these conditions.

8. *Can a park add additional conditions to a permit?*

Yes. A park may add additional conditions to a permit as appropriate to the resource and park-specific conditions. Standard park-specific conditions, many of which address collections, are listed by park on the RPRS web at https://science1.nature.nps.gov/research/ac/parks/ParkInfo.

Some examples of park specific conditions include:

- The names of all assistants and descriptions and license plates of all vehicles will be provided to park staff.

- The area where research will be conducted shall be marked on a 7.5 minute topographic map. The primary corners of the boundaries of this area should be identified using a formal coordinate system such as lat/long or UTM.

- The park annually requires copies of field notes, data, reports, publications and/or other materials resulting from studies conducted in NPS areas.

- Preference is for non-digital photographs and images (slides or prints, color or monochrome). If digital photographs are provided to the park, they should be in .tif or .jpg formats, with a minimum resolution of 300 dpi. Digital photos should be submitted on CD or DVD, along with hard copies printed on photo paper or acid-free paper. All photos should have accompanying metadata. Metadata specifications are available from the park data manager.

- Permittee must furnish an inventory and locality description of any or all specimens proposed to be collected. The permittee must submit the inventory to the park for approval before specimens are removed.

- Information on cataloging, labeling, and submission of records must be included in the study proposal**.**

9. *What issues should a curator consider when reviewing an application for a research permit?*

The RPRS provides a standardized approach to the information in a research application. However, each project will differ depending on the goals of the research project. One of the favorable factors for evaluation of study proposals, as stated in the "Application Procedures and Requirements for Scientific Research and Collecting Permits" is that the study proposal "discusses plans for the cataloging and care of collected specimens." See the decision tree for curators (Figure H.1) to help identify major issues that the curator should address.

Park curators should review <u>all</u> permit applications to:

- ensure that researchers understand their responsibilities to provide project documentation, such as copies of the data, photos, reports, and results of destructive analysis

- provide guidance to researchers on submission of specimens and associated records

- evaluate proposed non-NPS repositories for curation of park specimens, including review of storage and access conditions

- manage loans of specimens to other institutions for research and repository purposes

A memo calling for actions to improve natural resource collections management was issued in January 2009. In regards to research permits, parks must ensure that:

- Appendix A of the permit application is signed in advance by all non-NPS repositories that are designated in the permit
- the signed Appendix A is on file in the Study File for all permits issued in 2009 and beyond
- collection managers review all permits that involve the collection and permanent retention of specimens and the submission of resource management records and complete the Collection Manager Review section on all permits issued in 2009 and beyond
- researchers subject to the General Conditions for Scientific Research and Collecting Permit (General Conditions) have park-specific instructions on cataloging specimens and submission of specimens and records by:
    - posting park-specific instructions for submission of specimens and catalog data on the RPRS web site at https://science1.nature.nps.gov/research/ac/parks/ParkInfo
    - sending an e-mail providing park-specific instructions to all researchers authorized to collect specimens for permanent retention and filing a copy of this correspondence in the Study File (see RPRS Administrative Guidance)
- collections managers confirm that catalog records and the associated field records for all permanently retained specimens have been completed and the specimens and records have been submitted to the NPS or placed on a documented NPS loan to a non-NPS repository before identifying projects as "completed" in the Investigator's Annual Report (IAR)

10. *Who is responsible for curation costs?*

Director's Order # 24 states that project budgets must include funding for the basic management of collections that are project-generated. Collections management includes:

- cataloging and labeling
- conservation examination and treatment (including specimen preparation)
- initial storage of objects and specimens
- organization and storage of project documentation, including appraisal, arrangement, description, finding aid production, and appropriate archival housing
- photography, if appropriate to the material

If the project generating the natural history collections…	***Then…***
is initiated and funded by the NPS,	it's the responsibility of the NPS personnel in charge of the project to ensure sufficient funds are included in the project budget to cover the necessary curation costs whether the specimens are housed at the park or a partner repository.
is initiated by an outside researcher,	the curator should work with the permit coordinator to review study proposals and ensure that a proposal includes a plan for cataloging and care of collected specimens and specifies responsible parties, including responsibility for funding these tasks.

Both Director's Order #24 and Director's Order #77 state that it's the superintendent's responsibility to ensure projects include curation costs.

11. *What is benefits sharing?*

Benefits sharing occurs when the NPS enters into an agreement with another entity to share in monetary or non-monetary benefits from a discovery or invention that:

- has potential commercial value
- results from research originating under an NPS Scientific Research and Collecting Permit, or other permit or authorization.

In 2010, following completion of an Environmental Impact Statement, NPS issued a Record of Decision to enter into benefits sharing. Policy (DO 77-10) and procedural guidance specific to benefits sharing will provide further information regarding implementation. Although curators aren't likely to be responsible for negotiating benefits-sharing agreements, they may be involved in the negotiations. They must ensure that standard clauses on benefit sharing are included in loan agreements and other agreements involving curation and use of specimens. They will also have responsibility for tracking museum specimens and parts that result from research using specimens collected from NPS lands.

See DO 77-10: NPS Benefits Sharing and the associated *Benefits-Sharing Handbook*.

12. *What is a benefits-sharing agreement?*

The Scientific Research and Collecting Permit General Conditions, loan agreements, and other similar authorizations for research use of collected specimens require users with potential commercial applications for their research results to enter into an approved benefits-sharing agreement with NPS or obtain other NPS authorization prior to commercialization**.**

If…	***Then…***
the researcher develops research results using collected park specimens, and the results become part of a commercial application,	the researcher must enter into an approved agreement with the NPS wherein the NPS will share benefits or decline to share benefits.

13. *What if no specimens are collected?*

Even if no natural history specimens are collected during a project, the data collected from a project is of value to the park. This data may include but is not limited to:

- field notes and observations
- records of weather conditions
- sound recordings, such as bird calls
- maps
- photographs of geologic or stratigraphic sections of the geology
- reports

The park should catalog this material as resource management records and maintain the materials in the park archives. See Sections P, Q, R, and S for information on associated records.

14. *How do parks handle permits for multi-park collecting projects?*

Using RPRS, researchers have the option of applying to more than one park for a multi-park collecting project. In most cases, staff at each individual park will analyze the proposed study and process the application. Parks adjacent to each other geographically or managing similar resources may agree to approve a single permit for a multi-park project. The permit would cover field activities at more than one park unit. If this occurs, one park will normally take the lead responsibility for processing the permit application.

The lead park ensures that staff at all the parks involved with the study are aware of the proposed activities. The lead park also ensures all the parks in the project are involved in the analysis of the study proposal. Before applying for a multi-park permit, it's the responsibility of the applicant to review each park's specific conditions.

See Section S in this appendix for information on cataloging associated records for multi-park or network projects.

E. Accessioning Natural History Collections

1. *Must I accession NPS natural history specimens into the park museum collection?*

Yes. Both regulation (36 CFR 2.5g) and NPS policy require that natural history specimens be accessioned into the museum collection. NPS *Management Policies 2006* states:

4.2.3 Natural Resource Collections
Field data, objects, specimens, and features obtained for preservation during inventory, monitoring, research, and study projects, together with associated records and reports, will be managed over the long term within the museum collection. Specimens that are not authorized for consumptive analysis remain federal property and will be labeled and cataloged into the NPS cataloging system (ICMS, or its successor) in accordance with applicable regulations (36 CFR 2.5).

> ***Accession specimens and their associated data. The associated data becomes part of the park's archives. You must also accession the project data for projects that don't generate specimens.***

2. *How do I accession natural history collections?*

Follow the procedures in the *Museum Handbook*, Part II, Chapter 2. Most natural history collections are accessioned as field collections. Assign one accession number to each project. However, one project may have multiple permit numbers over time.

Note: The collector must give you information for accessioning the specimens. You must assign an accession number to the collection and give the number to the collector.

3. *When do I accession natural history collections?*

There are two different approaches on when to accession collections:

- You can begin the accessioning process before the final approved permit is released. Withholding the release of the permit provides an incentive for the researcher to contact the park curator for an accession number.

- You can wait until you receive information on the specimens that have been collected to assign an accession number.

When you assign an accession number, discuss with the researcher what information the park needs for collected specimens. The discussion should also include the need for the resource management records, such as notes, photos, and reports.

There should be a single accession number for multi-year projects that generate new natural history specimens each year.

Note: For multi-year accessions, adjust the number of items in the accession after the first year. Note that the adjustment is due to a multi-year accession. You can mention the additions to the accession in the

Noteworthy section of the Collections Management Report (CMR).

See the *Museum Handbook*, Part II, Chapter 2, Section N, for information on multi-year accessions.

4. *What information do I need for an accession?*

Questions to ask when accessioning natural history collections include:

- Do I have the principal investigator's name, contact information (including phone numbers and email), professional affiliation, and home institution?
- What is the study number of this project?
- Is this a new study or an ongoing one?
- Does the research involve more than one park? The collector needs an accession number from each park in which specimens are collected. If only data are collected:
    - a lead park can assign one accession number for all the data, or
    - each park can assign an accession number for park-specific data
- Will specimens be permanently maintained or consumed in analysis? If consumed in analysis, the deliverables must include a list of specimens collected and the results of the analysis.
- Will the specimens be housed at the park or at a partner institution as a repository loan? Do I need to prepare loan forms or a repository agreement?
- Have all of the specimens been identified, or do some specimens need to be sent to a specialist in order to confirm their identification?
- Are all specimens properly prepared according to the professional standards of the discipline? Are they stored in appropriate storage containers with labels? Have the methods of preservation and chemicals used been recorded? For example, in the case of wet specimens, the formula/name for the fixative and preserving fluid should be recorded.
- Do any of the specimens require special storage that cannot be provided by the park?
- At the time of curation does each specimen have the appropriate NPS label?
- Does the park have a copy of the field notes, maps, photographs, or other records related to the specimens being accessioned?
- Have arrangements been made for the investigator to provide the park with a copy of any publications based on the specimens, such

as technical publications or project reports?

- Has a follow-up mechanism been arranged in case the investigator has forgotten to provide any research data or copies of reports?
- Has the investigator provided the park with information on the special status of any of the specimens, such as type specimens, rare or endangered species?
- Has the investigator provided the park with copies of any required permits associated with the project issued by other government agencies such as the Fish and Wildlife Service?

5. *Can the NPS convey ownership of natural history collections from park lands?*

No. NPS natural history specimens have ongoing and increasing public benefit and value for park resource management, science, and education. The NPS has authority to control, possess, and manage these collections, which are federal property. As long as these collections conform to NPS mission and policy, the NPS has no authority to convey them to other entities.

This topic is specifically addressed at the RPRS website at https://science1.nature.nps.gov/research/ac/html/CollectionFAQ.

Note: The NPS doesn't convey ownership of specimens, but does encourage their use through long-term loans to appropriate repositories.

6. *May I exchange duplicate specimens?*

No. Species are morphologically and genetically heterogenous, such as males vs. females or different developmental stages in insects. Species also may vary over time. There may be seasonal changes, such as coloration in the feathers of ptarmigans. There may be anatomical changes as an animal becomes older. There are also often geographic differences, such as body size. For example, the small Key Deer in Florida and the large White-tailed Deer in Pennsylvania are the same species. The closest example of a possible duplicate specimen would be multiple clippings of leaves and branches from a single plant collected at one time. There is no such thing as a true duplicate specimen in a natural history collection. This is especially true since modern studies often examine multiple distinct populations and the genetic differences within a species over a broad geographic area. Samples from the same species may be collected at different times of the year or over a long period of time. Analysis of samples of the same species collected at different times may help identify changes to this park resource. Further, multiple specimens collected from the same individual, such as a plant, may have separate histories as museum specimens. For example, each specimen may be subjected to different studies and analyses or different storage environments that affect its long-term preservation and usefulness for research.

Some disciplines, most often botany and entomology, can easily acquire multiple examples of a single species from a single locality. There is a long-standing tradition of exchanging these "duplicates" with other institutions to enhance and diversify their collections. Specimens collected from within a park may be loaned to a secondary institution. As with all NPS specimens, these remain NPS property, must be cataloged in ICMS with a separate catalog number, and tracked as a loan. The collecting institution cannot use NPS specimens in an exchange with another institution in order to enhance their own collections.

7. *Can I loan natural history specimens?*

Yes. You can loan natural history collections:

- to a reputable researcher working out of a cultural, educational, or scientific institution for the purpose of research, but the specimens may not be used for commercial purposes without prior authorization, and the loan is to the institution, not the researcher

- to a non-NPS partner repository for the purposes of long-term collection management

- for the purpose of exhibition

You may not lend natural history specimens to private individuals.

8. *What procedures must I follow when loaning natural history collections?*

Document loans using the Outgoing Loan Agreement (Form 10-127 Rev.) See the *Museum Handbook*, Part II, Chapter 5, Outgoing Loans, for loan procedures. For repository agreements, use the loan agreement as a way to track the transaction in the Interior Collection Management System (ICMS). You don't have to have the agreement signed by the repository. See Section M of this appendix for information on repository agreements.

Note: You can prepare a complete list of specimens for the loan agreement after the collection is fully processed. Use the accession number on the loan form until the complete list of specimens has been prepared.

9. *Can I deaccession natural history collections?*

Yes, you can deaccession natural history collections but only under the following categories:

- loss, theft, or involuntary destruction

- voluntary destruction due to damage

- destructive analysis

Natural history specimens collected on park lands in compliance with 36 CFR 2.5g cannot be deaccessioned as outside the park's scope of collections. This means they **cannot** be:

- transferred

- exchanged

- conveyed (donated)

See the *Museum Handbook*, Part II, Chapter 6, Deaccessioning, for deaccession procedures.

Note: Check with the appropriate regulatory agency before deaccessioning Threatened and Endangered species or other specimens requiring permits to collect. See Section C, Question 10 for information on protected species.

10. *What documentation is required for unaccessioned specimens consumed through analysis as part of the research project?*

36 CFR, Chapter 1, Part 2, Section 2.5, g (2) states: Specimens and data derived from consumed specimens will be made available to the public and reports and publications resulting from a research specimen collection permit shall be filed with the superintendent. The data are part of the project records and cataloged as part of the archives.

11. *What documentation is required for cataloged specimens consumed through destructive analysis?*

A specimen or part of a specimen may be consumed in analysis. A copy of the report on the analysis must be furnished to the park. Place the report in the accession file for that specimen. If an entire cataloged specimen is consumed during analysis, the specimen is deaccessioned. Follow the deaccession procedures for Destructive Analysis in the *Museum Handbook*, Part II, Chapter 6. Keep the catalog record in the database, but note that the specimen no longer exists. Don't reuse the catalog number.

F. Cataloging Natural History Collections

1. *Where do I find procedures for cataloging natural history collections?*

See the *Museum Handbook*, Part II, Chapter 3, Cataloging, for general procedures on cataloging. See Chapter 2 of the *ICMS User Manual* for procedures on cataloging biology, geology, and paleontology in ICMS.

2. *Who is responsible for cataloging natural history collections?*

Responsibility for cataloging natural history collections depends on who made the collections.

If the collections are made by…	***Then…***
NPS staff,	NPS staff catalog the collections. This may require hiring seasonal employees or other temporary staff to complete the work, and those costs should be part of the project budget.
non-NPS staff,	the collector or contractor conducting the permitted research within the park must ensure that all collected specimens are cataloged.

3. *Who pays for cataloging natural history collections?*

Director's Order #24 specifically requires that budgets for project-generated collections include funding for cataloging. This includes projects that parks initiate.

Unless otherwise stated in a permit, the permit's General Conditions require permittees to accomplish this work within the scope and budget of their projects.

See the RPRS web site at:
https://science.nature.nps.gov/research/ac/html/CollectionFAQ.

https://science1.nature.nps.gov/research/ac/html/CollectionFAQ.

Note: Parks need to address the catalog backlog for all natural history collections. Enter projects in the Project Management Information System (PMIS), and catalog backlogged collections when funded.

4. *What materials for cataloging collections must I give to the collector?*

Before the end of the project, you must give the collector:

- an accession number for the collection
- a block of catalog numbers (when the researcher knows the quantity needed)
- instructions on submitting the data in the appropriate electronic format for importing into ICMS, including the data fields to include
- the ICMS program and the *ICMS User Manual*, if the collector will be using ICMS to catalog
- sample catalog records, and instructions on printing labels from ICMS, if the collector is using ICMS

Note: Track the catalog numbers that you issue for each accession. Check to make sure that the collector has used all the numbers.

5. *Must I use ICMS to catalog natural history collections?*

Yes. However, you can import/export catalog data into ICMS from other software applications, such as Excel and Access. It's critical that the curator work with the collector to determine the appropriate application, data fields, and format for importing data. See Section IV of Chapter 8 in the *ICMS User* Manual for information on importing and exporting data. You can access the manual online at http://nps.gov/history/museum/publications/ICMS.html.

Note: A park can give a copy of ICMS to a collector or non-NPS repository to catalog NPS collections. The installation software includes a contractor agreement form. Have the collector/institution complete the form and send a copy to Re:discovery Software, Inc.

Excel templates will be available on the RPRS web site for the import/export of ICMS natural history catalog records at:
https://science/nature.nps.gov/research/ac/html/CollectionFAQ

6. *What fields on the catalog record must the collector complete?*

You can determine the catalog fields that you want the collector to complete. This will vary by discipline. For example, plant specimens should always include a family name. At a minimum, the collector should complete the following DOI mandatory fields for natural history collections. Encourage the researcher to complete all the data fields for which there are data.

- Catalog Number
- Accession Number
- Class 1(Class 2-4 for Geology)

- Kingdom
- Phylum/Division
- Class
- Scientific Name: Genus and Species
- Object Scientific Name (Geology)
- Item Count or Quantity and Storage Unit
- Collection Number
- Collection Date
- Collector
- Condition
- Cataloger
- Identified By
- TRS, UTM/Z/E/N, or Lat/Long
- Period/System (Paleontology and Geology)
- Formation (Paleontology and Geology)

Note: Collectors can enter the mandatory data in another software application, such as Excel or Access. The fields in the software must be compatible with ICMS fields and must be easily imported into ICMS.

7. *Who is responsible for cataloging the documentation associated with the specimens?*

The park is responsible for cataloging the associated documentation. Refer to Sections P, Q, R, and S in this appendix for information on associated records. The permit may include park-specific guidance for submission of the associated documentation. Providing this guidance can decrease the time needed to process and catalog the documentation.

Note: The collector might not turn the field records over to the park until he/she has published or produced a final report. This may take several years. The park should track outstanding field documentation until the collector turns it over to the park.

8. *Who is responsible for monitoring the accuracy of the records?*

The collector should send the completed electronic database to the park for review. The permit conditions should state that the collector must make corrections or changes to the database based upon park review. It's a good idea to review the database at the start of cataloging in order to catch problems early.

Incorrect information with a specimen is worse than no information. It can lead future researchers studying the specimen to draw incorrect conclusions. Always note on the catalog record any question as to the accuracy or validity of the associated data. Never guess or speculate regarding a data entry. Whenever possible double check with the researcher regarding any unclear information pertaining to the specimen.

9. *What documentation must the collector submit to you?*

The collector must submit:

- approved electronic copies of the catalog data
- copies of all associated documentation

Note: When the park submits the records to the National Catalog, the National Catalog will print paper copies of the catalog records at the park's request.

10. *Who prepares the natural history labels and marks the specimens?*

The collector is responsible for marking the specimens (as needed) with the catalog number and labeling the specimens. See the General Conditions for Scientific Research and Collecting Permit and D.O. #24 Section 4.3.16.

The park can provide the collector with printed NPS labels from ICMS using the collector's database.

Use the field collection number as a reference until the collections are labeled.

See Sections N and O in this appendix for marking techniques.

The National Catalog can print wet specimen labels on a thermal printer at the park's request. See Figure H.5 for information on wet specimen labels.

11. *How do I track changes in scientific names?*

It's impossible for any one individual to be aware of all the potential changes in the scientific names of specimens in the park collection. This is due to the diversity of organisms in parks and ongoing taxonomic studies in many different groups. Curators often depend on park natural resource staff or outside researchers to inform them of changes in scientific names.

The inclusion of the Integrated Taxonomic Information System (ITIS) database in the natural history section of ICMS partially solves the challenge of updating scientific names. The National Museum of Natural History (NMAH) maintains the ITIS database. NMAH staff enter updated taxonomic information on a regular basis. Re:discovery Software, Inc., downloads the updated taxonomy annually and provides copies of the updated database to the parks. One function in the natural history portion of ICMS is the Mass Taxonomy Update, located under Edit on the Menu bar. Using this function will replace older (invalid) scientific names with the current accepted (valid) scientific name for the specimen.

ICMS tracks changes to scientific names in the Scientific Name supplemental record. See Chapter 3, Section XXII in the *ICMS User Manual* for information on this record.

12. *What is NPSpecies?*

NPSpecies is the NPS master database for documenting the occurrence and status of species in parks. The database includes data from more than 270 National Park units that contain significant natural resources. NPSpecies allows data integration and sharing across parks and with other agencies and organizations. The database contains standardized information associated with the occurrence of species in parks, including:

- scientific names and their synonyms
- common names
- abundance
- residency
- nativity
- T&E status
- reasons why a species may be of particular management interest to a park (for example, invasive, weedy, overabundant, globally or regionally rare, state-listed species)
- a cross reference of historical and currently-accepted scientific names using the Integrated Taxonomic Information System and the USDA PLANTS database as the taxonomic standards

Note: See Section K in this appendix for an explanation of the ITIS database.

Within NPSpecies each species record is supported by evidence in the form of:

- voucher specimens (both in park collections and outside repositories)
- references (scientific reports or datasets), *and/or*
- observation records that document the occurrence of the species in the park

Records are managed in a standard data structure and are periodically verified (certified) by subject-matter experts. The goal is to provide high quality, scientifically-credible, and continually improved data to users.

Due to data availability and funding constraints, the initial focus of NPSpecies has been on vertebrates and vascular plants in 270 parks. However, the data system is designed to manage species information for all taxa and all parks.

Part of the initial data used to build the NPSpecies database came from park natural history museum collection records. For many species, these specimens provide the primary documentation of the presence of a species in the park. Ongoing research in parks, BioBlitzes and ATBIs are increasing the number of species known for parks. Museum specimens generated by these projects will continue to serve as the primary vouchers documenting the new species records. NPSpecies will continue to rely on NPS museum records to ensure the accuracy of their database.

More information on the NPSpecies can be found at: https:/irma.nps.gov/App/Species/Welcome/.

13. *How do I handle cataloging for multi-year projects?*

The number of specimens collected each year will determine how quickly a researcher can get them properly preserved, identified, and cataloged. After the end of each field season, the researcher should have an estimate of how many specimens were collected. The researcher should request sufficient catalog numbers from the park curator to cover the sample. Over the course of a multi-year study, the researcher should be providing the park curator with catalog records on a regular basis. The researcher should not wait until the end of the project to start the cataloging.

It's the park curator's job to inform the park research coordinator of any problems regarding a researcher's cataloging. For multi-year studies, the renewal of a research permit each year should be contingent on the submission of catalog records. The researcher should submit catalog records for some or all specimens collected the previous year, depending on the number of specimens.

The NPS provides the funding for some multi-year projects. For these projects, release of funds may also be made contingent on the timely submission of catalog records.

G. Recording Locality

1. *Why is locality information important?*

Providing accurate and complete locality information for a natural history specimen is absolutely critical to ensuring its scientific value. Locality information is needed for scientific study and as the basis for resource management decisions. It may also have important legal implications. For example, locality data can confirm whether an endangered species or poached specimen was collected from inside or outside a park.

2. *What are the two types of locality information?*

Locality information may be descriptive or may be based on a coordinate system. Universal coordinate systems are the Universal Transverse Mercator (UTM) or longitude and latitude. Coordinate systems allow the specimen data to be included in a Geographic Information System (GIS) and utilized with other data in spatial analysis.

ICMS has fields to record a locality both descriptively and by using coordinate information. Descriptive locality information may include how to reach the locality from a specific starting point. The more details that are provided the easier it is for future researchers to relocate the spot where the specimen was collected.

There is a distinction between directions to find a locality (example 1) and a description of a locality (example 2). Both are valid information in a catalog record.

Example 1: Drive north on Highway 4 from the park visitor center 1.2 miles, and turn left on the dirt road on the west side of the highway, and continue until the road ends. Fossils were collected at the base of the cliff at the end of the road.

Example 2: The spring on the north side of Arroyo Seco, 100 yards south of where county road 10 crosses it in Sandoval County, New Mexico.

The two sources of information are complementary and provide varying degrees of precision. Both may not be necessary or available. For historical specimens collected before GPS and in areas lacking topographic maps, only a description of how to find the area where the specimen was collected was possible. If sufficient details were recorded it is often possible to find the locality and collect GPS data after the fact.

The level of descriptive details provided depends on the specimens collected and the standards for a discipline. For insects this may be very specific, as a species may live in a very small type of habitat. For a species of tree, the habitat may be very large, and the required level of precision is not as critical.

3. *Does ICMS include coordinate system fields for recording a locality?*

ICMS has fields for recording three types of coordinate systems. Including data for at least one of these systems is mandatory. All GPS data is collected relative to one of two datums: NAD 27 or NAD 83. At the time the GPS reading is made, the datum used should be recorded.

North American Datum of 1927 (NAD27) is a datum based on the Clarke ellipsoid of 1866. The reference or base station is located at Meades Ranch in Kansas. There are over 50,000 surveying monuments throughout the US, and these have served as starting points for more local surveying and mapping efforts. Use of this datum is gradually being replaced by the North American Datum of 1983.

North American Datum of 1983 (NAD83) is an earth-centered datum based on the Geodetic Reference System of 1980. The size and shape of the earth was determined through measurements made by satellites and other sophisticated electronic equipment. The measurements accurately represent the earth to within two meters.

There are differences in the two ellipsoids ranging from 200-300 feet in the western US to several tens of feet in the central and eastern US.

Note: For older specimens that don’t have coordinate data, enter “Unknown” or “Not Provided” in the Latitude/Longitude field.

4. *What is the Land Survey System?*

Historically, data was recorded using the Land Survey System which includes:

- Township, Range, Section Number (1-36) and
- quarter sections (NW, SW, NE, and SE) up to three times

A Township is a square 6 miles on a side, so it covers 36 square miles. It contains 36 Sections, so a Section is one square mile, and the first quarter Section is one quarter of a square mile (160 acres). That Section is divided again in quarters (40 acres) and is divided into quarters again (into 10 acre plots). Much of the legacy data for natural history specimens contains this type of information.

The map name on which the Township, Range and Section are located is identified as a Quadrangle (or Quad). The name should be recorded along with the scale of the map, which is usually 1:24,000. However, maps with other scales may be used.

5. *What is the most prevalent way to record locality today?*

Much of the current coordinate data collected during research projects is obtained using satellites and the Global Positioning Systems (GPS). The data are recorded either as UTM or latitude and longitude.

6. *What is the UTM coordinate system?*

The Universal Transverse Mercator (UTM) coordinate system is a grid-based method of specifying locations on the surface of the earth. The UTM system divides the surface of the earth between 80° S latitude and 84° N latitude into 60 zones. Each zone is 6° of longitude in width and centered over a meridian of longitude. Zones are numbered from 1 to 60. Zone 1 is bounded by longitude 180° to 174° W and is centered on the 177th West meridian. Zone numbering increases in an easterly direction. Each zone is further identified as being either North (N) or South (S) depending on whether it's in the northern or southern hemisphere.

The point of origin of each UTM zone is the intersection of the equator and the zone's central meridian. Within the zone the locality is further specified by the easting and northing coordinate pair. The easting is the projected distance of the position from the central meridian. The northing is the projected distance of the point from the equator. Both are distances measured in meters (m). The easting is identified by 6 digits, and the northing by 7 digits. If a geology specimen was collected at Old Faithful, the UTM coordinates would be given as Zone 12, 513833mE, 4922888mN.

In ICMS, the zone number, easting and northing are entered directly into the field and are separated by slashes.

7. *What is the latitude and longitude coordinate system?*

Latitude and Longitude is the coordinate system that describes a location on earth by two numbers -- its latitude and its longitude. These numbers are actually two angles, measured in degrees, "minutes of arc" and "seconds of arc." These are denoted by the symbols (°, ', "). For example, 35° 43' 9" means an angle of 35 degrees, 43 minutes and 9 seconds. A degree contains 60 minutes of arc, and a minute contains 60 seconds of arc.

The 0 reference line for latitude is the equator, and latitude is recorded as being north or south. The 0 reference line for longitude is the Prime Meridian, which passes through Greenwich, England. Longitude is recorded as being east or west of that line. If a geology specimen was collected at Old Faithful, the latitude and longitude would be given as 49° 27' 33" N, 110° 49' 34" W. The degrees may also be entered as decimal degrees, so the data would be givens as 49.4591° N, 110.8261° W.

H. Lot Cataloging Natural History Collections

1. *What is lot cataloging?*

Lot cataloging is a method of cataloging a group, or lot, of specimens rather than cataloging them individually. See the *Museum Handbook*, Part II, Appendix I, for additional information about lot cataloging. A variation of lot cataloging is bulk samples. See question H.4.

2. *What are the rules for lot cataloging natural history collections?*

The rules for lot cataloging natural history specimens depend on the taxa and the research objectives of the collecting project. In general, to lot catalog natural history collections, the lot must be:

- from the same accession
- from the same locale (same collection effort)
- from the same collection date
- from the same collector(s)
- studied together as a unit
- stored as a unit

Example:

Accession 1:	50 mixed insects and arachnids from a 5-minute sweep net sample
1 lot catalog record:	sweep net sample in a single vial of alcohol
Object/Specimen Name:	Sweep Net Sample
Quantification:	Item Count =50 and Storage Unit = EA
Accession 2:	thousands of insects from a single light trap that was run overnight
1 lot catalog record:	light trap sample in a single vial or jar
Object/Specimen Name:	Light Trap Sample
Quantification:	Item Count = 0, Quantity = 1, and Storage Unit = Vial or Jar
Accession 3:	10 dental and skeletal fragments from a paleontological specimen
Object/Specimen Name:	Coryphodon radians (genus and species)
Quantification:	Item Count = 10 and Storage Unit = EA

Incorrect lot cataloging can destroy the research value of a collection. The scientific integrity of any natural history collection depends on accurate information. The mixing of specimens with differences in their collection history or other attributes can result in faulty scientific analysis.

3. *How does lot cataloging relate to the research objectives of the collecting project?*

Some studies require collecting and studying samples that include many individual specimens. The collector collected the specimens as a unit and intends to study them as an assemblage. The definition of collection unit will, to some extent, be an arbitrary decision of the collector. The same is true for such collection data as date and time. For example, a light trap sample may represent hours of sampling time.

Locality is another variable. The collector determines if specimens collected within centimeters or meters of each other are from the same locality.

The cataloger will usually not have to be concerned with determining what to lot catalog. The researcher/collector has already made this decision as part of his/her research design. An object/specimen may be in many pieces and defined and labeled by the original collector as one collection unit.

4. *What is the difference between a lot sample and a bulk sample?*

A lot sample is composed of a single species, collected from one place at a single time. A bulk sample is composed of multiple species collected from a single place at a single time. A bulk sample may be kept intact because the important information is the relative number of individuals of each species. Subdividing it into smaller samples may result in loss of the information for which it was originally collected. A lot sample can be assigned to a specific taxon such as *Sardinops sagax*. It will have a specific number count such as 50 individuals. For a bulk sample, a general description will suffice rather than a specific taxonomy. Use the Description field to list the names of the species and the number of individuals for each species in the sample.

Examples of descriptive names for bulk samples:

- Plankton Tow Sample
- Water quality sample with insect larvae and other aquatic invertebrates
- Pollen sample
- Sediment sample with plant or mollusk remains

5. *What constitutes a natural history cataloging lot or unit?*

What constitutes a unit to be classified and cataloged varies among the different types of natural history specimens. Often a specimen consists of one physical unit or multiple components of one unit, such as:

- one complete species of plant, which may be mounted on one or more herbarium sheet(s)
- a complete study skin of a bird
- the bones in a skeleton
- group of seeds all collected at one time from one plant

Note: The definition of the specimen unit to be cataloged represents the judgment of what constitutes a single collection. Most of the time a cataloger will follow the specialist's decision in the classification and cataloging process. The collector/specialist will have already prepared, mounted, and labeled most collections. This in itself creates the definition of the collection unit and usually specifies the object/specimen name as well.

6. *Does lot cataloging vary from taxon to taxon?*

Yes. Mammals, birds, and reptiles are generally collected as individuals and are rarely lot cataloged. Smaller reptiles and amphibians are occasionally lot cataloged if they are collected on the same date from small sampling plots. Fish, particularly smaller, more common species, are frequently cataloged as a lot. Numerous specimens may be collected from a single seine haul or during electro-fishing or rotenone sampling.

Invertebrates are lot cataloged more than vertebrates. There are well-developed sampling techniques for invertebrates. For example, there are malaise traps, light traps, and pitfall traps for terrestrial arthropods. There are various grab, core, sled, or dredge samples for benthic and epibenthic organisms. There are a variety of net samplers for planktonic organisms.

Most plant specimens, like vertebrates, are collected as single individuals. Generally, give each herbarium sheet one catalog number. Count it as one item, even if the sheet has more than one plant of the same species. On occasion, numerous individuals of the same species are collected on the same date from a single sampling area. In these cases, you may lot catalog the specimens using more than one herbarium sheet. For example, if the specimens from the sample are on four herbarium sheets, give them all the same catalog number. Enter 4 in the Item Count field on the catalog record.

Assign one catalog number and lot catalog paleontological specimens that make up one individual. You can also lot catalog a matrix that has a mix of fossils from several individuals of the same species.

7. *What constitutes a herbarium specimen?*

One plant because of its size may be collected as a series of separate parts, such as:

- two flowering branches
- several leaves that are not physically attached to one another
- separate fruits or nuts that were originally part of one infructescence but are now separate

All of these parts might be mounted on one herbarium sheet and cataloged as a single specimen. In other cases, components may be too large or their cumulative size too great for a single herbarium sheet. They then may be mounted on multiple sheets but given a single catalog number.

Catalog plants separately when:

- multiple sets of parts are collected from a single plant for placement in separate repositories
- numerous plants of the same species are collected from a single sampling area and will be placed in separate repositories

8. *How do I catalog specimens in separate "pieces"?*

Some natural history specimens always consist of more or less separate "pieces" but are always maintained as a single item. Examples include separate bird eggs in a nest or loosely joined frog eggs that comprise a single egg mass. The context of these individual units is provided by the larger sample and their co-occurrence. Therefore they are cataloged as a single unit.

9. *How do I catalog multiple individuals or species that are in one physical unit?*

Some natural history specimens may be comprised of multiple individuals or even multiple species that are present in one physical unit. A common example is a piece of rock representing a piece of sea floor that contains fossils of a variety of different marine organisms. Samples or collections may be expressly made to:

- sample the diversity of biological communities
- provide information on the relative abundance of different species

Catalog these as a single unit. Examples include a sweep net sample from a stream and plankton samples.

10. *What is the maximum allowable taxonomic diversity within a lot?*

Taxonomic diversity means that the sample has more than one species in it. The amount of diversity will depend on the nature of the sample and the type of habitat from which it is collected. A plankton sample from the ocean may have many more species than one from a high mountain lake. There is no limit on the taxonomic diversity in a lot. It depends on the reason why it was collected. Maintaining the original sample intact in order to document the relative abundance of each species often provides the critical data and reason for the collection of the sample. The single sample may be treated as a lot. It may also be desirable as part of the research to separate out various taxonomic groups. The number of groups in each lot is determined by the lowest taxonomic level to which the specimens are identified when you accession them. This will vary depending on the:

- difficulty of identification within the group
- level of expertise of the collector, donor, or curator

11. *Are the procedures for lot cataloging bulk samples of natural history specimens different from cataloging specimens individually?*

No. The specific steps and guidelines for lot cataloging bulk samples are essentially the same as those you use to catalog specimens individually. Treat the entire lot (rather than the individual components of the lot) as a single specimen. Enter the number of specimens (or number of parts of one specimen) in the Item Count field in ICMS.

Use the Description field in ICMS to describe, in general terms the:

- contents of the lot
- specifics about the collection procedure, date, time of day
- associated data about climate and environment

Example: Approximately 50 *Daphnia pulex* in various stages of development from a ten-meter plankton tow using a 100 micron mesh plankton net.

If a taxonomic identification of the sample is not possible, then a general description will suffice, such as Plankton Tow Sample.

Place a completed NPS natural history label in the storage container for the lot. The label includes the catalog number and other pertinent information and identifies the lot. In some cases components of the lot have their own labels, such as pinned insects. It is not necessary to affix catalog numbers to individual items in a lot. A single specimen label for the sample is sufficient.

12. *What do I do if I need to remove specimens from the lot?*

Future researchers may use natural history specimens in different ways and for different reasons from the original collector. While a sample may originally contain multiple species, future researchers may want to focus on one species in that sample. In order to facilitate the research, it may be necessary to remove some specimens from the sample. When specimens are removed from the lot, assign them separate catalog numbers.

Having a link between the catalog number of the new record and the original is critical. Modify the original record to note the removal and separate cataloging of the specimens. For example, a fish specimen may contain internal parasites. A researcher studying fish parasites may remove the parasites from the internal organs. Catalog the parasites separately, but cross-reference the catalog records to show the relationship between the parasite and host species.

Scientists also frequently borrow specimens for identification purposes. You need to track specimens that you remove from a lot temporarily for study. Record the following information:

- a full description and count of the specimens
- the name of the person who will be responsible for them
- where they will be kept
- the date they were removed
- the date they are to be returned

If the specimens removed from a lot…	***Then track them…***
will be gone for less than 30 days,	with a Receipt for Property, Form DI-105.
will be gone for more than 30 days,	with an Outgoing Loan Agreement, Form 10-127.

Refer to the *Museum Handbook*, Part II, Chapter 5, for information about loans.

Place an Object Temporary Removal Slip, Form 10-97, or a note with the remainder of the lot. Refer to the *Museum Handbook*, Part II, Chapter 4, Section II, for information about Form 10-97. Record the same information on the note as in the list above. Use black ink on acid-free paper.

13. *What if specimens in a lot are recataloged?*

In the course of future study, it is likely that researchers will identify or re-identify specimens within a lot. Assign individual catalog numbers to single specimens or smaller lots of specimens. For example, a specialist may use environmental monitoring samples to document changes in species diversity over a period of twenty years. During that time, the specialist may identify all or some of the specimens in the original lot. As this happens:

- store the identified specimens with other fully identified specimens of the same or related taxon
- cross-reference to the catalog record for the original lot
- adjust the Item Count field for the original lot to show the removal of specimens
- include a cross-reference on the original record to the catalog records for specimens that have been removed from the lot

Note: If a specialist identifies many specimens of a single species from a lot, you can create another lot catalog record at the species level.

I. Taxonomy and Classification

1. *What is the difference between identification and scientific classification?*

Identification is the job of the specialist. The collector or specialist identifies the genus and species of a specimen (for biological and paleontological specimens) or the type of rock or geological sample.

At the time of cataloging, a natural history specimen may have a field label that records:

- the location where the specimen was collected
- date of collection
- other pertinent information

Many natural history specimens may only have a field tag with a collection number. This depends on the types of specimens at the time of cataloging. The number links the specimen to data recorded in field notebooks. Other field labels may record more information, such as:

- the location where the specimen was collected (either descriptive or with GPS coordinates)
- date of collection
- other pertinent information, such as type of habitat the specimen was collected in or field measurements, such as body dimensions and weight

Classification places specimens within a taxonomic framework, which facilitates retrieval of data tied to the specimen. It may also determine where a specimen is placed in the collection. Taxonomy is the orderly classification of biological collections according to their presumed natural relationships. It is used in different formats to determine how a collection will be organized.

Cataloging a specimen requires including its classification. In the context of cataloging, classification is **not** the process of identifying and classifying an organism from "scratch." Ideally, the specimens have been fully labeled. The researcher who collected the specimen usually provides the classification information. The park curator must ensure that the appropriate data fields related to the taxonomy of the specimen are completed accurately by using the:

- field label/tag
- associated research data, *and*
- classification provided in the Integrated Taxonomic Information System (ITIS) module in ICMS

Note: While both biology and paleontology utilize the same classification structure, this structure is different for geology. See the Hierarchical Classification Outline for Geology at the end of this appendix for information about classifying geology specimens.

2. *How does taxonomy affect the organization of my natural history collection?*

The organization of most biological collections and some paleontological collections is by taxonomy. Classifications and taxonomy are information retrieval systems based on a set of formal relationships. Therefore an individual familiar with the taxonomic relationships of a group of organisms can quickly find the specimen of interest.

Modern classification systems reflect the phylogeny (the history of a lineage as it has changed through time) of an organism. These systems are arranged from early primitive forms to later more advanced or derived forms.

Traditionally, the formal classification of a group is the basis for organizing most natural history collections. Classification differs depending on the group of organisms. The primary organization of biological and paleontological collections starts with the separation of the plant and animal kingdoms. These are the zoology and botany areas. Within each of these broader categories, the collections may be arranged in order:

- by phylum
- within phylum by class
- within the class by order
- within order by family
- by genus

- by species

Eventually all of the same species within a genus are stored together in one area.

Note: Collection organization also needs to address health and safety issues. For example, in many collections, the types of preservation, such as wet specimens in alcohol, may determine the collection organization.

3. *Does the organization of a biological collection always strictly follow taxonomy?*

No. While most collections of animals follow this strict phylogenetic order, plant collections often do not. Often herbarium collections are organized alphabetically by taxonomic groups. Alphabetical organization facilitates finding specimens more quickly. Herbaria are often organized alphabetically by:

- family without regard to class and order,
- genus within a family
- species within a genus

4. *Why is having the complete taxonomic hierarchy so important?*

Researchers use the database to determine what specimens pertinent to their research are available in the collection. They may search at different taxonomic levels: family, subfamily, tribe, genus, or species. An accurate and current taxonomy ensures that specimens can be easily and quickly located so that researchers will receive the appropriate specimens for their research. Taxonomy often determines the order in which biological specimens are stored and their location within the collection or cabinet. An incorrect taxonomy, such as an incorrect or invalid scientific name, may result in a specimen being misplaced in the collection. The specimen is then difficult to locate. Use of such a specimen as a reference specimen, may result in the incorrect identification of a new specimen.

5. *Are there other ways that parts of a natural history collection may be organized?*

Fossil collections may or may not be organized taxonomically. If a strict taxonomic arrangement is used then it would be in a phylogenetic sequence:

- from the most primitive phylum (single-celled organisms such as foraminifera)
- to the most advanced (vertebrates)

Alternatively, many fossil collections are primarily organized chronologically (biostratigraphic) from the oldest to youngest using the geological time scale:

- by period
- within period by epoch.

Within each time period, the second level of organization is:

- by locality (country, state, county, specific locality)
- within an individual locality taxonomically by class, order, family,

genus and species

For vertebrates there may be a fourth level of organization. A particular species may be organized by individual skeletal elements preserved from a single site. This organization is dependent on the number of bones.

6. *What are taxonomic rank suffixes?*

For many taxonomic ranks the suffixes of the names are standardized. ITIS provides these standardized names. For names that aren't in ITIS, spelling the user-defined name correctly with the appropriate suffix is important. Some of these suffixes only apply to specific groups of organisms. Standard suffixes include:

- Phylum – There is no standard name ending for animals, but for plants the Division name should end with *"-phyta,"* and for fungi it should end with "*-mycota*.*"*

- Subdivision – Plant names end with "*-phytina*,*"* and fungi names end with "*-mycotina*.*"*

- Class or a subclass – Plant names end with "*-opsida"* (class) and *"idea*,*"* but not "*-viridae*.*"* Algae names end with "*-phyceae"* (class) and "*-phycidae"* (subclass). Fungi names end with "*-mycetes"* (class) and "*-mycetidae"* (subclass).

- Order - In birds and fish names end with "*-iformes*."

- Superfamily – In animals names end with "*-oidea*."

- Family – Animal names end with "*-idea*." Plant names end with *"-aceae*.*"*

- Subfamily – Animal names end with "*-inae*." Plants names end with " *–oideae*.*"*

- Tribe – Animal names end with "*–ini*." Plant names end with "*-eae*"

- Subtribe – Plant names end with "*-inae"* (but not "*-virinae"*).

Lichens are a symbioses of two organisms -- a fungus and algae. Taxonomically lichens are classified by their fungal components.

7. *Is there any difference in the classification used for biology and paleontology?*

No. Biology and paleontology use the same system of taxonomy. The classification fields in ICMS are the same for both biology and paleontology. The classification scheme for both disciplines is:

- Class 1 = Biology or Paleontology

- Kingdom

- Phylum/Division

- Class

- Order

- Family

In the ITIS database created to standardize the taxonomy used by U.S. federal agencies that work with biological organisms there are currently 6 Kingdoms of life recognized. Other researchers may recognize other Kingdoms, but for the purposes of the taxonomy used in ICMS the six used are:

- Animalia (animals)
- Chromista (algae whose chloroplasts contain chlorophylls *a* and *c*, formerly included in the Protista or Protozoa)
- Fungi (fungus and lichens)
- Monera (the true bacteria eubacteria, the true bacteria, and cyanobacteria, blue-green algae)
- Plantae (plants)
- Protozoa (unicellular eukaryotes such as amoebas and ciliates)

Since paleontology includes many extinct forms, it includes classification hierarchy groups not represented in biology.

8. *How do I classify unidentified specimens?*

No single individual possesses the background knowledge necessary to identify all natural history specimens that might be present in a park. Park curators will depend on the expertise of the individual creating the collection to provide current and accurate taxonomic identifications of biological and paleontological specimens. While ITIS is the primary taxonomic source used by the NPS, it does not contain taxonomic information for all groups. When missing taxonomic information for a collection that is not in ITIS, check with the researcher for the missing information. You can also ask the researcher to recommend references that will provide the necessary information. Some examples are provided in the Taxonomic Resources and References in Section T.

Note: Sometimes a specimen cannot be fully identified. If you don't know the classification, you may use Unidentified in the classification fields as needed. Refer to the Biology, Geology, and Paleontology sections of Chapter 2 in the *ICMS User Manual* for specific instructions.

9. *Where can I find classification aids?*

It's impossible to provide a list of references to every taxonomic group. However, the publications and web pages in the bibliography in Section T may prove useful. These are examples of taxonomic resources and aren't comprehensive in their coverage. The classification of many groups is now accessible on the internet. As in all cases of using the web, consider the source of the information before utilizing it. Whenever possible consult with the researcher who provided the identification to find out the complete classification.

Many organizations have created databases that provide quick access to classification information. It's important to recognize that not all of these databases will provide the exact same classifications. This is because taxonomic classification is a dynamic discipline. Researchers and specialists will have differing opinions on an organism's scientific name and its relationship to other organisms. Both of these factors will affect classification. Different specialists may assign a particular species to different genera. A particular genus may be placed in different families and so on. It would make life easier for a cataloger or collection manager if there was a consensus on an organism's classification. However, this is not often the case, and is not likely to ever change.

10. *What is the HCO?*

The NPS developed and used the Hierarchical Classification Outline (HCO) to classify natural history specimens. The NPS now uses ITIS as the taxonomic standard. The NPS no longer uses the HCO for biology and paleontology, but still uses the HCO to classify geology.

The Geology HCO appears at the end of this appendix.

11. *What is a type specimen?*

The term "type" forms part of many compound terms used by taxonomists to distinguish between particular kinds of specimens. Only some of these are name-bearing types; that is the name created is directly tied to a physical specimen. The International Code of Zoological Nomenclature or International Code of Botanical Nomenclature regulates three categories of specimens:

- Holotype
- Lectotype
- Hapantotype

Holotype

Whenever a new species of an organism is described in a scientific publication, the author must identify the specimen upon which the new name is based. This single specimen is called the holotype. A holotype is the original specimen upon which a new scientific name is based. The holotype carries with it a special value as the standard reference by which other specimens may be assigned to that species. The NPS designates **ALL** holotypes, whether for modern or fossil specimens, as controlled property (requiring inventory every year).

Paratype

An author may identify in a publication that multiple specimens were used as the basis of describing a new species. This is the Type Series and includes all the specimens on which the author established a nominal species-group taxon.

After the holotype has been labeled, any remaining specimens of the type series should be labeled as a "paratype." Paratypes identify the components of the original type series.

Syntype

Syntypes are specimens of a type series that collectively constitute the name-bearing type. These specimens may have been expressly designated as syntypes. For a nominal species-group taxon established before 2000, all the specimens of the type series are automatically syntypes if neither a holotype nor a lectotype has been specifically identified. When a nominal species-group taxon has syntypes, all have equal status in nomenclature as components of the name-bearing type.

Lectotype

At times a specific specimen was not identified in the original publication as the holotype. A later researcher may then designate a lectotype from among the syntypes. The lectotype becomes the unique bearer of the name of a nominal species-group taxon and the standard for its application.

Neotype

A neotype is the name-bearing type of a nominal species-group taxon designated under conditions specified when:

- no name-bearing type specimen (holotype, lectotype, syntype or prior neotype) is believed to be extant, *and*
- an author considers that a name-bearing type is necessary to define the nominal taxon objectively

Allotype

The term "allotype" may be used to indicate a specimen of opposite sex to the holotype. An "allotype" has no name-bearing function.

Hapantotype

A "hapantotype" consisting of one or more preparations or cultures may be designated when a nominal species-group taxon of extant protistans is established. This hapantotype is the holotype of the nominal taxon.

12. *What is a voucher specimen?*

A voucher is a natural history specimen specifically collected to be preserved in a museum collection. Voucher specimens document the presence of a biological organism or other natural history specimen from a specific location at a specific time.

13. *How does a voucher specimen differ from a photo "voucher"?*

Photo "vouchers" are not vouchers in the scientific sense. They don't provide detailed information about the species except the data recorded when the photo was taken. The data provides date and location plus any other information entered into the field notes. Photo vouchers don't provide DNA or permit examination for:

- toxic substances
- isotope studies
- parasites
- details of anatomy
- other information that may be of interest to future researchers
- the anatomical details necessary to ensure accurate identification for closely related species or subspecies

Photo "vouchers" may be taken when a researcher is working with an endangered or threatened species. Photo "vouchers" may be taken when obtaining an original specimen is not permissible, possible, or practical. Photo "vouchers" should **NOT** be treated like an original specimen or cataloged into ICMS as an original specimen. Treat the photo and associated data as an archive record. File the photos as part of the documentation of the project.

Likewise, sound recordings of birds, insects or other organisms, can serve as a “voucher” for the presence of an organism. Treat these as archive records and not as actual specimens.

J. Scientific Name

1. *What is a scientific name?*

A scientific name is the genus and species names that the specialist or collector assigns to the specimen. The species may include a modifier, an authority, and a year. There are several sub-specific categories that may be part of the name:

- subspecies, authority and year
- variety, authority and year
- forma, authority and year

Note: To find the scientific name of a specimen, check the field tags and field data.

2. *Can a natural history specimen have more than one scientific name?*

Yes, some biological or paleontological specimens have the potential for two or more scientific names. In these cases, the researcher determines the primary name based on the reason for collecting the specimen. Use the primary name as the scientific name on the catalog record. Secondary names can be entered in the description of the specimen. For example, a leaf may be collected to specifically document a leaf mine made by an insect. Catalog the specimen by the name of the species that produced the leaf mine, such as the sawfly, *Fenusa pusilla*. In the specimen description, include the name of the plant species where the leaf mine was formed, such as the paper birch *Betula papyrifera*.

Another case would be wolf scat, where there may be identifiable animal and plant remains present. Catalog the scat as *Canis lupus*, since the wolf produced the scat. List the plant and animal remains found in the scat as part of the specimen description.

In the case of fossils, the leg bone of a fossil rhino, *Subhyracodon*, may have tooth marks from a scavenger, *Archaeotherium*. The primary taxonomy would be for the animal from which the leg bone originated. In the description, list the name of the animal that made the tooth marks.

3. *What abbreviations and notations can I use to denote uncertain identification?*

Many times it may not be possible to fully identify a natural history specimen based on the preserved parts. The specimen may lack the anatomical part characteristics of a specific taxon that permit an unambiguous identification. In order to indicate the uncertainty of the identification, taxonomists have adopted standardized abbreviations. These abbreviations are used to indicate different levels of uncertainty regarding the identification of the specimen.

cf

The abbreviation cf. is from the Latin “*confer*” meaning compare. The abbreviation cf. indicates that the specimen compares most closely with the genus or species name after the abbreviation. For example:

- cf. *Canis* for a single bone means the specimen most closely compares with a bone of a dog-like animal of the genus *Canis*

- *Canis* cf. *latrans* means the specimen is sufficient to assign it to the dog genus *Canis* and that it most closely compares with a coyote (*Canis latrans*)

aff

The abbreviation aff. is short for "affinity." It indicates that the preserved specimen is closely related to the species but seems to differ from that species in some characters. For example, *Acer* aff. *rubrum* indicates that the features found on a leaf most closely resemble the red maple, *Acer rubrum.*

near and see

"Near" and "see" are other terms that may be used to indicate uncertainty of identification. Both terms are used in conjunction with two scientific names. The terms indicate at what level in the taxonomic hierarchy the specimen can be placed and at what level there is uncertain identification. An example is Magnoliopsida (the Class for dicots) near Apiales (the Order for carrots, celery, parsley, and ivy). The name indicates that the plant can be identified as a dicot with certainty. The name also indicates that the specimen appears to be most similar to a member of the Order Apiales. "See" is used in a similar sense. It indicates the taxonomic level, species, genus, and so forth that the specimen most closely resembles.

4. *What are annotations?*

Sometimes a specimen bears more than one scientific name because of annotation. Taxonomy and classification is a dynamic discipline. New techniques, such as DNA analysis, often change our knowledge of the relationship of organisms. New techniques may also change the formal groups to which an organism belongs. Specimens in natural history collections may undergo multiple name changes through time. This is particularly true of older historical specimens.

Annotation occurs when a specialist in a particular group of organisms reviews a specimen and suggests a change in scientific name. This may be a correction of an initial misidentification. It may merely reflect changes in the scientific name that are a result of more detailed study of that group. Enter annotations on the Annotation label (Form 10-510). Attach the label to the specimen, or store it with the specimen in the same manner as other labels.

The annotation label should include the author, title, and institution of the annotator. Older annotations may not be dated, but any new annotation should include the date when it was made.

Enter the most recent annotated scientific name on the catalog record. The catalog record should also include the annotator's name and the date the annotation was made.

Anytime a catalog record is modified to reflect a taxonomic change, submit it to the National Catalog as a recataloged record.

5. *What should I do with older scientific name annotations?*

Annotations are an important source of information. Don't discard them. Most annotations will be left with the specimen. In some cases annotations may be filed in the accession or catalog folder once they are recorded on the catalog record. Older annotations may have been made on non-archival paper. They may require conservation in order to ensure their long-term preservation.

Do not modify, remove or discard the scientific name on earlier labels attached to the specimen. These labels are frequently attached to amphibians, reptiles, birds and mammals, or herbarium sheets. The labels are part of the intellectual history of the specimen. On plant specimens the annotation is sometimes written directly on the herbarium sheet.

You can record the history of changes to the scientific name using the Scientific Name supplemental record in ICMS. See Section XXII in Chapter 3 of the ICMS User Manual. It's recommended that you also cite the older scientific name in the Description field on the catalog record.

6. *What are synonyms?*

The taxonomic study of organisms is based on ongoing research and is not static. New species are being discovered and described. With multiple researchers in different countries, a single, unique organism or group of organisms may have been given more than one name over time. Subsequent research may determine that duplicate names have been assigned to a plant or animal. These are considered synonyms of the accepted name, which is usually, but not always, the earliest published name for that organism. For example, the accepted name for reptiles, the Class Reptilia, includes as synonyms the names: Anapsida, Archosauria, Diapsida and Lepidosauria. These synonyms are no longer accepted names and are listed as invalid in ITIS. Another example is the snail Orders Monotocardia and Pectinibranchia. They were previously considered distinct groups but are now considered part of the Order Mesogastropoda (periwinkles and conchs). The ITIS module in ICMS includes synonyms and terms that are no longer accepted.

If…	***Then…***
the scientific name you wish to apply to the specimen is not an accepted term, because it is a synonym,	the program will not backfill the complete taxonomy: select the next highest taxonomic name for the specimen that is valid from the ITIS module, *or* enter the appropriate names in each taxonomic field individually.

7. *What is a descriptive name?*

A descriptive name is often required for samples that contain multiple taxa, such as an insect sweep net or a plankton tow sample. Keep the sample intact rather than catalog the individual species. Use a descriptive name in the Scientific Name subfield Desc Name to accurately describe and provide information about the contents of bulk, composite, or environmental samples that contain multiple taxa.

8. *What is a common name?*

The common name may also be referred to as the vernacular name. Most people recognize a particular plant or animal based on its common name rather than its scientific name. Therefore including a common name may facilitate searches and information transfer. However, common names represent a special problem in systematics. Many species are referred to by several "common names" both within a country and between countries. The names depend on local traditions, language variations, and so forth.

Entry of a common name is optional. The Integrated Taxonomic Information System (ITIS) database includes common names for many of the taxa. ITIS will automatically fill the common name field if the Taxonomic Serial Number (TSN) is used. See Section K for information on ITIS and the TSN.

The first name of a common name is not capitalized unless it is a proper name, such as Swainson's thrush or Baltimore oriole. If a common name is used, it should be applied consistently.

Common names are not often standardized except in some rare instances. For example, the popularity of bird watching has resulted in the creation of widely accepted common names for all species. The American Ornithologists Union (AOU) maintains a web site listing of all living birds at http://www.aou.org/checklist/north/index.php. The checklist includes both the scientific name and the standardized common name used in the birding community. Not all groups of organisms have standardized common names. The rarer groups that are not likely to be encountered on a regular basis usually don't have common names.

9. *Do fossils have common names?*

Fossil species are less likely to have common names than modern species. Often the common name is a transliteration of the scientific name or is simply descriptive. For example, *Spermophilus rexroadensis* is called the Rexroad Ground Squirrel in reference to the name of the locality where the fossil species was first found. *Castoroides ohioensis*, or *Paenemarmota barbouri* are called the giant beaver or giant marmot respectively. The name reflects their large size in comparison with their modern relatives.

10. *How do I handle hybrid names?*

A hybrid is an organism resulting from the cross breeding of two different but usually closely related species. For example, the white oak, *Quercus alba*, may cross with a chestnut oak, *Quercus prinus*. A mallard duck, *Anas platyrhynchos*, may breed with a mottled duck, *Anas fulvigula*.

Hybrids may sometimes form by breeding between different genera, such as a swan (*Cygnus*) with a goose (*Anser*). Hybrids are designated by an X between the scientific names of the two species that formed the hybrid. Hybrids between representatives of two or more taxa may also be given a single name. The hybrid nature of a taxon is indicated by placing the multiplication sign × before the:

- name of an intergeneric hybrid
- epithet in the name of an interspecific hybrid

Example: *xSchimlinia floribunda* is a hybrid between *Franklinia alatamaha* and *Schima argentea. Lycopodium* X *habereri* is a hybrid of the species *Lycopodium digitatum* and *Lycopodium tristachyum*.

K. ITIS

1. *What is ITIS?*

The Integrated Taxonomic Information System (ITIS) is the approved taxonomic and classification standard for all government agencies working with modern organisms. The NPS Natural Resources Division has adopted ITIS as its taxonomic standard for living organisms. The classification in ITIS is also the taxonomic basis for NPSpecies. The NPS museum program has adopted ITIS as the classification standard for biological organisms in ICMS.

The National Museum of Natural History maintains the ITIS database in partnership with the NPS and several other agencies. You can access the database at http://www.itis.gov/. The ITIS database provides authoritative taxonomic information on plants, animals, fungi, and microbes of North America and the world. ITIS-North America is a partnership of:

- U.S. agencies, including NPS, USGS, USDA, FWS, NOAA, and EPA
- Canadian agencies
- Mexican agencies
- other organizations and taxonomic specialists
- Species 2000 and the Global Biodiversity Information Facility (GBIF)

The ITIS and Species 2000 Catalogue of Life (CoL) partnership provides the taxonomic basis for the Encyclopedia of Life (EOL). As such, ITIS is the taxonomic standard utilized by other federal agencies that deal with biological organisms.

2. *Are there limitations to ITIS?*

Yes. While ITIS is a useful database, it's incomplete. For example, insects and other invertebrates are not well represented. The ultimate goal of ITIS is to capture the taxonomic history and provide a classification of every organism on the planet. It will be a long time before that goal is reached. As of June 2012 ITIS had 606,131 entries. New entries are continually being added, and the database is updated regularly and accessible on line. The ITIS module in ICMS is only updated once a year. There may be taxa listed on line which are not yet in the module in ICMS**.**

However, you will likely be asked to catalog a specimen that has not yet been entered. For example, a researcher in your park describes a new species of insect. That particular new species may not be added to ITIS for years. In the meantime it must be cataloged and classified. If the new species is in a genus that is already in the ITIS database, you can usually provide a complete classification. Select the genus or its Taxonomic Serial Number (TSN) from the ITIS module. Then enter the species as a user-defined term. This can be done at higher levels as well. If the family is in the database, select it to provide the higher taxonomic levels. Then enter the new genus and species as user-defined terms. If the genus or family is not in ITIS, you may have to rely on specialists or other sources for the:

- name of the lowest taxonomic level available for the specimen in ITIS
- user-defined names you should enter for the levels below that

Once you determine the complete classification of an organism, enter it in ICMS with user-defined terms. The new terms will lack the convenience of the linkage to higher categories provided by ITIS.

The rules by which taxonomic names are created and used for animals is governed by the International Commission on Zoological Nomenclature (ICZN) and is found at the website http://www.iczn.org/

Plant taxonomy is governed by the International Code of Botanical Nomenclature and is found at the website: http://ibot.sav.sk/icbn/main.htm

3. *Do all researchers use ITIS?*

No. Not all researchers working in taxonomy agree on the appropriate name to apply to an organism or its classification. Not all researchers agree with the names considered valid in ITIS. Researchers in different regions may use a reference that may include taxonomies of some groups that differ from ITIS. For example, researchers in Florida use *A Guide to the Vascular Plants of Florida* (Wunderlin,1992). In California, the current standard reference book for native and naturalized plants is *The Jepson Manual: Higher Plants of California* (Hickman, 1993).

4. *How do I add additional classifications and names to ITIS?*

ITIS is a locked database and cannot be modified by individuals or organizations to suit their specific needs. You may, however, submit names of taxa to the ITIS program for inclusion. There is a charge for processing each taxon submitted for inclusion in the database.

The ITIS data submittal process allows users to request additions or changes to the database. The guidelines on how to submit a request are found on the ITIS website at: http://www.itis.gov/submit.html.

5. *Are fossil taxa included in ITIS?*

No. ITIS was designed to include only living taxa or species that have become extinct in historic times. It specifically excludes fossils. However, many of the higher categories in ITIS are applicable to fossil taxa. This is because fossils are the remains of once-living organisms, and paleontology uses the same classification system as biology.

Given the long evolutionary history and biodiversification on earth, the number of extinct organisms greatly outnumbers living organisms. Fossil classification is complex and includes more groups, many of which have no living relatives. Therefore, obtaining the complete classification for a fossil specimen can be more challenging.

The ITIS table used in ICMS has been modified to include fossil taxa found at parks, but it's incomplete. Fossil taxa in ICMS are identified by having a negative Taxonomic Serial Number (TSN). You can add fossil taxa from your park to the ITIS table in ICMS. Submit a request to the Senior Curator of Natural History with a list of the taxa you would like to add. The terms will be added in the next periodic update of the ICMS ITIS table.

6. *Are abbreviations and notations available in the ITIS table in ICMS?*

No. Abbreviations or notations to indicate uncertainty in the specimen's taxonomy aren't available in the ITIS table in ICMS. You will need nter these as user-defined entries.

7. *What is a TSN?*

TSN is the acronym for Taxonomic Serial Number. Every taxonomic group in ITIS, whether it is still considered a valid name or not, is assigned a unique TSN. The TSN facilitates tracking and linking the names in the database.

You can enter the TSN in the ITIS module in ICMS. The program then automatically populates the taxonomic fields on the catalog record. Selection of a "not accepted" name will populate the field for which it is appropriate, but it will not populate any of the higher fields. Selection of "not accepted" names is strongly discouraged.

Note: If you don't know the TSN, you can use the Find Specimen button in ICMS to enter a taxonomic name.

8. *Can I use the TSN to help classify unidentified specimens?*

Yes. Even if you can't identify to genus and species, you can enter the TSN for the lowest known taxonomic level. ICMS will then populate the higher fields for that entry. For example, you could use the TSN number:

- 178620 for *Mimus polyglottus,* a mockingbird nest
- 178618 for a nest known to be from the family Mimidae
- 178265 for a nest that can only be identified as being from a Passerine

9. *Can I use ITIS for hybrids?*

ITIS includes some hybrids but not all. If the hybrid isn't in ITIS, you will need to enter a user-defined term in the Scientific Name field. To include a full taxonomy, enter the TSN for the next highest level in the classification. Usually this will be the family.

L. Difficult Classifications

1. *How do I classify lichens?*

Lichens are unusual organisms. They are a combination of organisms from two different kingdoms: Monera (fungi) and Chromista (algae). For the purposes of classification, they follow the classification hierarchy of the kingdom fungi.

2. *What is an environmental sample?*

The name "sample" is used only for those specimens that were specifically collected:

- according to stringent collecting procedures
- in a strict regimen of collecting episodes
- for a specific purpose such as to answer a scientific question or provide information to aid in managing a natural resource
- with the highest level of associated data

While every specimen is a "sample" of the environment in the larger sense, it may not meet the above criteria. "Samples" result from scientific studies that:

- specify an exact time and place of collection
- utilize consistent collecting techniques
- are standardized in different disciplines to control for collecting bias
- produce the maximum amount of accurate information

A sampling program may be designed to collect repeated samples over set time intervals, using a consistent set of collecting techniques. Specimens acquired utilizing these rigorous requirements often have a higher scientific value than those collected accidentally or randomly.

Example: 10 cm diameter plankton net tow of 30 meters at a depth of 50 cm, 100 meters off the south shore, with good global positioning data.

There is a vast difference between the example and a bottle of water "scooped" out of the lake. However, the original field records and data associated with the plankton sample must be cataloged and preserved. Otherwise there is little difference between the two samples.

3. *How do I classify composite samples?*

As in the case of the plankton tow, research projects may result in composite samples. The classification of a composite sample is determined by the primary purpose for which the sample was made. For example, the purpose of taking a water sample may be to study the biota. Then you would consider the sample a biology specimen. If the sample was made to examine lake-bottom sediments, then you would catalog it as geology.

Classify composite samples based on the specimen of primary interest. To capture the other components to the sample, consistently enter additional classifications in the Description field of the ICMS record.

4. *What is a cast?*

Casts are exact copies made directly from natural history specimens, most often fossils, often by first creating a mold of the specimen. A cast may be made when the original cannot be collected, such as a modern or fossil footprint. In the case of footprints, which are negative impressions, the copy made directly from the footprint will be reversed. This copy may be placed in the collection or a second cast may be made that will resemble the original footprint. Traditionally casts were made in plaster, but plastics may be used as well. See questions 6 and 7 in this section for information on trace fossils.

NPS *Management Policies 2006,* Section 4.8.2.1 Paleontological Resources and Their Contexts states that the Service will avoid purchasing fossil specimens. Acquire casts or replicas instead.

5. *How should I catalog casts?*

Catalog casts like all other museum specimens even though they are not original. In the case of fossils, often the cast may be obtained from a museum either by purchase or exchange. These casts serve as reference specimens to aid in the identification of fossils found in the park. Many times parks will obtain casts of important specimens collected from the area before the establishment of the park. Parks get casts because they fall within the park's SOC and help further the park's mission. Parks may get some casts initially for exhibit. Casts on exhibit may secondarily support the park's research program and aid in serving as a reference specimen used to aid in the identification of newly discovered fossils. Note on the catalog record:

- that the specimen is a cast
- where the original specimen is located
- the catalog number of the original specimen

6. *What are trace fossils?*

Trace fossils, also called ichnofossils, are geological records of biological activity. Trace fossils may be impressions made on the sedimentary substrate or on another fossil by an organism. Examples include burrows, nests, borings, footprints, gnaw, bite and other feeding marks, and root cavities. The term in its broadest sense also includes the remains of other organic material produced by an organism, such as coprolites (fossilized droppings).

7. *How should I catalog trace fossils?*

Catalog a trace fossil under paleontology, not geology. It may or may not have a formal taxonomy. Matching a trace fossil to the specific biological organism that created it isn't always possible. Therefore the taxonomic fields may be incomplete. Trace fossils, like other fossils, are not included in the ITIS database.

8. *Should I include specimens mounted on slides as part of the collection?*

Yes. During the study of a biological organism, fossil, or geological specimen, parts of the specimen may be removed and mounted on a microscope slide. This is done in order to better examine the specimen's internal structure. Likewise studies of microorganisms, such as the tardigrades (also known as waterbears), require that the specimens are mounted on slides. Sediment samples may be processed in order to release microfossils which must be mounted on slides for examination.

Examples of slides that may be prepared include:

- different tissues from a plant or animal such as the heart, liver, muscle from a mouse
- thin sections of fossil bone or teeth
- microscopic fossils such as pollen, diatoms, or foraminifera, both modern and fossil
- petrographic slides of rock samples to examine crystals and mineral composition

9. *How do I catalog specimens on slides?*

If not all of the original specimen is consumed in the preparation of the slide:

- give the slide the same catalog number as the original specimen
- note in the Description field in ICMS that a slide(s) was prepared from the specimen

Store individual slides in a slide storage box, with multiple slides from a single specimen stored together. Store the slide storage box with the original specimen when possible.

If the original specimen is absent and only the slide remains, assign the slide a unique catalog number.

10. *How do I catalog and preserve tissues?*

Small samples of biological organisms, rather than the whole specimen, will be collected when:

- killing the animal is not desirable, *or*
- placing the entire animal, such as a bison, in the museum collection is impractical

Tissue samples may be preserved:

- as microscope slides
- stored in alcohol
- cryogenically (frozen)

Storage depends on how the tissue has been preserved. Tissues stained and mounted on slides may be stored in museum cabinets. Tissues in alcohol or glycerin may need to be stored with other wet specimens. Frozen tissue samples will usually be stored at a partner repository that can provide cryogenic storage. Discuss with the researcher how the specimens will be prepared and preserved. Get the researcher's recommendations for how the specimens should be stored.

Give the same catalog number to multiple samples of tissues from a single organism.

11. *How do I preserve DNA samples?*

Samples, such as tissues, specifically collected for DNA preservation should be stored in either:

- 90% ethanol, *or*
- at a temperature colder than -130° C, usually in cryovats stored in liquid nitrogen

Parks can maintain specimens in 90% ethanol. However, the cost of cryogenic storage requires the NPS to work with partner repositories that have this type of specialized facility. The NPS has a servicewide repository agreement with the Ambrose Monell Collection for Molecular and Microbial Research (AMCC). See question M.10 below.

One method of storing DNA is FTA® cards. An FTA card consists of a filter paper chemically treated with a reagent mixture composed of:

- strong buffers

- physical denaturants
- a free radical trap designed for the collection and room-temperature storage of biological samples for subsequent DNA analysis

This patented technique has been optimized for the stabilization of DNA and *in situ* processing for DNA amplification using polymerase chain reaction (PCR).

FTA cards were designed for long-term storage. They're designed to provide protection from negative environmental impact and microorganisms at room-temperature. The cards eliminate the need for special handling requirements or refrigeration. However, like any cellulose product, FTA cards are susceptible to fire and ideally should be stored in a fire-proof container.

12. *How do I catalog DNA samples?*

Ideally, the collection will include all or parts of the original biological specimen in addition to the DNA sample. The specimen will provide morphological confirmation of the original source of the DNA.

If…	***Then…***
there is a specimen in addition to the DNA sample,	give the DNA sample the same catalog number as the original specimen, and identify each of the different components in the specimen Description field in ICMS.
no other parts of the organism are preserved in the collection,	accession the DNA sample(s) and assign each sample a unique catalog number in ICMS.

Note: Depending on the way in which the DNA is preserved, the DNA sample and the original specimen may require storage in different environments.

13. *How do I document a loan of a DNA sample that is a component part of a specimen?*

DNA samples are frequently loaned for research. Use the following procedures for documenting a loan of a DNA sample that is cataloged as a component of a specimen:

On the ICMS Loans Out screen:

- Enter the catalog number with the designator (for example, PARK 52c) in the Objects field on the ICMS Loans Out screen.
- Note in the Loan Memo field that only the DNA component of the specimen is being loaned.
- Do not attach the catalog record to the Loans Out screen.

On the catalog record:

- Note the loan of the DNA in the Description field of the catalog record.

- Include the new location for the DNA sample in the Location field of the catalog record.

- Don't change the Object Status field to Loan, since only a component of the specimen is on loan.

14. *How do I care for frozen specimens?*

Tissues may be collected and frozen for purposes other than just DNA sampling. As described above, these specimens may be placed in cryogenic storage. These specimens cannot be stored at a park. Partnership with a non-NPS repository that has the appropriate facilities is necessary. Long-term cryogenic storage of specimens is expensive. Therefore it's best that the park develop a repository agreement with the institution. The agreement should clearly identify the costs and the responsibilities of both parties. As with all partner repositories, individual specimens need to be cataloged and tracked with a loan form.

Parks with glaciers or permanent ice deposits may have researchers who collect ice cores. As glaciers form, the yearly accumulation of snow and ice over many years will trap wind-blown dust, ash, bubbles of atmospheric gas, and radioactive substances. The composition of these layers, especially the presence of hydrogen and oxygen isotopes, can be used to:

- reconstruct changes in temperature

- provide a picture of changes in climate over time

Samples from the glacier removed by drilling are called ice cores. Ice cores are important for climate change studies.

Ice cores need to be kept frozen immediately after they are removed. They must be transported in a freezer unit to the storage facility. Curation of ice cores requires special low temperature freezers. Some ice cores may be hundreds of feet long, so large volume freezer units are needed. The United States Geological Survey maintains the National Ice Core Laboratory storage facility at the Denver Federal Center in Colorado. The main storage area is held at -35° C to promote the longevity of the core. The cold laboratory area for studying the cores, including a Class 100 clean room, is maintained at -22 ° C. A similar facility is maintained at Ohio State University.

Parks cannot provide long-term storage of ice cores. All cores collected from parks will need to be stored at a partner repository. While each core may have multiple sections, only one catalog number should be assigned to each core.

M. Repositories for Natural History Collections

1. *What is a partner repository?*

Many types of natural history collections require specialized care that isn't available at the park. Therefore, many parks work with non-federal partners such as museums and universities to house park natural history collections.

Generally, collections from one project are housed at the same repository. Directors Order #24, 4.3.17 states, **"**House those collections associated with a single accession at the same repository to facilitate research and use. Superintendents may authorize housing of collections from the same accession at different repositories if by so doing preservation, research, and use will be improved."

2. *What kind of standards must a partner repository meet?*

Partner repositories are expected to meet the same standards for collection care as the park. These standards are outlined in the *Museum Handbook*, Part I, Museum Collections. See especially:

- Appendix A: Mandates and Standards for NPS Museum Collection Management, Figure A.3, Director's Order #24

- Appendix F: Collections Management Checklists, Figure F.2, NPS Checklist for Preservation and Protection of Museum Collections. (The Checklist is also included in ICMS)

- Appendix G: Museum Collection Protection

Note: Staff at the partner repository should be aware that they may be asked to participate in an annual inventory.

3. *How do I choose a partner repository?*

You should take a number of issues into consideration when choosing a repository. The partner repository should:

- have specialized staff with the expertise to curate the types of natural history specimens collected in the park

- have facilities appropriate to the needs of the natural history specimens, such as a wet specimen storage room that meets all the necessary fire code, health, and safety requirements

- be willing to abide by NPS standards for collection care and participate in the annual inventory

- recognize that the specimens in their care will remain NPS property

4. *How do I track specimens stored at a partner repository?*

Use a loan agreement to track specimens stored at a partner repository. Many parks develop a repository agreement with the partner repository. See the sample repository agreement wording at the end of this appendix. See the *Museum Handbook*, Part II, Chapter 5, for information about loans.

5. *Can specimens be placed on "permanent" loan?*

No. The NPS retains ownership to all of its collections. There are no "permanent" loans. The NPS always retains the right to recall the specimens at any time. However, the parties may want to negotiate specific circumstances of recall because of the long-term agreement that the parties are making.

You can use a repository agreement to place specimens on long-term loans of twenty years. You can then extend the loan for another twenty-year period.

6. *Can specimens be placed in private collections?*

No. NPS policy requires that only public non-profit educational institutions can serve as partner repositories. Loans to private individuals are prohibited. Individuals borrowing natural history specimens must be associated with a public non-profit educational institution. They must accept the loan as an official of the institution. This requirement includes individuals borrowing specimens for identification purposes, as part of an ATBI, or as part of another study. The loan is to the institution, not the individual.

7. *How do I create a repository agreement?*

A draft repository agreement based on the generic repository agreement provided at the end of this appendix can be used as a start of negotiations between the NPS and the repository. You can use it as a checklist and starting point for discussion with the partner repository about:

- the mutual responsibilities of each partner
- NPS expectations
- the needs and expectations of the partner

You can modify the sample as needed. Including the Regional Curator as part of the collaborative process is recommended. Taking the time to develop a repository agreement between the park and the partner repository will:

- allow both parties to address issues of concern and come to a mutually satisfactory arrangement
- ensure the appropriate care for the specimens and access for researchers

Exceptions to policy or normal procedures can be made. However, the negotiated agreement must be consistent with law, regulation, and NPS policy. The Senior Curator for Natural History should review and approve any terms that are an exception to the general loan conditions.

Note: The Regional Curator and solicitor should review all repository agreements.

8. *Who pays for curation costs at a non-NPS repository?*

Director's Order #24, 4.3.16 requires that project budgets include funding for the basic management of project-generated collections. Collections management includes:

- cataloging
- labeling
- conservation examination and treatment (including specimen preparation)
- initial storage of objects and specimens
- organization and storage of project documentation, including appraisal, arrangement, description, finding aid production, and appropriate archival housing

If the project generating the specimens…	***Then...***
is initiated and funded by the NPS,	the NPS personnel in charge of the project must ensure that the project budget includes sufficient funds to cover the necessary curation costs, whether the specimens are housed at the park or a partner repository.
is initiated and funded by an outside researcher,	the researcher's budget should include the costs of curation.

9. *What are the costs involved with curation at a repository?*

There are two basic costs involved with curation at a partner repository:

- those initially incurred for the inclusion of the specimens into the partner's collections
- those associated with the ongoing maintenance and care of the specimens

An example of the latter is the replacement of alcohol used in the preservation of wet specimens as it evaporates. Parks should discuss with the partner repository recurring costs for care of NPS specimens. These expenses should be included in the park's annual budget.

A cooperative agreement, contract, or other funding agreement is needed to provide funds, materials, supplies, or services to care for NPS specimens housed in a partner repository. A loan or repository agreement provides no legal mechanism for transferring funds to aid in the care of the collections. Once funds are transferred, the partner repository may contract with another entity to provide specific services needed for the care of NPS specimens.

10. *Does the NPS have any servicwide repository agreements?*

Yes. NPS has the following servicewide repository agreements for natural history museum collections. None of these are exclusive agreements. Parks may determine where specimens will be housed and may designate NPS or other repositories for which NPS does not have a servicewide agreement.

- **General Agreement between National Park Service and Smithsonian Institution for Custodianship of National Park Service Natural History Collections**. Parks may offer selected specimens to the Smithsonian Institution. If the Smithsonian accepts the offer, the Smithsonian will gain permanent custodial responsibility for the specimens. The NPS retains ownership responsibility.
- **Agreement between National Park Service and Arizona Board of Regents, University of Arizona, On Behalf of its Laboratory**

of Tree-Ring Research (LTRR). This agreement covers natural history and cultural collections made on National Park system lands for the purposes of tree-ring analysis. Collections are loaned to, stored, and managed by the Laboratory of Tree-Ring Research at the University of Arizona. The agreement also covers associated records. All past collections and future collections that NPS offers and LTRR accepts will be covered.

- **Agreement between the National Park Service and the American Museum of Natural History on Management of NPS Tissue Collections.** This agreement is with the American Museum of Natural History, Ambrose Monell Cryo Collection (AMCC). The agreement provides for AMCC to manage animal tissue samples from federally listed threatened and endangered (T&E) species collected on NPS land. Instructions are available for individuals collecting samples, NPS permit coordinators, NPS curators, and the AMCC curator. The tissue samples are maintained in cryogenic storage.

NPS also has the following repository agreement for NPS living collections. These living collections are currently managed under the museum collections until the living collections policy and procedures are established.

- **Agreement between the National Park Service and the American Type Culture Collection (ATCC).** This agreement covers living NPS biological collections (such as microorganisms) from parks that ATCC maintains as cultures in its "National Park Service Special Collection." ATCC distributes these collections upon request to the scientific community. Procedures for deposit and distribution to third parties are on the ATCC web site at http://www.atcc.org/CulturesandProducts/SpecialCollections/NationalParkService/tabid/198/Default.aspx.

The RPRS web site at https://science1.nature.nps.gov/research/ac/ResearchIndex and https://science.nature.nps.gov/research/ac/ResearchIndex posts:

- all current servicewide agreements (and related instructions), including the above agreements
- additional agreements established since this appendix was issued

11. *What is a material transfer agreement?*

A material transfer agreement defines the provisions that apply to the distribution and use of cultures, such as cultures managed at ATCC (see question 10). A material transfer agreement requires NPS authorization before distribution. See D0 77-10: NPS Benefits Sharing and the *Benefits-Sharing Handbook* for instructions on using Material Transfer Agreements.

12. *What are orphan collections?*

Many parks have long-term agreements with partner repositories. However, changes in staffing and funding at these institutions may impact their ability to continue to care for NPS collections. Collections that a museum or university is no longer able to maintain are referred to as orphan collections. For example, a local university has taken care of a park’s plant specimens in its herbarium for many years. Due to budget cuts it can no longer maintain the herbarium. The university may decide to transfer or possibly sell its herbarium collection to another museum. It's important for the university to recognize that the NPS plant specimens in the collection are federal property that cannot be sold. The university needs to consult the park so that the park can:

- have the specimens returned to the park, *or*
- approve the inclusion of the park specimens in the transfer to the recipient institution and make sure that the recipient is aware that they will be caring for NPS specimens, *or*
- arrange for the specimens to go to another museum that is willing to work with the park

N. Natural History Specimen Labels

1. *What are natural history specimen labels?*

The NPS uses standardized natural history specimen labels to identify all natural history museum collections. Use of these labels is mandatory for all natural history specimens. See Figure H.2 for illustrations of the labels.

2. *Why are labels important?*

Labels identify the specimen as NPS property and tie it to its catalog data. Labels provide immediate information regarding a specimen. They can quickly facilitate confirmation of the location of the specimen during the annual inventory. They can also quickly inform a researcher about attributes of the specimen, such as collection locality. Label information allows researchers to quickly determine if the specimen is useful for their research. Examination of a museum label to obtain the necessary information about the specimen can reduce handling and potential damage.

3. *Must I use NPS labels?*

Yes. Specimens collected under 36 CFR 2.5, if retained in museum collections, must have official NPS museum labels. Their catalog numbers must also be registered in the NPS National Catalog.

4. *Where can I get natural history labels?*

ICMS can produce all the required official NPS natural history labels. See Chapter 5 in the *ICMS User Manual* for information on printing the labels. The program also completes most of the information on the label from data you enter on the catalog record. Use acid-free paper to produce labels.

See Figure H.2 for a list of the official NPS natural history labels.

5. *Who completes the natural history specimen label?*

The collector or specialist usually provides the information for the label. The accession and catalog numbers are added to the label after the specimen is cataloged. This may be done by park staff, the collector, or the repository that manages the specimens.

6. *What information goes on the label?*

The type of information that goes on the label depends on the type of natural history specimen. Many labels share information in common, such as locality information. Other labels include information that is discipline specific. For example, paleontology and geology labels include geological age and formation information that doesn't appear on biology labels.

7. *What if a label is incomplete?*

Complete the label using data provided by the collector only. Don't guess what data belong in blank fields.

8. *What labels do I use for a specimen?*

The choice of label depends on the specimen. There are different labels for different types of natural history specimens.

Some specimens, such as insects on pins, bear multiple small labels. Each contains portions of information, such as catalog number, scientific name, or locality. Each portion is recorded on a separate label.

Birds and mammals may have two labels. The original field tags and the official NPS label printed from ICMS are attached to the specimen.

Paleontology, geology, and some biology specimens may have the park acronym and catalog number written directly on the specimen in indelible ink. The associated information is provided on the label and placed in the tray or box with the specimen.

Note: Specimen labels can only contain a limited amount of information. The catalog record is critically important for providing all of the documentation about the specimen.

9. *Do NPS specimens at repositories have both the NPS and the repository labels?*

Many partner repositories may also assign their own catalog number to an NPS specimen. This doesn't indicate a change in ownership. It merely provides the partner with another way to track the specimen and its associated data in their catalog. Having an NPS label with a specimen is a minimum requirement, but having labels from the partner repository is acceptable.

10. *How do I modify existing labels in ICMS to meet specific needs?*

NPS labels are official government forms and cannot be modified by individuals. If you have specific needs or have suggestions for label modifications, submit a request to the Park Museum Management Program.

11. *Can I remove old labels?*

Only remove old labels if they are damaging the specimen. If you must remove the old label, place it in the accession or catalog folder. Never discard old labels!

Don't remove clearly legible, well-attached collector labels that have much of the information required on NPS specimen labels. Add any additional or new information, such as accession and catalog numbers, to the NPS label, and keep both labels with the specimen.

O. Labeling and Marking Specimens

See the Museum Handbook, Part I, Appendix Q, Appendix T and Appendix U for additional information on labeling and marking specimens

1. *What supplies do I need to mark and label natural history specimens?*

Use the following supplies to mark and label natural history specimens:

- acid-free NPS natural history labels
- glue for labels (methylcellulose paste)
- permanent, waterproof black ink

- clear lacquer for rocks and minerals (Acryloid B-72® acrylic resin/acetone)
- white lacquer for rocks and minerals (Acryloid B-72® acrylic resin/acetone with titanium dioxide white pigment)
- acetone
- polyvinyl acetate adhesive 5% in ethanol
- crowquill or Rapidograph® pen
- cotton string or thread (non-colored)

2. *How do I label wet specimens?*

Wet specimens are often stored in alcohol, formalin or glycerin. Labels placed in storage containers with these fluids are subject to deterioration over time. Inks that are not insoluble may be leached from the paper. Both can result in the loss of data and can contaminate the preservative. It's important to make sure that both the paper and ink used for wet labels will not deteriorate in the preservative used.

Labels

Use high quality, long-fibered, 100% white cotton rag paper with a pH of 6.5 to 7. Labels printed on fluid-resistant durable stock such as spunbonded polyethylene; a non-woven polyester, such as Tyvek®; or other synthetic polymers that can withstand the fluid environment also hold up well in fluid collections.

Do **not** use**:**

- Paper treated with formaldehyde or other chemicals to make it fluid-resistant. Use of such treated paper can cause slight acidification of storage fluids. It can also introduce contaminants that could damage the utility of the specimen.
- Metal labels can corrode and may also cause mechanical damage to specimens. However, leg bands and ear tags should remain with specimens, even when stored in fluids.

Inks and Other Media

Write information on the label in indelible ink with a technical pen or pencil or typed with black carbon ribbon.

Use only carbon-based, black inks on specimen labels, including barcode labels. Carbon inks don't fade over time. Commercial black printing inks are usually carbon-based, as are most laser and photocopier toners. Laser and photocopiers also apply the toner with a certain amount of heat, which helps fuse the toner particles to the paper.

Ink from a correctable typewriter ribbon and laser printers doesn't form a strong bond between ink and paper and will separate.

Liquid Inks

Liquid inks vary greatly in quality. For labeling wet collections, use black drafting inks. (Drafting inks are designed for writing on drafting film, using technical pens.) These inks tend to be carbon-based inks with a neutral pH that adhere well to almost any surface. They do not dissolve in water, alcohol, or formalin solutions.

Note: These inks do not have to be used in technical pens or on drafting film for specimen labeling.

Fiber-Tipped Pens

Black liquid inks in some fiber-tipped pens are acceptable for use in labeling wet specimens. Be sure to choose pens with carbon-based inks, and test:

- how long it takes for the ink to dry so that it will not smear
- how well the ink resists water, alcohol, and formalin
- how well it resists smearing or loss from abrasion when wet with any of these fluids

Attachments for Labels

Uncolored cotton thread or string work well to attach labels to fluid-preserved specimens.

Do **<u>not</u>** use:

- wire or any other metal fasteners
- plastics

See Figure H.3 for attaching string to labels.

3. *Are there other forms of wet specimen labels?*

Yes. One of the preferred methods is a thermal printer that will heat bond a carbon powder to spunbonded polyethylene stock.

There has been an increase in the number of biological specimens requiring storage in fluid preservatives. These specimens include fish, amphibians, and aquatic invertebrates. The increase has demonstrated the need for a centralized service to print specimen labels that can be placed in fluids. The PMMP has purchased a thermal printer in order to provide parks with specimen labels for fluid stored specimens. There is no charge to parks for the service or materials or supplies. See Figure H.5 for information on requesting thermal printer labels.

4. *How do I mark a number on a natural history specimen?*

You don't mark the catalog number directly on all natural history specimens. For some specimens, mark the number only on the label.

When applying the catalog number to a specimen, use ink and lacquer. Refer to Appendix J in the *Museum Handbook*, Part II, for information on using ink and lacquer for marking. Make sure you don't cover important features with the number. Place the catalog number and label in a location that minimizes handling the specimen.

Place very small specimens in vials, and attach a label to the vial. If appropriate, place the catalog number inside the vial. Place insect labels on an insect pin.

When attaching labels directly to a specimen, use uncolored cotton thread.

For oily and wet specimens you may want to use a polypropylene cord.

For lot cataloged specimens, place a label on the storage container. Place an additional tag inside the container.

5. *How do I mark plant specimens?*

Herbarium specimens

Don't mark the number directly on the specimen. Glue the Herbarium Collection Label, Form 10-512, on the lower right corner of the herbarium sheet. Mark the catalog and accession numbers on the label.

Don't use starchy pastes. They can attract insects and mold. Don't use glues with a toluene or acetone base (model airplane glues). White glue, such as methylcellulose paste or polyvinyl acetate emulsion works well.

Nuts, large seeds, and wood specimens

Place the number on the specimen. Use clear lacquer for a primer coat with permanent black ink and a protective overcoat of clear lacquer.

Wet plant specimens

Don't mark the number directly on the specimen. Write the accession and catalog numbers on a Wet Plant Specimen Label, Form 10-506, and place it in the jar or container. See Figure H.5 to get thermal labels for wet specimens from the Park Museum Management Program.

6. *How do I mark vertebrate specimens?*

Bones

Place the number directly on vertebrate bones. Use clear lacquer for a primer coat with permanent black ink and a protective overcoat of clear lacquer. Locate catalog numbers:

- in the center of the largest part of the bone
- near the proximal end of long bones
- at the lower back center of the skull
- on the right ramus of the jaw

Put small bones in a vial or box and write the accession and catalog numbers on the Skull Vial or Box Label, Form 10-502. Place the label in or on the container.

Wet vertebrate specimens

Don't place numbers directly on wet vertebrate specimens. Write the accession and catalog numbers on the Vertebrate Wet Specimen Label, Form 10-500. Place this label in the jar or container. You can also write the numbers on a Vertebrate Specimen Label, Form 10-501. Tie it to:

- the right hind leg above the ankle
- fish, through a nose or gill
- some amphibians and reptiles, around the body near the head.

See Figure H.5 to get thermal labels for wet specimens from the Park

Museum Management Program.

Animal skins

Place the number on flat skins. Use clear lacquer for a primer coat with permanent black ink and a protective overcoat of clear lacquer. Locate the number on the reverse, on the inside of the neck, or on the right hind leg. You can also number flat skins by writing the catalog number on a Vertebrate Specimen Label, Form 10-501. Attach the label to a right hind leg. For large skins, attach it through a natural opening like an eye or the nose. For the technique for attaching the string to the specimen label see Figure H.3.

Eggs

Place the number directly on the eggs. Use clear lacquer for a primer coat with permanent black ink and a protective overcoat of clear lacquer. Also write the catalog number on an Egg Box Label, Form 10-508. Attach the label to the outside of the box with polyvinyl acetate adhesive 5% in ethanol (PVA).

7. *How do I mark invertebrate specimens?*

Insects

Don’t place numbers directly on the insect. Write the accession and catalog numbers on an Insect Label, Form 10-509. Pin the insect with a rust-proof insect pin. Then pin the label at standard height, below the specimen, parallel to the insect’s longitudinal axis. The label must be readable from the left side. A collector’s label indicating locality, collector’s name, and date may exist on a separate label placed in a similar orientation below the insect label.

Other Invertebrates

Place the number directly on other invertebrates, such as shells. Use clear lacquer for a primer coat with permanent black ink and a protective overcoat of clear lacquer. Locate the number on the interior, bottom, or reverse of the specimen. Write the accession and catalog numbers on the Invertebrate Label, Form 10-507, or the Invertebrate Specimen Label, Form 10-503. Place the label in the container with the specimen.

Wet invertebrate specimens

Write the accession and catalog numbers on the Invertebrate Label, Form 10-507, or the Invertebrate Specimen Label, Form 10-503. Place the label in the jar or container with the specimen.

See Figure H.5 to get thermal labels for wet specimens from the Park Museum Management Program.

8. *How do I mark paleontology specimens?*

Place the number on the specimen. Use clear or white lacquer for a primer coat with permanent black ink and a protective overcoat of clear lacquer. Locate the catalog number in a flat inconspicuous surface, where it will not wear off or obscure any important features. Write the accession and catalog numbers on the Paleontology Label, Form 10-505. Place the label with the specimen.

Fossil resins may dissolve in solvents. Don’t apply lacquer to a specimen of this type without consulting a conservator. Write the catalog number on an acid-free tag, and attach or place it with the specimen. You can also write the number on Teflon® tape with archival film pens, and tie the tape to the specimen.

9. *How do I mark geology specimens?*

You can usually mark the number directly on the specimen using lacquer and ink. Don't use lacquer with extremely fibrous and powdery or flaky specimens. Write the catalog number on an acid-free paper tag or cotton twill tape, and attach or place it with the specimen. Make sure the pressure of securing it won't damage the specimen.

If the specimen is a resin it may dissolve in solvents. Don't apply lacquer to a specimen of this type without consulting a conservator. Write the catalog number on an acid-free tag, and attach or place it with the specimen. Alternatively, write the number on Teflon® tape with archival film pens, and tie the tape to the specimen.

Rocks

Use clear or white lacquer for a primer coat with permanent black ink and a protective overcoat of clear lacquer. Locate the catalog number on a flat inconspicuous surface, where it will not wear off or obscure any important features. Keep the number small. Also print the accession and catalog numbers on the Geology Label, Form 10-504. Place the label with the specimen.

Minerals

Use clear or white lacquer for a primer coat with permanent black ink and a protective overcoat of clear lacquer. Locate the catalog number on a flat inconspicuous surface, where it will not wear off or obscure any important features. Keep the number small. Print the accession and catalog numbers on the Mineral Label, Form 10-511. Place the label with the specimen.

10. *How do I mark microscopic specimens?*

For glass slides use clear lacquer for a primer coat with permanent black ink and a protective overcoat of clear lacquer. For cardboard slides, use pencil to write the number. Write the number on the end of the slide. Avoid touching the cover slip.

Write the accession and catalog numbers and any additional information, if provided, on a small acid-free paper label. For geology specimens, additional information might include age and formation. Store the labels by catalog number, near the specimen microscopic slides. These labels are not standardized.

11. *When do I use an annotation label?*

Use an Annotation Label, Form 10-510, when a specialist reviews a specimen to verify or correct the scientific name. Attach the annotation label to the specimen, or store it with the specimen. Include the name confirmation or change of name, the name of the identifier, and the date of review on the label. Don't forget to change the name on the catalog record. ICMS tracks changes in scientific name.

P. Associated Records

1. *What are associated records?*

Associated records – sometimes called associated documentation or field records – are records generated by natural history projects at NPS sites. The records for any particular project might include:

- field notes
- correspondence
- final reports

- progress reports
- trip reports
- planning statements
- statements of work
- photographs
- maps
- spreadsheets
- digital materials
- sound recordings
- stratigraphic sections
- well logs

For more information, see Section M: Handling Resource Management Records, in the *Museum Handbook* Part II, Appendix D.

2. *What policies and other guidance cover the management of associated records?*

There are a number of policies and guidelines related to associated records.

- DOI *Museum Property Handbook* (411DM), Vol. II
- NPS *Management Policies 2006*
- DO #11D: *Records and Electronic Information Management* REIM Guide, *and* Service-wide Records Schedule (SRS)
- DO #24: *Museum Collections Management*
- NPS #77: *Natural Resource Management Guidelines*
- NPS *Museum Handbook*, Part II, Appendix D, Section M
- *ICMS User Manual*, Appendix F
- NPS *Conserve-O-Grams*

The associated documentation for natural history collections increases the scientific value of the collections.

3. *Who owns the associated records?*

The park owns the records associated with all projects carried out by the park**.** For projects carried out under permit by independent researchers, the park must include a park-specific condition in the research permit. The condition must require the researcher to give the park either originals or exact copies of all associated records. The park doesn't own the records that a permittee generates until the permittee submits the records or copies of the records as a condition of the permit. Treat these as original park records even though non-park staff have authored the documents and even though non-park staff may retain copyright privileges.

The records are not donated papers. They are records received by the park in connection with the park's oversight of permitted research and monitoring of resources. The records become the park's property, just as the specimens do. The permittee, as author, retains the intellectual property rights to the records. As part of the permit process, the park should obtain the rights to use the material. All copies should be made on archival quality paper.

If a project…	***Then…***
is funded by the NPS,	the NPS owns all original data and records but may give copies to the researcher. The NPS also owns the copyrights to all data generated as part of the project.
is funded by the researcher,	make arrangements to have copies of field notes, and all other data and records from the project placed in the park archives. The contractor or non-NPS researcher owns the copyrights to the records unless the contract or permit states otherwise.

4. *What if no research permit was issued?*

Research permits should be issued for all research conducted by non-park staff. Failure to issue permits is a question for park management to resolve. Permits aren't required (but are recommended) for research that park staff conduct as part of their official duties. However, all records generated by such research would automatically be park records – with or without a permit.

5. *Who owns records generated by USGS or other federal agencies stationed at the park as partners?*

Both the park and the outside agency may retain identical copies of all documents generated by an outside agency's research. The copies retained by the park would be park records. The copies retained by the outside agency would be that agency's records – even if they are exact duplicates. Neither agency would retain copyright privileges. Federal agencies cannot copyright documents written by their staff as part of their official duties. Records *received* by federal agencies may have copyright restrictions, if they were written by non-federal staff. The same laws and regulations restricting access, however, would apply equally to the records retained by the outside agency as well as the park (see question 6).

6. *Could there be overlap or duplication between a park's natural history records and an independent researcher's collection of personal papers?*

Yes. An independent researcher may retain copies or the original records created under a research permit. The researcher could later donate his or her personal papers to the park. The park would then have two or more sets of the same field notes and reports. In such a case, catalog one set as park records. Catalog the second set as the donor's personal papers.

Note: Don't consolidate or cull documents that appear both in park records and in a collection of personal papers. To do so would destroy the integrity of one or both bodies of materials. The documents turned over to the park in compliance with research permits are park records. Documents donated to the park are personal papers, regardless of any duplication that might appear. Both the park records and the personal papers must remain intact and must not be mixed.

7. *How should I handle, preserve, and house the associated records?*

Refer to Sections N and O, Processing and Preservation, in the *Museum Handbook* Part II, Appendix D.

Q. Accessioning Associated Records

1. *Should I accession associated records?*

Yes. Natural history collections without associated documentation lack scientific value. A single accession number ordinarily covers all of the specimens and records produced in connection with a project. You will need to complete an Accession Receiving Report (Form 10-95) and enter the accession in the accession book. These accessions should be recorded as field collections.

Whenever possible, keep the associated records with the specimens. Although not stored together, the records should be in the same repository as the specimens in order to facilitate research.

2. *Why is it necessary to accession associated records?*

Associated records are necessary to manage park resources including the:

- museum specimens generated by projects
- sites where projects took place
- flora and fauna in an inventory and monitoring project

The lack of related records reduces the research value of specimens collected as part of natural history projects. The associated records may give context information essential for understanding the specimens. Similarly, inventory and monitoring projects would lose their value and significance without the background information contained in the associated records.

3. *Should I accession records for projects that don't produce specimens?*

Yes. Accession records associated with all projects and for all disciplines (geology, biology, and paleontology). This includes projects that produce specimens for the museum collection and projects that don't produce specimens. It also includes projects completed by park or regional staff, contractors, or permitted researchers. Accession all associated records no matter who produced them.

4. *Do I accession associated records from non-NPS researchers as a gift?*

No. The records (or copies of the records) must be given to the park in compliance with the conditions on the research permit. Treat the records as a field collection, which is automatically park property. The records are federal records, as defined by the Federal Records Act. They aren't donated materials.

5. *May researchers keep copies of the associated records they generate?*

Yes. Many researchers keep the original records and turn in copies of the associated records.

6. *Should all archival materials relating to natural history automatically be considered park records?*

Not necessarily. Park records are records:

- generated by park staff or by vendors under contract to the park
- turned over to the park by independent researchers in compliance with their research permits

However, independent researchers may wish to donate or sell their personal papers to the park. Accession those personal papers as gifts, even if they contain information on natural history in the park.

7. *Are there restrictions on site data in the associated records for natural history collections?*

Yes. It's important to note restrictions at the time of accession. By law, you must place restrictions on the location data for:

- caves and cave resources – Federal Cave Resources Protection Act of 1988 (16 USC 4301-4309)
- information concerning the nature and specific location of mineral or paleontological specimens that are endangered, threatened, rare or commercially valuable – National Parks Omnibus Management Act of 1998 (16 USC 5937)

You should also place restrictions on the following location data; however, these data may be subject to Freedom of Information Act (FOIA) requests:

- nesting sites or specific habitat on threatened and endangered species – Endangered Species Act of 1973, as amended (16 USC 1531-1543)
- paleontological sites – Paleontological Resources Preservation Act of 2009 (16USC 470aaa)

8. *Can I restrict access to the associated records?*

Once you accession records, you cannot restrict access unless specific documents fit one or more of the exemptions cited in FOIA (5 USC 552). FOIA Exemption no. 3 covers records that are protected from disclosure by statute as noted in question 7 above.

Note: The FOIA has no bearing on personal papers. Archival materials acquired through donation or purchase are not federal records, and not subject to the FOIA. Parks have greater leeway with personal papers to determine what information needs to be restricted, but restrictions must apply to all researchers equally. Parks may not make certain documents available to some researchers while denying them to others. However, parks must still restrict information under the laws cited in question 7 above.

R. Archival Collections

1. *What is a collection?*

Ordinarily, an archival collection in NPS custody would include *all* documents made or received by a single records creator. That would mean that *all* park records for a particular park would constitute one collection.

Under this definition, associated records in any one discipline (such as biology) would constitute a series within the one collection of park records.

It is also acceptable to treat all the files in a particular discipline as a collection. For example, all of the associated records in paleontology would constitute a collection. All the associated records in geology would constitute a collection. All the associated records in biology would constitute a collection.

Some parks have only a few natural history projects. These may be easy to handle as one collection, regardless of specific discipline.

2. *Why isn't each different project a separate collection?*

The associated records for all natural history projects are part of the park's resource management records. For example, three different files on three different projects are all part of a single collection because they all have the same provenance. They are all records made or received by the park in the course of conducting official business.

Even if specific reports, field notes, or other documents were written by non-NPS staff, they are still part of a single collection of park resource management records. The records have a shared provenance and function. They document activities related to natural history projects (biology, geology, paleontology) in a specific park. Agencies wouldn't handle each personnel file as a separate collection. For parks to handle each project file as if it were a separate collection would be just as inappropriate.

All files accumulated by a single records creator form a single, coherent, organic collection. This is one of the core principles of archives. Cataloging park project files in a given discipline as individual collections destroys organic collections and makes records difficult to manage.

There is a difference between documents received as records and documents received as donations.

If a permittee…	***Then…***
turns over originals or copies of his or her field notes, reports, or other materials, *as a condition of the permit*,	those documents were received by the park in connection with its administration of permits and its monitoring of resources, and therefore the park would be the records creator and the documents would be considered park records.
If that same researcher …	***Then …***
were to accumulate a collection of his or her personal papers and then donate them to the park with a Deed of Gift,	the researcher would be the records creator, and the park would receive those documents not as official records but as museum property.

3. *How do I manage project files if they are kept together in a single collection?*

Manage archival collections through organizing files, not through cataloging them individually. Archival collections are structured hierarchically into series and subseries, as necessary. Maintain individual files within those series and subseries according to a consistent arrangement pattern. Arrangement depends on how file units are labeled or otherwise identified. Files within a given series may be arranged alphabetically, chronologically, numerically, or according to some kind of custom filing code.

4. *Should I keep together all the documents relating to a particular project?*

Yes. Keep all files relating to a particular project together. The only exception would be if you separate non-textual records (such as photographs and maps) from textual records (such as correspondence and reports). If you do that, you should either complete separation sheets for each document removed for preservation purposes, or establish a regular filing scheme for project files that is based on physical format.

5. *May I mix documents from different projects in the same file units or file folders?*

No. Manage file units on different projects as parts of larger series and collections, but never mix documents from different projects. Project files must remain intact and distinct, even though they form a series of file units within a single collection. The only exception would be if your project used documents from another project. In that case, you would file the borrowed copies with your own project documentation.

"File" refers to "file unit," not "file folder." A file unit contains all documents within a particular series for a specific project. It doesn't matter how many file folders are needed to contain those documents. A file folder is simply a physical device for housing documents.

Note: For more information about file units, see the *Museum Handbook*, Part II, Appendix D.

6. *What if a single field notebook contains information about multiple projects?*

Copy the relevant pages from the notebook, and file those copies with the records for each specific project. If, in addition, you accession the complete notebooks, you may wish to handle them as a separate series or subseries. One way to arrange them would be alphabetically by name of notekeeper. Then arrange each notekeeper's material chronologically. (This arrangement assumes that each notekeeper maintained his or her own notebooks and entered data in them on a chronological basis). The fact that there would be duplication between the individual project files and the multi-project notebooks would not be a problem and is completely acceptable.

S. Cataloging Associated Records

1. *How should I catalog associated records?*

Catalog associated records by "collection" – with **one** catalog record per collection. Don't catalog on a document-by-document, file-by-file, or accession-by-accession basis. See the section on Organizing and Arranging Associated Records for Biology, Paleontology and Geology Collections at the end of this appendix.

2. *What steps do I need to take before I can begin to catalog a collection of associated records?*

First, ensure that the collection contains records made or received by only one records creator. In the case of natural resources records, this means that all records must be park records (even if they were authored by non-park staff). Natural resources-related archival materials that were *donated* to the park are not park records. They must be handled as part of one or more separate collections.

Second, identify or establish an internal organizational structure for the records. The records may have been transferred to the park's archives in accordance with an established filing scheme. On the other hand, project files may have been accessioned randomly. There may not be a filing scheme governing how they are managed in relation to each other. Then as a body these would be considered "unarranged records." You must discern their original order or impose an organization scheme that will make it easier to manage the records. This internal organizational scheme will involve subdividing the collection, as necessary, into series. It may also involve further subdividing the series into subseries. These series and subseries may be based on a variety of factors, such as:

- office of origin
- discipline
- function
- date range
- document format

Individual file units in most series and subseries will also have to be arranged in a consistent fashion. All the file units in one series, for example, may be arranged alphabetically by the title of the project. In another subseries they may be arranged numerically by accession number or permit number. In yet another, the file units may be arranged in chronological order. It all depends on the nature of the records and the way in which they were created.

Finally, arrange the records physically, in accordance with the hierarchy and filing schemes you identified or established. When you start to catalog and describe the collection, your descriptions will follow the same hierarchical format.

For further explanations of archival arrangement, and for examples of series, subseries, and filing schemes, see the separate section Hierarchies for Associated Records at the end of this appendix.

3. *What steps do I need to take to catalog a collection of records associated with natural history projects?*

Follow the steps listed below to catalog a collection of associated records for a natural history project.

Step 1: Define the collection (for example, all records associated with all projects in a particular discipline). Then establish the internal organization (the hierarchy, described in question 2 above).

Don't attempt to catalog or describe archival materials until you have determined their arrangement or arranged them hierarchically. See the section at the end of this appendix for examples of different types of hierarchies.

Step 2: Create a single catalog record in ICMS for the collection as a whole. This should be a very broad overview of the collection, noting types of documents, general topics, and notable projects. It should also include:

- the organizational structure, that is, the titles of the various series
- a brief history of the park and its activities in connection with the discipline in question
- volume
- date range

Step 3: Copy the catalog record over to the collection-level screen in the archives module of ICMS.

Step 4: Create separate, series-level screens for each series, and enter full descriptions. Think of these descriptions as mini-catalog records for each series. The descriptions should provide the same general information for each series that you provided earlier for the collection as a whole. As you move down the hierarchy, in other words, you provide progressively more focused and detailed information. The collection level description is very general. The series level descriptions are focused specifically on a single series. If you have to organize series into subseries, then the subseries descriptions would be even more specific.

Step 5: Open file unit-level screens for each project file, and provide very brief information. If you are organizing the file units by accession number, then enter:

- the accession number and the name of the project into the title screen (the accession number should also appear in the accession number field)
- very basic information into the summary note field about the site, purpose, subject, findings, and key personnel of the project

The summary note should seldom be more than one or two sentences. It should only provide enough information or key words to help you identify files for reference purposes.

Step 6: The documents on any one project constitute a single file unit, no matter how many folders there are. Assuming these folders have different titles, you may want to list them individually. To do so, go to the supplemental records in the Archives Module, and select Container List. Enter a box-by-box list of the individual folder titles.

Step 7: Create a finding aid from your Archives Module entries. To automatically generate a finding aid in Microsoft Word:

- open the collection-level screen for a particular collection
- select Record on the menu bar
- click on Finding Aid/SGML, and follow the directions

Note: When describing collections, series, and file units in the Archives Module, be sure to follow directions contained in the:

- *Museum Handbook*, Part II, Appendix D
- *ICMS User Manual*, Appendix F
- ICMS field help for each field in the Archives Module

4. *What if previously accessioned project files were already cataloged separately?*

After you have established your hierarchy and arrangement schemes, determine where in this organizational structure these individually cataloged project files would fit. Then describe each previously cataloged project file in the Archives Module. Use a file unit screen that is numbered according to the proper sequence and subordinate to the appropriate series or subseries. Depending on how well the catalog record is written, this may be as simple as copying the description field from the catalog record over to the file unit screen. If this work cannot be done immediately, add numbered but incomplete file unit screens as placeholders. Once this work is done, retain the superseded catalog record but change its status to "Incorporated Into Larger Archival Collection."

5. *How should I handle new accessions that come in after I have cataloged a collection of associated records?*

Handle new accessions as "accretions" to existing collections. Don't handle new accessions as new collections, and don't create new catalog records for them.

One way of doing this would be to incorporate the new file unit into the existing collection as a logical extension of the existing filing scheme.

If the files are arranged…	***Then …***
in ascending numerical order by accession number, and the newly accessioned file unit has a higher accession number than the last file unit in the existing collection,	add the new file unit at the end of the collection.
If the files are arranged…	***Then …***
chronologically, and the new file unit has a later date than the previous file unit,	add the new file unit at the end of the collection.

In either case above, the new file unit would fit automatically into the collection's established numerical or chronological filing scheme.

Physically place the textual records for the new project at the end of the series of textual records. Place the photos at the end of the series of photos. Place the maps/drawings at the end of the series of maps/drawings. By ordering the collection according to accession number, you can easily place the new materials. Place them in boxes or drawers immediately after the previously-accessioned materials. Since the new material will have a higher accession number, it automatically fits into the collection's numerical arrangement scheme.

To handle the new accession in ICMS:

- In the Archives Module, complete new file unit-level screens for the newly-accessioned materials under the appropriate series or subseries headings. Also, add folder titles to the Container List supplemental record.

- Update series-level screens in the Archives Module for each series affected by the new accession. The updates should reflect any change in date range or volume.

- In the Collection Management Module, revise the catalog record to reflect changes in date range or volume resulting from the new accession. Note the addition in the Description field. Then copy the revised catalog record over to the collection-level screen in the Archives Module. (Check the Archives Module before copying to make sure that existing data are not overwritten.)

For more information on handling accretions to existing collections, see the *Museum Handbook* Part II, Appendix D, Section G.

6. *What if you are filing accessions by accession number, but accessions are not received in the order in which the accession numbers were issued?*

Create a dummy file unit entry citing the accession number and a collection level/series level/file unit level number in the proper sequence. This dummy file unit screen will serve as a placeholder until you actually accession the project file in question. At that point you can write the description and complete other fields as necessary.

7. *Should my park report accretions to existing collections on the Collections Management Report?*

Yes. Archival collections may take more than one year to catalog. It's also not uncommon for archival collections to grow after initial cataloging has been completed. Therefore, it's permissible to report archival cataloging *incrementally*. However, you should report additions to existing catalog records. Don't create new catalog records.

Suppose you catalog a 50 linear foot collection of geological project files at your park. You report this in your annual Collections Management Report (CMR). Then suppose you accession and catalog another 2 linear feet of geological project files two years later. Although you aren't adding a new catalog record, you're adding newly cataloged material to an existing catalog record. You can report the addition to the catalog record as new cataloging. Amend the CMR for that fiscal year to show that you cataloged 2 linear feet of newly-accessioned material.

REMEMBER: The catalog record is just the overview of the collection as a whole. The series screen in the Archives Module is used to provide an overview of the series as a whole. The project-by-project information should be entered into a file unit level screen in the Archives Module. This includes information on the specific location of an individual file unit that may be retained off-site.

8. *How should I catalog associated records for accessions that are housed at off-site repositories?*

No matter where the associated records are housed, they are part of a single, organic collection. Don't catalog them separately. Catalog all the associated records under one catalog number. One catalog record should document all of your park's project files for a particular discipline. Records that are housed off site are included on this record along with all other project file descriptions for that collection. Use the Location field in the Archives Module file unit screen to enter the name of the off-site repository where the file unit is housed.

Associated records on a park's natural history projects are park records regardless of their physical location. Never handle individual project records as stand-alone collections.

9. *How should I catalog associated records for network projects?*

The records generated at a park in connection with multi-park or network projects remain park property. Manage these associated records as part of the park's collection of records relating to the discipline. For example, the park has a collection of associated records relating to biological projects. The park then participates in I&M Network studies or inventories of bird migrations or plant species. The park records generated by the network studies are added as a file unit on the catalog record that covers all the park's biological records.

For clarity and ease-of-use, however, it might be wise to organize the collection into two series:

- network projects
- park-specific projects

The hierarchy for a collection of records generated by both network projects and park-specific projects could look like this:

ASSOCIATED RECORDS RELATING TO BIOLOGICAL PROJECTS AT XYZ NATIONAL PARK

SERIES I: Records Relating to Network Projects

SERIES II: Records Relating to Park-Specific Projects

These series may then be further organized into subseries based on the kinds of records they contain. The series of records on network projects might be organized into subseries based on types of projects. For example, there may be a subseries on wildlife inventories or water quality studies. The subseries may in turn be organized into sub-subseries based on document format, such as textual records, maps, or slides.

This is only one example of how records for multi-park or network projects may be handled. See the section Hierarchies for Associated Records at the end of this appendix. It contains examples of hierarchies relating to network Inventory and Monitoring projects.

10. *How do I manage associated records created under a multi-park permit?*

Multi-park permits may be issued through a lead park. Any specimens collected under such permits should be accessioned by the individual parks where they were collected.

If the associated records…	***Then…***
can be divided easily by park,	they may be sent to the individual parks to be housed as part of the park archives.
cannot be divided easily among the parks because they apply to the entire project,	the lead park retains the records, but copies may be provided to other parks as necessary.

In either case, a copy of the final report should be placed in the archives for each park covered by the permit. All the parks covered by the multi-park permit would have copies of the final report. However, only the lead park would have the field notes, maps, photos, and other field records. The non-lead parks should handle the final reports as file units within their natural history project records. Indicate in the ICMS Archives Module that the lead park retains the field records relating to the report. If specimens and associated records were acquired under the same accession, however, this is not strictly necessary. The specimens and associated records are automatically linked via the accession number.

11. *What if my park has to send network-related project files to a network coordinator at another park?*

Records relating to network-initiated projects at your park and maintained by the network coordinator at another park are still park records. Catalog and describe them as noted in the question above. Note the name of the park where the records are kept in the Location field of the file unit-level screen. Cross-reference the specimen catalog records to the archive records to retain the link between specimens and their associated records.

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Fossil Vertebrates and Invertebrates:

The Paleobiology Database includes the classifications for many groups of fossil organisms, but just as ITIS is incomplete for modern forms, the Paleobiology Database is incomplete for many fossil groups. The Paleobiology Database has not been adopted as the National Park Service's taxonomic standard for fossils. It is however a useful tool to aid catalogers working with fossils.

Paleobiology Database. National Center for Ecological Analysis and Synthesis.
http://paleodb.org/

Fossil Invertebrates:

The *Treatise on Invertebrate Paleontology* is a multivolume series designed to provide a comprehensive and authoritative yet compact statement of knowledge concerning groups of invertebrate fossils. It currently comprises 49 volumes and involves the work of more than 300 authors worldwide with another dozen or so volumes in various stages of preparation. It is only available in hard copy, but the latest volumes will provide the most up to date taxonomic information for different groups of fossil invertebrates. A list of published volumes is posted on the University of Kansas Paleontological Institute website.

Treatise on Invertebrate Paleontology
http://www.paleo.ku.edu/volumes2.html.

U. LIST OF FIGURES --- APPENDIX H

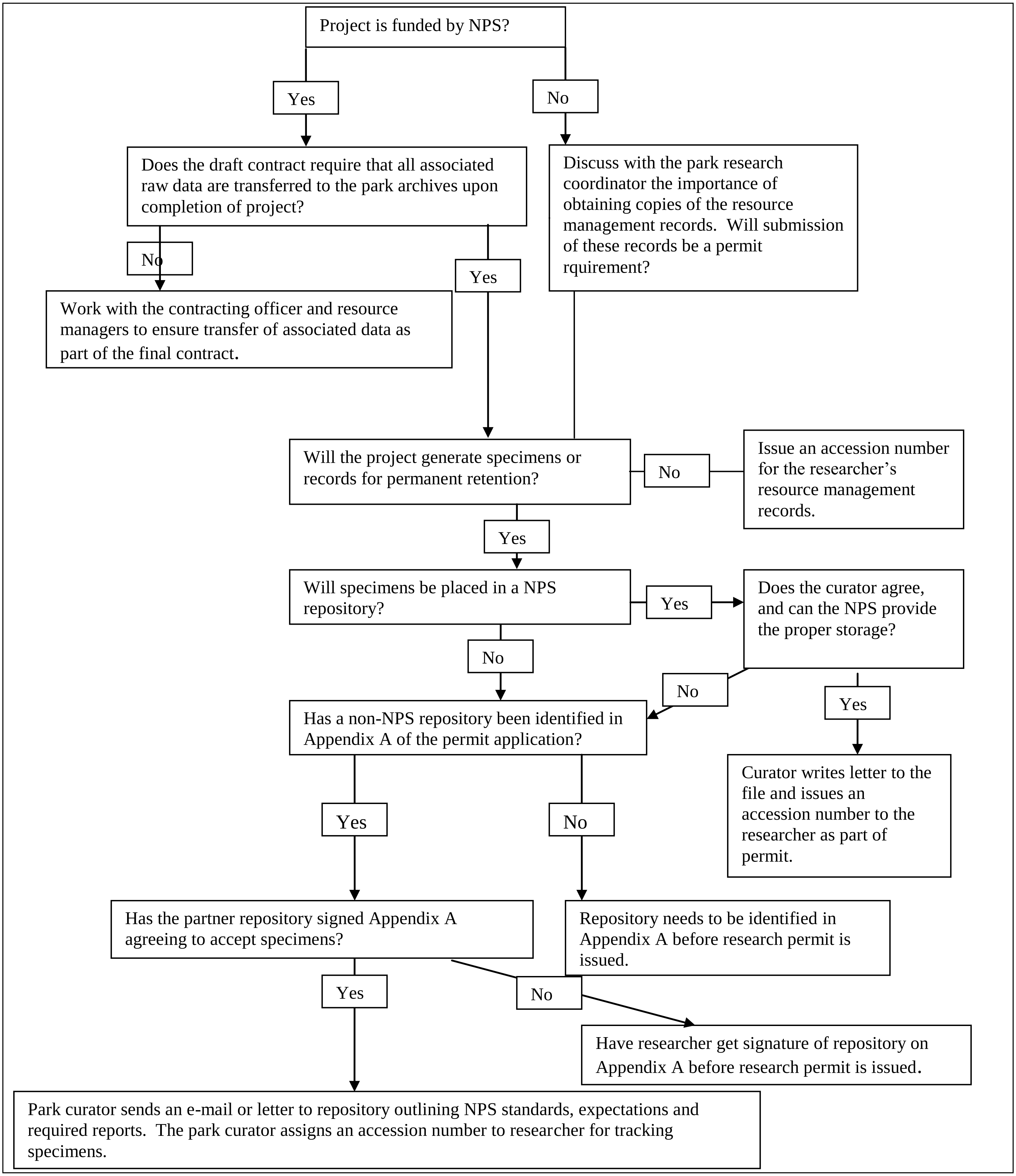

Figure H.1 Decision Flowchart for Curators

NATIONAL PARK SERVICE **NPS FORM 10-500** Park Code

Cat. No. Acc. No. - No. Specimens

Genus Species

Sex

Coll. By Date

Ident. By

Locality

Notes

Original Fixative ____________________

Preservative ____________________ **VERTEBRATE WET SPECIMEN LABEL**

NATIONAL PARK SERVICE
NPS FORM 10-501

PK. CODE Cat. No. Acc No.

Prepared By:

Collected By: Date:

(Genus) (Species) (Subspecies)

Locality Sex

Measurements Age

VERTEBRATE LABEL

Figure H.2 Natural History Labels

NATIONAL PARK SERVICE
10-502

Park Code

Cat. No. Acc. No. -

Genus Species

Locality Sex Age

Date

Collector

SKULL VIAL or BOX LABEL

NATIONAL PARK SERVICE **NPS FORM 10-503**
(June 1992)

Park Code

Group No. Specimens

Phylum Cat. No. Acc. No. -

Taxon Collected By Date

Family Identified By Date

Name

Locality

Notes ______________________________

____

Original Fixative ______________________________

Preservative ______________________________

INVERTEBRATE SPECIMEN LABEL

Name

Cat. No.
Acc. No. -

Locality

Fm.:
Coll:
Date:
Ident By:
Date:

GEOLOGY COLLECTION
NATIONAL PARK SERVICE
Park Code
NPS FORM 10-504
(June 1982)

Figure H.2 Natural History Labels continued

NATIONAL PARK SERVICE
NPS FORM 10-505
(June 1982)

Park Code

Cat. No. Acc. No. -

Genus Species

Group

Locality

Collected By Date

Identified By Date

Formation Period

Notes

PALEONTOLOGY LABEL

NATIONAL PARK SERVICE NPS FORM 10-506
(June 1982)

Park Code

Technical Name Cat. No.

Common Name Acc. No. -

Locality Elevation

Orig. Fix.

Habitat Preservative

Collected By Date

WET PLANT SPECIMEN LABEL

NATIONAL PARK SERVICE NPS FORM 10-507

Park Code Cat. No.

Group Acc. No. -

Phylum Orig. Fix.

Family Pres.

Name

Loc.

No. Spec.

Coll. By Date

Ident. By Date

Notes

INVERTEBRATE LABEL

Figure H.2 Natural History Labels continued

NATIONAL PARK SERVICE **DESCRIPTION OF NEST**

Park Code

Cat. No. Acc. No. - Coll. By

Genus

Species

Locality

Notes A.O.U. No.

Date Coll.

Ident. Incu.

Set Mark

EGG BOX LABEL

NATIONAL PARK SERVICE Pk. Code
NPS FORM 10-509

Genus Species

Acc. No. - Cat. No.

INSECT LABEL

NPS FORM 10-510
(JUNE 1982)

ANNOTATION LABEL
National Park Service

Acc. No. - Cat. No.

Name

Cat. No.

Acc. No. -

Locality

Mine:

Coll:

date:

Donor:

date:

Acc: -

date:

MINERAL COLLECTION
NPS Form 10-511
NATIONAL PARK SERVICE (June 1982)
Park Code

Figure H.2 Natural History Labels continued

NATIONAL PARK SERVICE **NPS FORM 10-512 (June 1982)**	Park Code
Technical Name	Cat. No.
Common Name	Acc. No. -
Locality	Elevation
Habitat	
Collected By	Date
	HERBARIUM COLLECTION

Figure H.2 Natural History Labels continued

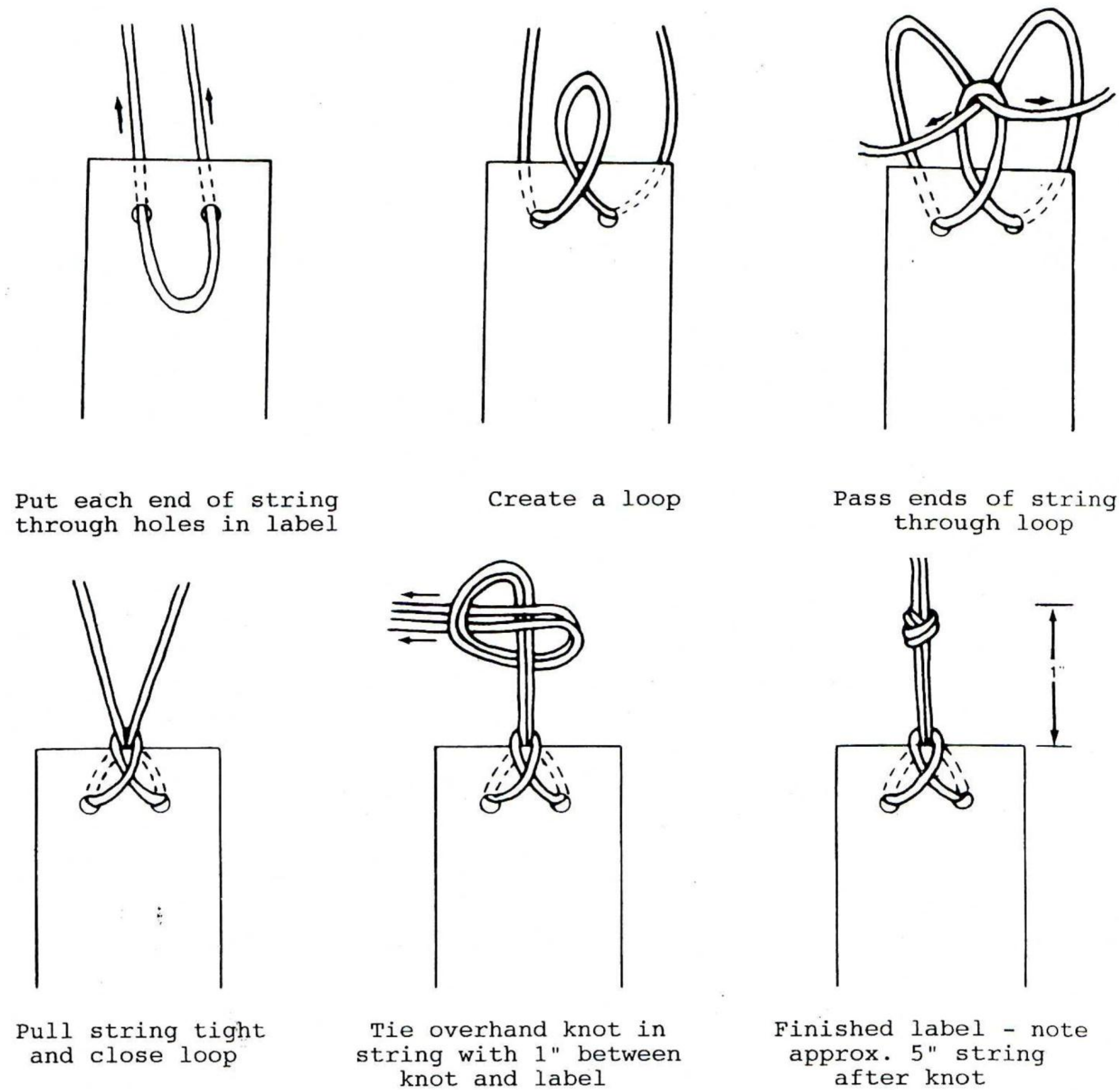

Figure H.3: Attaching String to Specimen Label

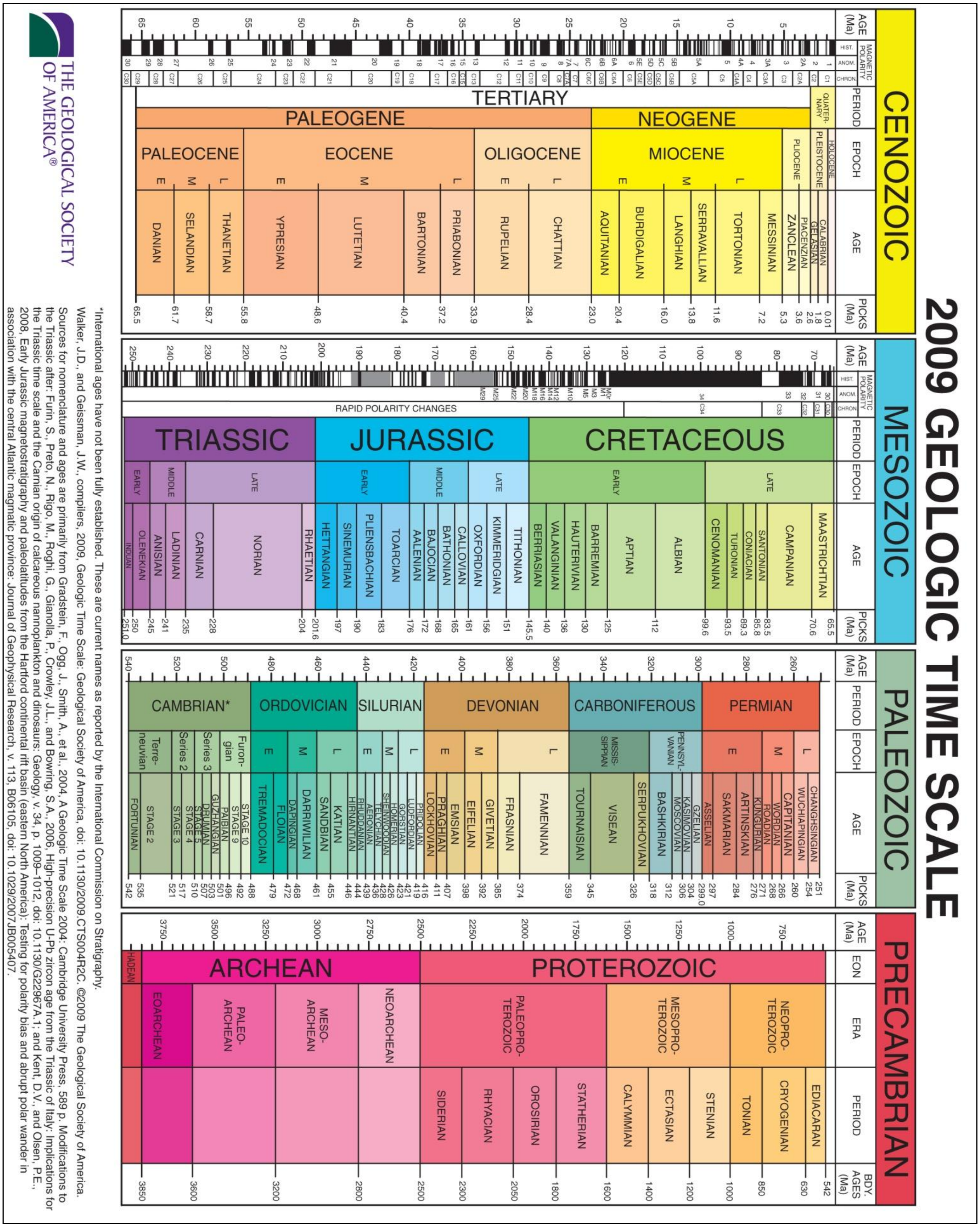

Figure H.4: Geological Time Scale

Procedure for Requesting Thermal Labels

Where: The thermal printer is set up at the Bombshelter in Harpers Ferry and is maintained by the National Catalog office.

What: The purpose of the printer is to print labels for specimens that need to be stored in liquid preservatives **ONLY**. Printing requests for labels for anything other than wet specimen labels will **NOT** be accommodated. Our standard operating procedure is to print only one label per specimen; however, we will consider requests for multiple labels per specimen on a case-by-case basis and may be able to print multiple labels if time and resources allow. The labels will be standard NPS specimen labels appropriate to the specimen. Labels will be printed by a thermal printer at 300 dpi on 9.5 mil Polytag (a polyester tag medium).

If you have any questions regarding thermal transfer printers and their application to wet specimens, please see the article by Andrew Bentley in the Society of the Preservation of Natural History Collections (SPNHC) Newsletter 18(2), September 2004 at: http://www.spnhc.org/opencms/export/sites/default/spnhc/publications/linked_documents/september2004.pdf

Who: Submit requests for wet specimen labels to the Senior Curator of Natural History, Greg McDonald at greg_mcdonald@nps.gov. Requests will be reviewed by the Senior Curator of Natural History and passed on to the National Catalog.

How: The park curator submits a request for labels (a request form will be released in the near future). Please be sure to provide all of the information requested. All specimens for which labels are requested must be fully cataloged. We will not print labels for draft records. Records must also include the preservative (the liquid in which the specimen is currently stored). Specimens that are **not** in ICMS cannot be accommodated. Completed labels will be sent to the park via FedEx. Include the name, FedEx address, and phone number of the person who will be receiving the labels.

Data Transfer: Create a backup of the park's NH database that includes a tag file of the records to use for printing labels, or create an NH directory of the catalog records to use for printing the labels. Use the Selected Directories backup in ICMS (*ICMS User Manual*, Chapter 9). Name the file with the park acronym or directory name and Label, such as NOCANHLabel. Upload the backup to the ftp site at:

ftp://67.221.117.85/catalog submissions/

Enter the user name: NCSNPS
Enter the password: ICMSncs!1

When: Requests may be submitted at any time. Labels will be printed and returned as quickly as possible.

Figure H.5 Requesting Wet Specimen Labels

Sample Repository Agreement

AGREEMENT
between
NATIONAL PARK SERVICE
and
[Repository]
on
Management of NPS Natural History Collections

A. Coverage

This agreement covers natural history collections (specimens and associated records, or copies) made on national park system lands identified in Attachment 1 and stored and managed by the (insert repository name [R]). The agreement covers biological collections including non-fossilized specimens of monera, algae, fungi, plantae, protista, and animalia; paleontology; and geology. It excludes cultural artifacts and human remains and natural history collections recovered from archeological and other cultural sites. The agreement applies to all collections that NPS offers and [R] accepts after the date of the last signature on this agreement. Collections made under 36 CFR 2.5 and loaned to [R] prior to this agreement will be covered by this agreement only if listed in an attachment. [Attach list of additional collections to be covered in Attachment 2.]

B. Background

The National Park Service (NPS) museum collections number more than 146 million items from over 380 units of the national park system, including natural history collections of 2,968,000 biological, 604,000 paleontological, and 81,000 geological specimens. The NPS collections are managed in parks, NPS centers, and non-NPS repositories. NPS staff and permittees collecting on park lands generate NPS natural history collections in accordance with 36 CFR 2.5. These collections are Federal property. Managers of NPS natural, cultural, and archival collections typically respond annually to more than 20,000 research requests from park staff and over 213,000 requests from non-park staff. Authority to manage these collections is in 16 USC 1-4 (National Park Service Organic Act) and 16 USC 18f, f2, f3 (National Park Service Museum Act).

[R] has [insert number] biological, [insert number] paleontological, and [insert number] geological specimens. [Briefly describe repository's scope and areas of specialty, staff expertise, collections access policies, and research use. Include quantitative data. Describe exhibit, education, publication and other programs, as applicable.]

The current NPS Inventory and Monitoring Program, All-Taxa Biological Inventory in selected parks, Natural Resource Challenge, and other programs and projects are generating NPS natural history museum collections at a faster rate than ever before. NPS is seeking viable options for effectively responding to this increased collections growth. Managing these NPS collections in partnership with [R] would provide for their preservation, enhance their research value through ongoing study and identification, and make them readily accessible to researchers using the [R] collections. Collections from national parks will enhance the biological and geographical diversity represented in the [R] collections. [R] management of collections from units of the national park system is a desirable option.

Individual parks have always had the option of storing collections at [R] under NPS loan agreements. Managing multiple loan agreements from multiple parks may place a burden on [R] resources. This agreement will facilitate and streamline such loan arrangements for both [R] and parks and improve the ability of parks and [R] to respond to the increased collecting activity in parks. This agreement is not binding on either NPS or [R] to place NPS collections at [R] but offers both parties that option.

C. Policies

1. Both parties agree that:

    a. Specimen collection and management of park specimens and associated records, including loans, complies with NPS regulations (36 CFR 2.5) and, except as noted herein, with NPS policies, including:
        1) NPS *Management Policies 2006* (available at http://data2.itc.nps.gov/npspolicy/index.cfm);
        2) Director's Order #24: NPS Museum Collections Management (available at http://www.nps.gov/refdesk/DOrders/index.htm);
        3) NPS procedures, including NPS *Museum Handbook* and the *Interior Collection Management System (ICMS) User Manual* (available at http://www.cr.nps.gov/museum/publications/index.htm); and
        4) permitting procedures (available at https://science.nature.nps.gov/research/ac/ResearchIndex)
        5) Director's Order 77-10: NPS Benefits Sharing.

    b. Management of specimens and associated records at [R] complies with [list applicable laws, regulations and policies specific to the repository]. It is anticipated that most [R] requirements are consistent with NPS requirements. When [R] requirements conflict with NPS requirements, NPS requirements will prevail with respect to NPS specimens.

    c. Differing requirements between NPS and [R] policies known at the initiation of the agreement have been herein identified and procedures provided in this agreement. The agreement will be amended to resolve any conflicting requirements that may be identified in the future.

    d. [R] may integrate NPS collections into the [R] collections physically in storage, exhibits, and programming and through its documentation systems for management and access purposes, except that collections may not be physically integrated where they might be exposed to known pre-existing hazardous conditions in the [R] collections, such as arsenic or asbestos, or to use that would rapidly accelerate their deterioration.

e. Parks that intend to designate [R] in a permit or in a park employee study plan must ensure that the Application for a Scientific Research and Collecting Permit or employee study plan, refers to this Agreement and names [R] in the repository signature block on page 2 of the application, in lieu of the signature of an official of [R]. [R] does not need to sign each Application. The park will send [R] copies of all permits issued in the previous calendar year that name [R] as the designated repository. [R] may require more frequent notification, but not more frequent than quarterly.

f. [R] may annually or more frequently require a park to notify [R] in advance of the types and quantities of specimens likely to be deposited with [R] within a specified future period.

2. [R] agrees that:

   a. It will negotiate additional conditions, if any, for specific repository loans with individual NPS units that are consistent with this agreement, NPS regulations, permitting procedures, and NPS loan conditions. These additional conditions will be included in the park's outgoing loan agreement to [R] for the specific loan.

3. NPS agrees that:

   a. When choosing a management option for park collections, including specimens and associated records, priority will be given to housing those collections from the same park accession in a single repository to facilitate research and use. Superintendents may authorize housing of collections from the same accession at different repositories if, by so doing, preservation, research, and use will be improved.

D. Documentation, Information Management, and Accountability

1. Both parties agree that:

   a. The collections will be at [R] as a repository loan(s) for the purpose of long-term storage and collection management, including for research and other scientific purposes.

   b. The standard NPS loan conditions will apply except as noted below:

      1) [R] will have authority to approve destructive sampling of most specimens without prior approval by the park superintendent. The superintendent approves any destruction of an entire specimen. Only NPS regional directors or Washington Office associate directors with museum collections responsibility can approve destructive sampling and

destruction of an entire specimen for rare or highly significant specimens, including holotypes, and consumptive use of specimens. Consumptive use is approved use that will expose the specimen to otherwise unacceptable wear, deterioration, destruction, or the possibility of breakage, loss, or theft. Approvals for such use are rare and given only when use of a reproduction is unsatisfactory. [R] may recommend that a park seek approval for destructive sampling of rare or highly significant specimens or consumptive use. Procedures for parks to use in seeking regional director approvals are in the *Cultural Resource Management Guideline* (NPS-28), Chapter 9, page 152-154, available at http://www.nps.gov/refdesk/DOrders/index.htm. *Note: For the purposes of this agreement, routine morphological dissections of holotypes, where the parts are retained, are not considered destructive sampling.*

2) [R] will have the authority to loan specimens and associated records to other qualified institutions or organizations for the purposes of exhibit, research, scientific or exhibit preparation, analysis, photography, conservation or other requested services, other than a repository loan. Such loans must meet NPS loan conditions and the standards of [R].

c. [R] and the NPS units will ensure transferability of electronic data between their respective museum collections data management systems.

d. Each will keep the other party informed, at all times, of its official contact person and appropriate e-mail addresses for each loan. Unless otherwise notified the official e-mail contact for each park will be the superintendent. Superintendent addresses take the following form using the park acronym PARK_Superintendent@nps.gov. The name and address for each superintendent is on the NPS Web site searchable by park name at http://data2.itc.nps.gov/npsdirectory/.

2. [R] agrees to:

a. Do one or both of the following:

1) Maintain ICMS catalog records for the specimens and associated records on loan according to the NPS *Museum Handbook* and *ICMS User Manual*. Record changes to other catalog records for park collections that [R] maintains in an electronic format in lieu of ICMS records. Record changes so that data can be imported to appropriate fields in ICMS. Submit these changes electronically to each park by July 31 each year.

2) Maintain information on NPS collections in its own databases, to maximize the accessibility of the specimens to researchers using the [R] database. Maintain a retrievable reference to each specimen that includes:

a) the NPS catalog number

b) the name "National Park Service" and the name of the national park system unit were the specimen was collected
c) the identity of the location where the specimen was collected, by geographic locator and description
d) the scientific name of the specimen
e) identification of the specimen as Federal property and the National Park Service as "owner"

3) Record changes to other catalog records for park collections that [R] maintains in its database in an electronic format in lieu of ICMS records. Record changes so that data can be imported to appropriate fields in ICMS. Submit these changes electronically to each park by July 31 each year.

b. Return collections to parks if specimens and associated records are delivered by the park without accession and catalog numbers and/or specimens lack NPS labels, unless [R] agrees, in advance, to provide these services.

c. Maintain associated field records in working proximity to the specimens.

d. Recommend, to NPS, any park items that should be deaccessioned because they lack scientific, educational, historical, or monetary value. Assist NPS (the park) in prompt completion of deaccession transactions once NPS (the park) has approved a deaccession.

e. Report a loss to the lending park within 5 working days of determination of the loss. [R] will record the loss in the records that it maintains for the specimen.

f. Note damage or deterioration on the catalog record that [R] maintains for each specimen or associated record.

g. Report the following information annually to each park for the period of October 1 through September 30. Provide this report to each park (at PARK_Superintendent@nps.gov) on September 1.

1) Any damage or deterioration that has occurred to specimens or associated records in the past year. The report should include photographs, as appropriate, and dates and other details of the occurrence. Organize the report by NPS catalog number, or if a catalog number is not assigned, by NPS accession number.
2) The catalog numbers of all specimens loaned out in third-party loans, the loan recipient, and the duration of the loan.
3) The catalog numbers of specimens and associated records that were on exhibit. Identify the exhibit title, location, and duration.

4) Number of NPS research requests and number of non-NPS research requests.

h. Annually inventory all holotype specimens and specimens of high value [specify dollar value] as identified on the NPS catalog record as controlled property; and either 1) verify, at a park's request, the presence and condition of specimens that appear on a park's random sample inventory, or 2) complete a random sample inventory that includes all cataloged NPS specimens and associated records at [R] that are subject to this agreement. Use the inventory procedures in ICMS for the NPS specimens, or equivalent random sample procedures. Equivalent procedures may be for only the NPS specimens or for [R]'s entire collection, including the NPS specimens. If appropriate, use the ICMS procedures available to repositories managing multiple park collections. If, in any given inventory cycle, no NPS specimens appear in [R]'s random sample of its entire collection, [R] will randomly select and inventory 25 NPS specimens or 20 percent of the NPS specimens held, whichever sample includes fewer specimens. Certify completion of the annual inventory and report the summary findings on all missing and damaged specimens and other irregularities. Report this summary information for all specimens (NPS and non-NPS) covered by the subject inventories. If [R] uses ICMS to complete the inventory, submit the completed and signed inventory. Send to each park superintendent the certification and report, and, as applicable, completed and signed inventories generated by ICMS, no later than July 31 each year.

3. NPS parks (units) agree to:

a. Accession and catalog collections (specimens and associated records) into ICMS or its successor and apply NPS labels to specimens prior to delivery to [R], or contract or otherwise arrange for such services prior to finalizing the applicable repository loan agreement, unless [R] agrees in the loan agreement to assume this responsibility at no cost to NPS.

b. Destroy, or authorize [R] to destroy, any collections judged to have no scientific, educational, historical or monetary value. Follow NPS deaccession procedures if these items have been accessioned.

c. Place collections on loan to [R]. Designate the purpose as a repository loan for "storage and collections management" and record the loan in ICMS.

d. Amend the list of objects/specimens in an existing loan record in ICMS when additional items are loaned to [R] under the same conditions. If the conditions change, add those changes to the conditions in the existing loan.

e. Report and document a loss that occurs at [R] following NPS procedures in NPS *Museum Handbook*, Part II.

f. Record any damage or deterioration in the ICMS record for the affected specimen or associated records.

g. Ensure that loan, exhibit, and research request statistics reported by [R] are incorporated in each park's annual Collections Management Report.

h. For items that appear on the park's annual inventory, note in the comments column any that are on loan to [R]. Rely on [R] to inventory these items according to the provisions of this agreement.

i. By September 15 annually, replace catalog records with the revised records that [R] submits to the park.

j. Review [R]'s annual inventory and certification submission to the park. Submit a copy of this inventory and certification with the annual inventory that the park submits for its other collections.

k. Consider [R]'s recommendations for NPS to make repository loans of selected specimens to a third party. Determine whether the proposed recipient institution is qualified and the loan is advantageous to NPS. If approved, document return of the specimen(s) to NPS by removing them from [R]'s loan, catalog the specimen(s) individually, and prepare a repository loan to the third party. Follow NPS loan procedures in NPS *Museum Handbook*, Part II, to document the loan. Include standard text in the loan requiring an agreement with NPS (see DO 77-10: NPS Benefits Sharing) if a potential commercial application is identified.

E. Preservation and Protection

1. [R] agrees to:

a. Provide storage conditions that meet or exceed NPS standards in the NPS Checklist for Preservation and Protection of Museum Collections and keep NPS apprised of all standards that are not met by identifying them on the Checklist. (Storage conditions will have been generally met if approximately 95% of NPS standards are met.)

b. Provide conservation treatment to a level that meets or exceeds NPS standards in the NPS *Museum Handbook*, Part I, and [R]'s standards. Document the treatment on the ICMS and other catalog record that [R] maintains for park specimens.

F. Access and Use

1. Both parties agree that:

a. Specimens covered by this agreement may be used for scientific, environmental conservation, or educational purposes only. Specimens will not be used for commercial or other revenue-generating purposes without the prospective user first having entered into a separate agreement with NPS.

b. [R] will maintain the specimens and associated records so that the public will have access to them in accordance with NPS laws, policies and procedures. Data are subject to the Freedom of Information Act (FOIA) (5 USC 552), but protected information must be withheld from non-Federal entities, as appropriate, to comply with Section 207 of the National Parks Omnibus Management Act (16 USC 5937), the Federal Cave Resources Protection Act of 1988 (16 USC 4301-4309), or any other Federal statute requiring withholding under FOIA. (See NPS *Museum Handbook*, Part I, Chapter 2, Section H. Other Legal and Sensitive Issues.) In cases where [R] believes that making protected information available to a third party would be beneficial, [R] will provide NPS with its analysis regarding the benefits and detriments of having the protected information released to the public and will suggest to the third party that it petition the NPS for access to the information.

   Absent specific instructions from the Superintendent, [R] will not place the following data on publicly accessible portions of [R]'s catalog records and specimen labels, or otherwise make these data publicly available:

   1) data noted as restricted on the NPS catalog record
   2) collector's private address and private contact information
   3) monetary valuation

   Unless the NPS Director specifically determines and the park gives written notification to [R] that release is appropriate, [R] must withhold, from any form of release to non-Federal entities, information on the *nature* and *specific location* (including exact site of collecting) of

   1) a national park system resource that is endangered, threatened, rare, or commercially valuable
   2) a mineral with commercial value or a paleontological object or an object of cultural patrimony (for example, archeological and ethnographic objects and objects important to culturally associated groups) within the national park system.

   Following consultation with and authorization by the park superintendent, [R] may release location information in a more generalized format such that its release will not reveal the specific location of the qualifying resource.

2. [R] agrees to:

   a. Provide NPS full access to park collections (specimens and associated records) and related information sources at any time during regular working hours, subject to use and handling restrictions in this agreement.

b. Make specimens physically available, subject to use and handling restrictions identified in this agreement, in the NPS catalog record, in NPS policies, including the NPS *Museum Handbook*, and in [R]'s policies.
c. Make information about specimens available from ICMS and [R]'s specimen database, if different, subject to [R]'s data access policy and restrictions in this agreement, in the NPS loan agreement, and on the catalog record.
d. Allow destructive sampling in accordance with D.1.b.1 that does not compromise the scientific value of the collection according to terms of a written valid research proposal; file the research proposal that [R] receives, accepts, and maintains in files associated with the specimen; record a description of the destructive sampling and the research results in the catalog record that [R] maintains for the specimen.
e. Cite in submitted publications about park specimens, "National Park Service," park name, specimen name, and NPS catalog number. Publications include paper-based and electronic media (including the Web).
f. Notify NPS if a user identifies a potential commercial application. Ensure that parties proposing to use specimens for commercial or other revenue-generating purposes have entered into an agreement with NPS before so using the specimens. [R] will include a provision in loan, research and other agreements and permissions directing the user to contact NPS to develop such agreements as needed. The wording to be included in such loans and agreements is as follows:

> If you identify or intend to develop a potential commercial or revenue-generating application based on the covered National Park Service (NPS) specimens, you must immediately notify the contact for [R] and the NPS superintendent of the park from which the specimens originated. Contact information for park superintendents is searchable by park name on the Web at http://data2.itc.nps.gov/npsdirectory/. The superintendent will provide information on the agreement that is required providing for NPS to share in benefits from the commercial application or to decline to share benefits. Failure to comply with NPS requirements may render the user liable to NPS for payment of 20% of the gross revenue from sales and may result in NPS imposition of additional penalties and remedies, including injunctive relief.

g. Upon request of the lending park, return specifically identified specimens to the park for compelling reasons, including but not limited to park management purposes and legal requirements.

3. NPS parks (units) agree to:

a. Document as a returned loan (by amending the list of objects) specimens that [R] returns at the park's request for compelling reasons, including but not limited to park management purposes and legal requirements. When the park use is concluded, return the specimens to [R], amending the list of objects to again include these specimens in the repository loan to [R].

G. Funding, Personnel, and Special Service Requests

1. Both parties agree that from time to time NPS may request and [R] may provide special services, such as posting collections on-line in the NPS Web Catalog at http://www.museum.nps.gov, making digital images, and providing non-routine conservation treatments. Funding for such services is to be negotiated and documented in an associated funding agreement, as needed.

2. [R] agrees to:

    a. Bear all costs of providing routine storage, maintenance and access, unless another agreement between [R] and NPS addresses these costs.

    b. Charge for access only in extraordinary circumstances, and report all access charges to the NPS Chief Curator by September 30 annually.

    c. Accommodate NPS needs, from time to time, to co-locate personnel at [R] to facilitate study of NPS collections. The terms of such arrangements are to be determined in an agreement between NPS and [R] signed in advance and may include provisions for NPS personnel to provide cooperative assistance to [R].

3. NPS parks (units) agree to:

    a. Assign NPS personnel to work with [R] according to terms of specific provisions agreed between [R] and NPS when such arrangements would be mutually beneficial.

    b. Require any personnel co-located at [R] to abide by this agreement and follow [R] procedures for handling collections.

    c. Provide funds to [R] for services rendered in accordance with any additional agreements, subject to appropriated funds.

H. Agreement Conditions

1. Both parties agree that:

    a. This agreement applies to all repository loans from any parks listed in Attachment 1 to [R] for the covered collections. Specimens are on loan to [R] through a single repository loan per park that is subject to this umbrella repository agreement.

    b. The term of this agreement is 25 years. The agreement will be renewed for an additional 25 years unless either party has given three months written notice of intent to terminate.

c. This agreement may be amended at any time with the concurrence of both parties.

d. The term of individual park repository loans will be ten years. Individual park repository loans will be renewed every ten years unless either party has given three months written notice of intent to terminate that specific loan or this agreement.

e. Each park that has a repository loan to [R] will have a single loan with a single set of conditions. The park will amend the list of items on loan as it sends additional specimens to [R] and receives returned specimens. The park will amend the conditions as necessary.

f. All park repository loans issued under this agreement will immediately terminate if this agreement terminates. Either party may terminate this agreement and all associated park repository loans without cause after giving three months written notice. Individual termination of the associated park repository loans will be according to the conditions of each repository loan.

g. If loan or agreement conditions are not being met, one party notifies the other and both agree to meet within 30 days to resolve the issue. If the issue is not resolved and one or both parties desire termination, the three months for notice of termination, shall be deemed to have begun effective the date of notification.

h. Insurance is waived for park collections at [R].

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ORGANIZING AND ARRANGING ASSOCIATED RECORDS FOR BIOLOGY, PALEONTOLOGY, AND GEOLOGY COLLECTIONS

What should a collection of associated records for science projects contain?

A "collection" – or "record group" – should contain all documents made or received by a single records creator.

Who is considered the creator of the associated records for NPS science collections?

For NPS science collections, the records creator is the park. When independent researchers turn over originals or copies of records such as field notes and reports, as required by their research permits, those materials are park records.

What are acceptable ways to define the park's associated records for science collections?

There are three approaches to defining the collection that are acceptable. The collection can consist of all:

- records relating to a specific discipline, for example, PARK Biology Project Records or PARK Geology Project Records

- records relating to natural history in general, for example, PARK Natural History Program Records

- resource management records, for example, PARK Resource Management Records

Note: The collection as all resource management records is the preferred method because it reflects the professionally-accepted best practice in archives.

Never handle individual project files or individual documents as separate collections. Don't create separate catalog records for single project files.

How do I organize and arrange a collection of associated records for science projects?

A hierarchy is the skeleton or infrastructure upon which an entire collection is built. It is the basis for:

- organizing and arranging a collection

- cataloging and describing a collection

- servicing or providing reference on a collection.

To construct a hierarchy, you must identify each series and analyze its organization and file unit arrangement. You're then ready to join the series together in order to create the hierarchy for the collection as a whole. Once the hierarchy is established, the collection will become manageable and everything will fall into place smoothly. Failing to establish a proper, collection-wide hierarchy, however, will make it impossible to manage the records successfully. Establishing a hierarchy can seem a little tricky at first, but hierarchies are indispensible to professional and effective archival work.

Is there a template for establishing a hierarchy for science project associated records?

No. Hierarchies are all based on the same principles of archival organization, but there is no universal template for establishing a hierarchy. Thus, there is no one hierarchy that all NPS units can follow when managing their associated records for science projects. The hierarchies for similar types of records often will resemble each other, but each hierarchy will be customized to its specific collection. The hierarchies are likely to vary based on:

- the types of records that each park kept

- each park's mission

- the sorts of projects carried out at the various parks

- the way in which each park filed those records

For more information about archival collections and hierarchies, see the *Museum Handbook*, Part II, Appendix D.

What should I keep in mind when beginning to organize a collection?

There are several basic archival principles which will help you to define what constitutes a collection.

- Make sure you have identified the collection *in its entirety*. An archival collection is greater than the sum of its parts. Don't take an individual project file and manage it in isolation by treating it as a collection. This removes it from the context of the park's overall resource management records and makes it less useful for researchers.

- Start with the collection as a whole and then work down through series and subseries to individual files. Don't manage files as stand-alone bodies of records.

- Remember that the series defined in any collection must be based on the records themselves.

- Make sure you have not mixed multiple collections together.

- Identify each series in the collection.

- Determine how each series is organized (for example, alphabetically, numerically, by subject, by format).

What is a series?

A series is a grouping of file units based on the office of origin, discipline, function, or other common characteristics. A series generally features consistent filing schemes. For example, Paleontological Project Files could be a series, or Natural History Reports could be a series.

You can further divide series into subseries or sub-subseries when it's appropriate to break a series into smaller groups. For example, a series of vegetation studies could be divided into a subseries of vascular plants and a subseries of non-vascular plants.

If you…	***Then …***
have a series of natural history reports, and some of those reports were organized alphabetically by name of researcher, and others were arranged numerically by permit number,	establish different subseries for each of those two filing schemes.
If you…	***Then …***
have organized a series of paleontological project files so that the textual records were filed together, the maps were filed together, and the photographs were filed together,	establish subseries based on format.

What is a file unit?

A file unit is an assemblage of documents relating to a single project, subject, event, person, or activity. A file unit is not a file folder. A file unit is the basic means by which records are physically consolidated and arranged. File units are the building blocks of the series. A series that doesn't need to be subdivided is usually made up of one or more file units arranged in a consistent pattern. File units can consist of many file folders.

Be sure to keep separate series and file units for each project. Don't mix the records for different projects.

Should I catalog associated records for science projects to the item level?

No. Item level cataloging is rarely justified when cataloging associated records for science projects.

Examples of Hierarchies for Natural History Associated Records

Following are some examples of the types of natural history associated records that might be encountered at NPS units. The examples show how you might organize and arrange the records. These are examples only. They are not mandatory templates but are intended solely to show the logic behind the development of records hierarchies.

Example 1: Hierarchy Based on Principle of Managing All Records of One Records Creator as Part of a Single Collection/Record Group

Establishing a collection or record group encompassing all of a park's resource management records is the preferred method. This example follows established archival theory most closely. It's the park level equivalent of handling all NPS records accessioned into the National Archives as a single record group (Record Group 79). All park resource management records have the same provenance. They were all created by the park, regardless of the authors of individual documents. Best practices in archives provides for them to be managed as a single, organic collection.

Suppose a park's resource management records included the following:

- central files
- a body of uncoded subject files dealing with resource management issues
- a series of reports on cultural resources (such as historic structures reports, historic furnishing reports, cultural landscape reports)
- records associated with archeological projects

- chief naturalist's records
- natural history reports
- records associated with paleontological projects
- records associated with biological projects
- records relating to network projects

Managing all of these records as a single collection could involve a hierarchy such as the one below. Note that the file units have been omitted from this example. There would be separate file units for each project.

<u>Collection Title</u>: RESOURCE MANAGEMENT RECORDS OF PARK XYZ

SERIES I: Central Files

SERIES II: Subject Files

SERIES III: Cultural Resources Reports
- SUBSERIES A: Historic Structures Reports
- SUBSERIES B: Historic Furnishings Reports
- SUBSERIES C: Cultural Landscapes Reports

SERIES IV: Records Relating to Archeological Projects
- SUBSERIES A: Reports, Field Notes, and Correspondence
- SUBSERIES B: Still Pictures
- SUBSERIES C: Maps

SERIES V: Natural Resources Records
- SUBSERIES A: Records of the Chief Naturalist, 1930-1971
  - SUB-SUBSERIES 1: Chief Naturalist's Files, 1930-1952
    - SUB-SUB-SUBSERIES a: Correspondence
    - SUB-SUB-SUBSERIES b: Reports
    - SUB-SUB-SUBSERIES c: Research Files
  - SUB-SUBSERIES 2: Chief Naturalist's Files, 1953-1971

- SUBSERIES B: Natural History Reports, 1940-1990
  - SUB-SUBSERIES 1: Researcher Name Files, 1940-1973
  - SUB-SUBSERIES 2: Subject Files, 1952-1990

- SUBSERIES C: Records Associated with Paleontological Projects
  - SUB-SUBSERIES 1: Reports, Correspondence, and Field Notes
  - SUB-SUBSERIES 2: Maps and Drawings
  - SUB-SUBSERIES 3: Still Pictures
    - SUB-SUB-SUBSERIES a: Photographic Prints
    - SUB-SUB-SUBSERIES b: Photographic Negatives

SUB-SUB-SUBSERIES c: Slides

SUBSERIES D: Records Associated with Biological Projects
SUB-SUBSERIES 1: Vegetation Studies
SUB-SUBSERIES 2: Invertebrates
SUB-SUBSERIES 3: Vertebrates

SUBSERIES E: Records Relating to Network Projects
SUB-SUBSERIES 1: Biological Inventory Records
SUB-SUB-SUBSERIES a: Reports, Field Notes, and SUB-SUB-Correspondence
SUB-SUB-SUBSERIES b: Still Pictures
SUB-SUB-SUBSERIES c: Electronic Records
SUB-SUBSERIES 2: Environmental Monitoring Studies
SUB-SUB-SUBSERIES a: Water Quality Studies
SUB-SUB-SUBSERIES b: Ozone Quality Studies
SUBSERIES F: Records Relating to Geological Projects
SUB-SUBSERIES 1: Reports, Correspondence, and Field Notes
SUB-SUBSERIES 2: Maps and Drawings
SUB-SUBSERIES 3: Still Pictures

Example 2: Natural History-Specific Hierarchy

The preferred method above is to manage the park's natural science records within a collection that encompasses all of the park's resource management records. However, it may be appropriate to manage the natural science records as a stand-alone collection.

Suppose a park's museum archives included the following records:

- records of the chief naturalists who were on staff from 1930-1971
- reports on natural history projects from 1940-1990 that were filed by the researcher's name
- reports on natural history projects from 1940-1990 that were filed by subject
- specific projects files, irrespective of discipline

In this example, the park could choose to manage all of these records within a single collection of natural history records, using the hierarchy shown below. To demonstrate the higher levels of the hierarchy, the listings of file units have been omitted. There would be separate file units for each project.

<u>Collection Title</u>: RESOURCE MANAGEMENT RECORDS RELATING TO NATURAL HISTORY AT XYZ NATIONAL PARK

SERIES I: Records of the Chief Naturalist, 1930-1971
  SUBSERIES A: Chief Naturalist's Files, 1930-1952
    SUB-SUBSERIES 1: Correspondence
    SUB-SUBSERIES 2: Reports
    SUB-SUBSERIES 3: Research Files
  SUBSERIES B: Chief Naturalist's Files, 1953-1971

SERIES II: Natural History Reports, 1940-1990
  SUBSERIES A: Researcher Name Files, 1940-1973
  SUBSERIES B: Subject Files, 1952-1990

SERIES III: Natural History Projects Records

Example 3: Discipline-Specific Hierarchy

A park may have large volumes of associated records for specific disciplines, such as paleontology or biology. In such cases, the park may choose to regard the records for each of those disciplines as a collection. For example, "Records Associated with Paleontological Projects" would be a collection. "Records Associated with Biological Projects" would be a separate collection. The collection title may vary (for example, "Paleontology Project Records"). However, the idea behind this hierarchy is that all paleontology records created *or received* by the park are part of a single collection.

An example of this type of collection and its corresponding hierarchy is presented below. Note that this is an example only and that the hierarchy for each collection must reflect the records present. In the example below, the series arranged by format and file units have been omitted to demonstrate higher-level aspects of the hierarchy. There would be separate file units for each project.

Collection Title: RECORDS ASSOCIATED WITH PALEONTOLOGICAL PROJECTS AT XYZ NATIONAL PARK

SERIES I: Correspondence and Memoranda
SERIES II: Field Notes
SERIES III: Reports
SERIES IV: Maps and Drawings
SERIES V: Still Pictures
  SUBSERIES A: Photographic Prints
  SUBSERIES B: Photographic Negatives
  SUBSERIES C: Slides

If…	*Then…*
associated records are organized into series or subseries by type, and each type has a unique accession number,	the different types of records for any particular project will automatically be linked by the accession number.
If…	***Then…***
multiple projects were accessioned under a single number,	the different types of records for a particular project will still be linked by virtue of having exactly the same file unit title.

What are project files?

At most parks, the vast majority of associated records related to natural history will be project files. These are records associated with specific research projects carried out in biology, geology, or paleontology. They include Inventory and Monitoring projects. In the three hierarchy options above, the project files would represent file units within either series or subseries.

Remember: Associated records for individual projects are not stand-alone collections. They are only file units within a larger collection.

The volume and organization of these project records will vary from park to park, necessitating different hierarchical structures. Small parks, cultural history parks, and parks in urban areas may not have very large or active natural history research programs. These parks therefore only have a small number of project files. For a small number of project files, you could maintain a simple filing scheme. The filing scheme would include all project files, regardless of discipline. Arrangement could be based on accession number, permit number, or project date. Other parks may have large and complex natural history research programs. For these parks, it may be necessary to manage project files for different disciplines as separate series. Each series may require the development of a complex hierarchy.

Example 4: Hierarchy for Project Files for Small Collections of Natural Science Records

You can handle small collections of natural science records as a single series or subseries within the larger resource management records collection. In the example below, the records are arranged by accession number.

Series Title: RECORDS ASSOCIATED WITH NATURAL HISTORY PROJECTS

File 001: PARK-00209, Biological Survey Reports
File 002: PARK-00213, Analysis of Shrubs, Trees, and Cacti in Park Plant Population
File 003: PARK-00216, Census of Birds
File 004: PARK-00217, Limnological Investigations Project
File 005: PARK-00354, Faunal Study
File 006: PARK-00412, Geologic Analysis of Rock Deterioration
File 007: PARK-00415, Speciation of Congeneric Amphipods
File 008: PARK-00511, South Creek Aquatic Study: Fish and Herpetofauna
File 009: PARK-00520, Water Quality Analysis
File 010: PARK-00522, Long-Term Monitoring, Rattlesnakes

Note that different disciplines are represented. The project files could include records generated both by NPS-initiated projects as well as by independent researchers working under permits. The park is the "records creator" for all the files. Therefore, managing the files as part of a single series or subseries does not violate archival rules relating to provenance. Because there are so few project files, there would be no need to establish tiny subseries or sub-subseries for each discipline. Simply arranging them numerically by accession is sufficient to maintain firewalls between the individual project files.

Note: If the park doesn't issue permits for park staff, this system won't work because there could be many park projects under one accession number.

For more information see the *Museum Handbook*, Part II, Appendix D.

Example 5: Hierarchy for Project Files for Large Collections of Natural Science Records

A park with an extremely active research program in biology makes or receives scores of project files every year. These projects relate to a wide variety of plant and animal life. Some parks have chosen to organize their associated records in biology according to a hierarchy that correlates more-or-less to taxonomic levels.

<u>Series Title</u>: RECORDS ASSOCIATED WITH BIOLOGICAL PROJECTS

SUBSERIES A: Vegetation Studies
- SUB-SUBSERIES 1: Vascular Plants
- SUB-SUBSERIES 2: Non-Vascular Plants

SUBSERIES B: Invertebrates
- SUB-SUBSERIES 1: Insects and Spiders
- SUB-SUBSERIES 2: Earthworms
- SUB-SUBSERIES 3: Crustaceans
- SUB-SUBSERIES 4: Mollusks
- SUB-SUBSERIES 5: Corals and Sponges

SUBSERIES C: Vertebrates
- SUB-SUBSERIES 1: Birds
- SUB-SUBSERIES 2: Fish
- SUB-SUBSERIES 3: Terrestrial Mammals
- SUB-SUBSERIES 4: Marine Mammals
- SUB-SUBSERIES 5: Reptiles and Amphibians

Several park-specific variations are possible within this roughly taxonomic structure. Some parks with exceptionally numerous project files may establish subseries for each class, such as reptiles. Other parks may handle the files as sub-subseries under subseries based on subphylum, such as Vertebrates. Other parks may establish sub-subseries for project files on individual species. Still others may use scientific names for the subseries and sub-subseries titles, such as Aves rather than Birds.

Similarly, parks may adopt different filing schemes within each sub-subseries. Some may order projects files chronologically by date of final report. Others may order them by accession number, assuming that each project was assigned a unique accession number. Others may arrange them alphabetically by project title. However, using project titles can make it difficult to accrete records in the future without interfiling or creating new subseries. It's even possible to vary file arrangements from sub-subseries to sub-subseries. For example, the project files on birds might be arranged chronologically, whereas the project files on fish might be arranged numerically by accession.

Example 6: Hierarchy for Project Files for Parks with Large Amounts of Non-textural Natural Science Records

Some parks accession associated records with large quantities of non-textural materials, such as photographs, slides, and oversized maps. In these cases, parks may want to organize the records according to format. The example below illustrates a hierarchy for a series of project files in paleontology that is organized by format. Note that this series is part of a larger collection of park natural history records.

<u>Series Title</u>: RECORDS ASSOCIATED WITH PALEONTOLOGICAL PROJECTS

SUBSERIES A: Reports, Correspondence, Memorandums, and Field Notes
- File Unit 001: PARK-10121
- File Unit 002: PARK-10122
- File Unit 003: PARK-10123

SUBSERIES B: Maps and Drawings
- File Unit 001: PARK-10121
- File Unit 002: PARK-10122
- File Unit 003: PARK-10123

SUBSERIES C: Still Pictures
- SUB-SUBSERIES 1: Photographic Prints
  - File Unit 001: PARK-10121
  - File Unit 002: PARK-10122
  - File Unit 003: PARK-10123
- SUB-SUBSERIES 2: Photographic Negatives
  - File Unit 001: PARK-10121
  - File Unit 002: PARK-10122
  - File Unit 003: PARK-10123
- SUB-SUBSERIES 3: Slides
  - File Unit 001: PARK-10121
  - File Unit 002: PARK-10122
  - File Unit 003: PARK-10123

The file units in this example are arranged numerically by accession. The park could just as easily choose to arrange them numerically by:

- permit number
- study number
- chronologically by date of final report
- alphabetically by title of project
- an internally-devised filing code.

Note: Usually, the arrangement depends on how the records are organized when received.

What if the natural science records include different arrangement schemes when I receive them?

Some parks file reports on natural history projects by the name of the principle investigator or the subject of the project. They may have abandoned those practices and moved on to other filing schemes later. Keep the older materials in their original order even if the park instituted new filing schemes to replace those earlier methods. In other words, don’t take materials filed in one way and re-file them according to a new filing scheme.

The following hierarchy reflects overlapping and eventually superseded methods for managing natural history reports. Both are now “closed” series, as indicated by the finite date ranges. Note that these records are a series within a larger collection of natural history records.

Example 7: Hierarchy for Project Files with Different Arrangement Schemes

<u>Series Title</u>: NATURAL HISTORY REPORTS, 1940-1990

SUBSERIES A: Researcher Name Files, 1940-1973
File Unit 001: Adams, Thomas: "Isolation of Microbacterium Tuberculosis from Soil at XYZ Cave."
File Unit 002: Bailey, Glenn: "Study of Micro and Meso Fauna."
File Unit 003: Rogers, Janet: "Deer Trapping Reports."
File Unit 004: Wilson, Debra: "Clastic Sediments in Karst Conduits."

SUBSERIES B: Subject Files, 1952-1990
File Unit 001: Cave Beetles
File Unit 002: Ecological Effects of Water Pollutants on Fauna
File Unit 003: Hydrogeological Symbionts
File Unit 004: Siltation Studies of Rivers Within Park Boundaries

Note: It's possible that separate copies of a single report may have been filed both under the researcher's name, in Subseries A, and under the subject title, in Subseries B. That is acceptable. Even though they are duplicates, you should leave them both where they are.

Example 8: Hierarchy for Inventory & Monitoring Program Project Files

Accession the files that were generated by the inventory and monitoring networks and carried out within a park as associated records. Hierarchical structures may vary, depending on how the different networks carry out their assignments and file the records. One possible hierarchy is illustrated below, and is based on the I&M Network filing scheme.

<u>Series Title</u>: RECORDS RELATING TO NETWORK PROJECTS

SUBSERIES A: Biological Inventory Records
SUB-SUBSERIES 1: Reports, Field Notes, and Correspondence
File Unit 001: PARK-00591, Amphibian, Reptile, and Turtle Survey
File Unit 002: PARK-00592, Bird Inventory
File Unit 003: PARK-00617, Summer Roosts for Rare Bat Species
SUB-SUBSERIES 2: Still Pictures
File Unit 001: PARK-00591, Amphibian, Reptile, and Turtle Survey
File Unit 002: PARK-00617, Summer Roosts for Rare Bat Species

SUB-SUBSERIES 3: Electronic Records
File Unit 001: PARK-00591, Amphibian, Reptile, and Turtle Survey
File Unit 002: PARK-00592, Bird Inventory

SUBSERIES B: Environmental Monitoring Studies
SUB-SUBSERIES 1: Water Quality Studies
File Unit 001: Monthly Water Quality Data, December 2002
File Unit 002: Monthly Water Quality Data, January 2003

File Unit 003: Monthly Water Quality Data, February 2003
File Unit 004: Monthly Water Quality Data, March 2003
SUB-SUBSERIES 2: Ozone Quality Studies
File Unit 001: Annual Ozone Study, 2001
File Unit 002: Annual Ozone Study, 2002
File Unit 003: Annual Ozone Study, 2003

In this example, the network filed the Biological Inventory Records numerically by accession and the Environmental Monitoring Studies chronologically. Other networks, however, may file records differently. Also, in this example, the network organized its Biological Inventory Records according to format and its Environmental Monitoring Studies according to subject. Again, other networks may develop different filing protocols. Finally, note that each accession of Biological Inventory Records had textual records. However, only two of them had still pictures, and only two had electronic records. The hierarchy and file units reflected what was actually retained for each accession, which is appropriate.

What is an example of a hierarchy for deliverables from research permits?

Many parks must deal with files for projects carried out by independent researchers who have received permits from the park. It's perfectly acceptable to keep files on permitted research in the same series or subseries with files on research conducted by park staff or contractors. However, there must be a consistent filing scheme (such as arranging all project files by researcher name or by the accession, permit, or study number).

It's also acceptable to separate permitted research from park research. The permitted research files and the park research files would remain in the same collection within separate series or subseries. Within the series or subseries, the park is free to determine the appropriate arrangement scheme. Possible arrangement includes:

- by accession number
- by permit number or study number (**Note:** When you are dealing with multi-year permits, you may have to accession records for projects with higher numbers first. You may create a dummy file unit screen in the Archives Module as a placeholder for the multi-year permit that was issued earlier. Complete the file unit placeholder once the records have been received.)
- chronologically (by the date on which the permittee turned over the records to the park)
- alphabetically (by name of the permittee or the title of the project) (**Note:** This is a particularly useful approach if you have a multi-year bloc of legacy project files that are not accessioned individually. They can be handled as a single subseries. Then future accessions can be handled numerically or chronologically in a new subseries.

Note: These are just examples. There is no hard-and-fast rule about what kind of arrangement scheme works best for a particular body of records. The only requirement is that some kind of logical filing scheme needs to be developed. Normally such filing schemes are developed at the records management stage long before files are retired to an archival repository. However, this responsibility falls to the archivist or curator when no order was devised for a body of records before accessioning.

In the following example, the park:

- maintained biological project files produced by park staff and park contractors numerically by accession

- kept biological project files produced by permitted independent researchers separately, with an arrangement scheme based on permit number

Example 9: Hierarchy for Deliverables from Research Permits

Series Title: RECORDS ASSOCIATED WITH BIOLOGICAL PROJECTS

SUBSERIES A: Project Files relating to Park-Initiated Research
File Unit 001: PARK-10135, Accumulation and Toxicity of Metals in Marine Organisms
File Unit 002: PARK-10200, Migration Pattern and Population Genetic Structure of the Lesser Long-Nosed Bat
File Unit 003: PARK-10201, Water Balance & Carbon Cycling Across the Snow Line in Forested Landscapes

SUBSERIES B: Project Files Relating to Permitted Research
File Unit 001: PARK-2001-SCI-0001, Biological Inventory of Anchialine Pools
File Unit 002: PARK-2003-SCI-0001, Monarch Butterfly Migration
File Unit 003: PARK-2003-SCI-0002, A Mark and Recapture, Blood Sampling, and General Survey of the Florida Box Turtle

Note: Either or both of the subseries cited above may be organized into sub-subseries arranged by scientific classifications or based on document format.

What is an example of a hierarchy for chief naturalist records?

Older parks, with a strong emphasis on natural history, may have employed a "chief naturalist" at one time. Especially from the 1930s through the 1970s, chief naturalists at natural history-oriented parks oversaw all natural history-related activities. Museums at many of those parks eventually accessioned the records of the chief naturalists. In some cases, they provide the best available record of early natural history programs at the parks.

The chief naturalists likely kept their records in whatever way seemed appropriate and logical to them at the time. If at all possible these records should be retained intact and in the original order in which they were filed.

The following example shows a hierarchy (within the broader collection on resource management records) for a park with:

- records of a chief naturalist on staff from 1930 to 1952 who created files grouped by correspondence (arranged chronologically), reports (arranged alphabetically by title), and research files (arranged alphabetically by discipline and then alphabetically by topic)

- records from another chief naturalist, who served from 1953 to 1971 who filed everything by broad subject

Example 10: Hierarchy for Chief Naturalist Records

Series Title: RECORDS OF THE CHIEF NATURALIST, 1930-1971

SUBSERIES A: Chief Naturalist's Files, 1930-1952
SUB-SUBSERIES 1: Correspondence
SUB-SUBSERIES 2: Reports
SUB-SUBSERIES 3: Research Files

SUBSERIES B: Chief Naturalist's Files, 1953-1971
File Unit 1: Birds
File Unit 2: Fish
File Unit 3: Mammals

Within a collection, each series and subseries must have a unique title. Although the titles of Subseries A and Subseries B are similar, the date range distinguishes one from the other. There is no need to organize Subseries B into sub-subseries. The second chief naturalist maintained all files in one consistent, alphabetical arrangement pattern. He/she didn't divide them up into correspondence, reports, and research files.

How do I add new material to the collection?

A collection or record group containing all of a park's resource management records will grow over time. As new records are accessioned, they should be added – or *accreted* – to the existing collection. There are two principal ways of doing this. You can add new file units or add entirely new series or subseries.

If you add new material to a collection, be sure to modify the:

- collection level record in the Archives Module

- catalog record in the Collections Management Module

Increase the volume of records for the collection as a whole. Expand the date range (if applicable). Add new subject terms (if appropriate), and add any changes in the hierarchical structure.

What is an example of adding records as file units?

Suppose you have a series of natural history project files arranged numerically by accession number. Each new accession number for an incoming project file will be higher than the one previously assigned. You can continue to accrete new files to this series forever. All project files, with successively-higher accession numbers, will automatically fit into an ongoing and consistent arrangement scheme. As was noted above, if you actually receive accessions out of order, you should create dummy file unit records in the Archives Module. These serve as placeholders for lower-numbered accessions that are still outstanding. Enter full descriptions once those accessions are received.

The example below includes a hierarchy which originally had 10 file units (in regular type). Newly accreted file units appear in bold type.

Example 11: Adding Records as File Units

<u>Series Title</u>: RECORDS ASSOCIATED WITH NATURAL HISTORY PROJECTS

File 001: PARK-00209, Biological Survey Reports
File 002: PARK-00213, Analysis of Shrubs, Trees, and Cacti in Park Plant Population
File 003: PARK-00216, Census of Birds
File 004: PARK-00217, Limnological Investigations Project
File 005: PARK-00354, Faunal Study
File 006: PARK-00412, Geologic Analysis of Rock Deterioration
File 007: PARK-00415, Speciation of Congeneric Amphipods
File 008: PARK-00511, South Creek Aquatic Study: Fish and Herpetofauna
File 009: PARK-00520, Water Quality Analysis
File 010: PARK-00522, Long-Term Monitoring, Rattlesnakes
File 011: PARK- 00530, Rattlesnake Relocation
File 012: PARK-00541, Scuba Exploration to Collect Data on Lake
File 013: PARK-00600, Vegetation Inventory and Classification
File 014: PARK-00608, Seasonal Effects on Geochemical Evolution of Park River
File 015: PARK-00610, Eagle Survey

What is an example of adding records as series or subseries?

In some cases, an accretion might involve a body of records rather than individual file units. The records may not fit into any of the existing series. For example, they may have incompatible arrangement schemes, or they may relate to different disciplines. In such situations, it's possible to accrete an entire series or subseries to the collection.

In the example below, the park's resource management records were cataloged as a single collection, organized into 5 large series. Following the initial cataloging of this collection, the park curator accessioned a series of records associated with geological projects. The existing hierarchy doesn't have a place to accommodate these records. The curator may accrete them to the collection as a new subseries within the series for natural history records (bold type below).

Example 12: Adding Records as a Series and Subseries

Collection Title: RESOURCE MANAGEMENT RECORDS OF PARK XYZ

SERIES I: Central Files

SERIES II: Subject Files

SERIES III: Cultural Resources Reports
- Subseries A: Historic Structures Reports
- Subseries B: Historic Furnishings Reports
- Subseries C: Cultural Landscapes Reports

SERIES IV: Records Relating to Archeological Projects
- Subseries A: Reports, Field Notes, and Correspondence
- Subseries B: Still Pictures
- Subseries C: Maps

SERIES V: Natural Resources Records

- Subseries A: Records of the Chief Naturalist, 1930-1971
  - Sub-subseries 1: Chief Naturalist's Files, 1930-1952
    - Sub-sub-subseries a: Correspondence
    - Sub-sub-subseries b: Reports
    - Sub-sub-subseries c: Research Files
  - Sub-subseries 2: Chief Naturalist's Files, 1953-1971

- Subseries B: Natural History Reports, 1940-1990
  - Sub-subseries 1: Researcher Name Files, 1940-1973
  - Sub-subseries 2: Subject Files, 1952-1990

- Subseries C: Records Associated with Paleontological Projects
  - Sub-subseries 1: Reports, Correspondence, and Field Notes

Sub-subseries 2: Maps and Drawings
Sub-subseries 3: Still Pictures
Sub-sub-subseries a: Photographic Prints
Sub-sub-subseries b: Photographic Negatives
Sub-sub-subseries c: Slides

Subseries D: Records Associated with Biological Projects
Sub-subseries 1: Vegetation Studies
Sub-subseries 2: Invertebrates
Sub-subseries 3: Vertebrates

Subseries E: Records Relating to Network Projects
Sub-subseries 1: Biological Inventory Records
Sub-sub-subseries a: Reports, Field Notes, and Correspondence
Sub-sub-subseries b: Still Pictures
Sub-sub-subseries c: Electronic Records
Sub-subseries 2: Environmental Monitoring Studies
Sub-sub-subseries a: Water Quality Studies
Sub-sub-subseries b: Ozone Quality Studies

Subseries F: Records Relating to Geological Projects
Sub-subseries 1: Reports, Correspondence, and Field Notes
Sub-subseries 2: Maps and Drawings
Sub-subseries 3: Still Pictures

Geology Classification

Line 1: Enter Geology

Line 2: Material Type

Enter one of the following material types:

- ROCKS
- SURFACE PROCESS MATERIALS
- MINERALS
- ORGANIC MATERIALS
- EXTRATERRESTRIAL MATERIALS
- SOILS

Many of these material categories overlap. The collector's objective should indicate the most appropriate category. For example, classify a specimen collected to document glacial striations as Surface Process Materials, even though it may be composed of granite (an igneous rock).

Line 3: Major Group

Enter the name of the Major Group from the Hierarchical Classification Outline. The Major group is underlined.

ROCKS	SURFACE PROCESS MATERIALS	MINERALS
Igneous	Weathering	Native Elements
Sedimentary	Stream Action	Sulfides
Metamorphic	Lake Action	Sulfosalts
Fault-Zone Materials	Marine Action	Oxides
	Glacial Action	Halides
	Wind Action	Carbonates
	Other	Nitrates and Iodates
		Borates
		Sulphates
		Selenates (ites) and Tellurates (-ites)
		Chromates
		Phosphates and Arsenates
		Antimonates (-ites) and Arsenites
		Vanadium Oxysalts
		Molybdates and Tungstates
		Nesosilicates
		Sorosilicates
		Cyclosilicates
		Inosilicates
		Phyllosilicates

		Tectosilicates
		Other
ORGANIC MATERIALS	EXTRA-TERRESTRIAL MATERIALS	SOILS
Hydrocarbons	Meteorites	Alfisols
Resins	Tektites	Aridisols
Bitumens	Terrestrial Impact Features	Entisols
Other	Other	Histosols
		Inceptisols
		Mollisols
		Oxisols
		Spodosols
		Ultisols
		Vertisols

Line 4: Filing Group
Filing Groups are listed in the accompanying Hierarchical Classification Outline and vary widely. The Filing Group is marked with an asterisk.

Examples of the 4-line classification for geology:

Line 1: Discipline	GEOLOGY
Line 2: Material Type	ROCKS
Line 3: Major Group	Sedimentary
Line 4: Filing Group	*Limestones

Line 1: Discipline	GEOLOGY
Line 2: Material Type	SURFACE PROCESS MATERIALS
Line 3: Major Group	Glacial Action
Line 4: Filing Group	*Abraded Stones

GEOLOGY OBJECT/SPECIMEN NAME

Enter the name of the geology specimen in the Object/Science name field on the catalog record. Enter the most specific name available.

Examples: Bass Limestone
Diorite

In some cases, the data accompanying the specimen may be specific to only the Major Group or Filing Group level. Enter UNUSED in classification line 4 for these specimens.

For unidentified or composite specimens, refer to the *ICMS User Manual*, Chapter 2, Section VI, Cataloging A Geology Specimen.

Soil Collections:

The Object/Specimen Name for soil collections will generally be the Soil Series Name. This is often the specific mapped soil unit of the collection site. The Soil Series Name is the name used on the soil maps for park, county, or state soils published by the Soil Conservation Service. These maps provide a standardized reference to soil names.

Silicates:

Silicate classification is based on types of linkages of Si-O tetrahedral, in which Si may be partly replaced by Al. The types of silicates are:

Neosilicates – silicate structures in which individual SiO_4 tetrahedra are not linked together, i.e., they do not share oxygens. An example is olivine. SYN: Orthosilicate. SiO ratio = 1:4.

Sorosilicates – a structural class of silicate minerals characterized by the linkage of two Si-O tetrahedra by the sharing of one oxygen. An example is hemimorphite, $Zn_4Si_2O_7(OH)_22\ (H_2O)$. SiO ration = 2:7.

Cyclosilicates – a class, or structural type of silicate characterized by the linkage of the SiO_4 tetrahedra in rings. Examples are Tourmaline, Beryl. SiO ratio = ring 1:3, (n:3n).

Inosilicates - a class or structural type of silicate characterized by the linkage of Si-O tetrahedra into linear chains by sharing of oxygen. Single chain minerals, e.g., pyroxenes, are characterized by the radical (SiO_3). Double chain minerals, e.g., amphiboles, are characterized by the radical (Si_4O_{11}). SiO ratios: triple chain = 3:8, double chain = 4:11, single chain = 1:3.

Phyllosilicates – a group of silicate minerals with similar structures characterized by silicon-oxygen tetrahedra linked in a planar arrangement. Examples are micas. SiO ratio = 2:5.

Tectosilicates – a structural class of silicate minerals in which the Si-O tetrahedral share all oxygens with adjacent tetrahedra to build up a three-dimensional network. Examples are quartz and feldspar. SiO ratio = 1:2.

Igneous

Plutonic rocks (coarse and medium grained)
- *Granite group (granite, granodiorite, and others)
- *Syenite group (syenite, monzonite, and others)
- *Diorite group
- *Gabbro group
- *Feldspathoid-rich group
- *Ultramafic group
- *Carbonatites
- *Pegmatites
- *Other plutonics

Volcanic and shallow-intrusives rocks (fine grained and glassy)
- *Rhyolite-dacite group
- *Trachyte-latite group
- *Andesite-basalt group
- *Phonolite-tephrite group
- *Diabases
- *Lamprophyres
- *Glassy rocks
- *Volcaniclastic rocks (primary fragmental volcanics)
- *Epiclastic rocks (redeposited fragmental volcanics)
- *Other volcanic and shallow intrusives

Sedimentary

Nonconsolidated sediments
- *Gravels
- *Sands
- *Silts
- *Clays
- *Marls
- *Peats

Consolidated rocks

Clastic rocks
- *Conglomerates
- *Breccias
- *Sandstone group (quartz, arenite, arkose, graywacke, and others)
- *Mudstone group (siltstone, claystone, shale, and others)

Chemical and biochemical rocks
- *Limestones
- *Dolostones
- *Evaporites (gypsum, halite, and others)
- *Siliceous precipitates (chert, flint, and others)
- *Iron-rich rocks
- *Phosphate-rich rocks

- *Cave flowstone and spring deposits
- *Concretions and nodules

*Organic sedimentary rocks (lignite and coal)
*Other consolidated rocks

<u>Metamorphic</u>

Contact metamorphic rocks
- *Hornfelses
- *Marbles
- *Skarns
- *Other contact metamorphic rocks

Regional metamorphic rocks
- *Marbles
- *Quartzites
- *Metaconglomerates
- *Slates
- *Phyllites
- *Schists
- *Gneisses
- *Amphibolites
- *Granulites
- *Migmatites
- *Other regional metamorphic rocks

<u>Fault-zone materials</u>
- *Breccias or gouges
- *Cataclasites
- *Pseudotachylites
- *Mylonites
- *Other fault-zone materials

Weathering
- *Weathering crusts
- *Desert varnishes
- *Other weathering

Stream action
- *Deposits
- *Cave stream deposits
- *Abraded stones
- *Abraded bedrock surfaces
- *Other stream action

Lake action
- *Deposits
- *Other lake action

Marine action
- *Deposits
- *Abraded bedrock surfaces
- *Other marine action

Glacial action
- *Deposits
- *Abraded stones
- *Abraded bedrock surfaces
- * Ice Cores
- * Other glacial action

Wind action
- *Deposits
- *Abraded stones (ventifacts)
- *Abraded bedrock surfaces
- *Other wind action

Other Surface Process Materials
- * Ice Cores

Native elements
Sulfides
Sulfosalts
Oxides
Halides
Carbonates
Nitrates and Iodates
Borates
Sulfates
Selenates(-ites) and Tellurates(-ites)
Chromates
Phosphates and Arsenates
Antimonates(-ites) and Arsenites
Vanadium oxysalts
Molybdates and Tungstates
Nesosilicates
Sorosilicates
Cyclosilicates
Inosilicates
Phyllosilicates
Tectosilicates
Other minerals

Hydrocarbons
Resins
Bitumens
Other organic materials

Meteorites
- *Iron
- *Stony Iron
- *Chondrite
- *Carbonaceous Chondrite
- *Achrondrite

Tektites

Terrestrial Impact Features (e.g. shatter cones)

Other extraterrestrial materials

<u>Alfisols</u>
*Aqualfs
*Boralfs
*Udalfs
*Ustalfs
*Xeralfs

<u>Aridisols</u>
*Argids
*Orthids

<u>Entisols</u>
*Aquents
*Arents
*Fluvents
*Orthents
*Psamments

<u>Histosols</u>
*Fibrists
*Folists
*Hemists
*Saprists

<u>Inceptisols</u>
*Andepts
*Aquepts
*Ochrepts
*Plaggepts
*Tropepts
*Umbrepts

<u>Mollisols</u>
*Albolls
*Aquolls
*Borolls
*Rendolls
*Udolls
*Ustolls
*Xerolls

<u>Oxisols</u>
*Aquoxes
*Humoxes
*Orthoxes
*Torroxes
*Ustoxes

<u>Spodosols</u>
*Aquods
*Ferrods

*Humods
*Orthods

Ultisols
*Aquults
*Humults
*Udults
*Ustults
*Xerults

Vertisols
*Torrerts
*Uderts
*Usterts
*Xererts