



## Society of Vertebrate Paleontology

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FEIN: 06-0906643

November 25, 2018

**Subject:** Comments from the Society of Vertebrate Paleontology on the draft Monument Management Plans and Environmental Impact Statement for the Grand Staircase-Escalante National Monument and Kanab-Escalante Planning Area.

To U.S. Bureau of Land Management,

The following comments (**Appendix 1**) on the draft Monument Management Plans (**MMPs**) and Environmental Impact Statement (**EIS**) for the Grand Staircase-Escalante National Monument (**GSENM**) and Kanab-Escalante Planning Area (**KEPA**) are submitted on behalf of the approximately 2,200 members of the Society of Vertebrate Paleontology (**SVP**: <http://vertpaleo.org>).

SVP is a non-profit international scientific organization consisting of researchers, educators, students, and enthusiasts, to advance the science of vertebrate palaeontology and to support and encourage the discovery, preservation, and protection of vertebrate fossils, fossil sites, and their geological and paleontological contexts. Thus, SVP is an important stakeholder in U.S. national monuments, including GSENM. In fact, about 10% of SVP members have conducted research in GSENM since it was established in 1996, either in the field or in collaboration on specimens repositied in public collections. In addition, at least 28 members have ongoing research in the areas that have been excluded from the monument by Presidential Proclamation 9682.

Paleontological resources are nonrenewable and irreplaceable. GSENM has already transformed the way we understand the evolution of Mesozoic ecosystems and all of it, including KEPA, should be managed at a level well above the minimal standards in our March 2018 'Paleontological Resource Management Plan' (see **Appendices 3 & 4** and [http://vertpaleo.org/GlobalPDFS/SVP-Response-Letter-\(GSENM\)-Final.aspx](http://vertpaleo.org/GlobalPDFS/SVP-Response-Letter-(GSENM)-Final.aspx)).

Questions concerning our letter and comments should be addressed to Drs. Emily Rayfield and David Polly (Present and Past SVP Presidents: [svp\\_president@vertpaleo.org](mailto:svp_president@vertpaleo.org)) or Dr. Kenshu Shimada (Chair of SVP's Government Affairs Committee: [kshimada@depaul.edu](mailto:kshimada@depaul.edu)). Thank you for the opportunity to comment.

Sincerely yours,

Handwritten signature of Emily J. Rayfield in black ink.

Emily J. Rayfield, Ph.D.  
*SVP President*

Handwritten signature of Jessica M. Theodor in black ink.

Jessica M. Theodor, Ph.D.  
*SVP Vice President*

Handwritten signature of P. David Polly in black ink.

P. David Polly, Ph.D.  
*Past SVP President*

## Appendix 1

SVP's comments on BLM's draft MMPs and EIS for GSENM and KEPA.

### Preamble

The GSENM was established in 1996 in large part to preserve the unique fossils that had been discovered there over the preceding decade. Twenty additional years of research have pinpointed more than 3,000 scientifically important fossil localities at GSENM. The monument is perhaps best known for its exquisite preservation of Late Cretaceous ecosystems. The Kaiparowits, Wahweap, Straight Cliffs, and Tropic Shale formations include one of the most diverse large herbivorous dinosaur faunas in the world, some of the only Cenomanian and Santonian aged mammals anywhere, and the earliest mosasaurs. GSENM also preserves the type section of the Permian-aged Kaibab Limestone, key Triassic faunas from the Moenkopi and Chinle formations, as well as the largest petrified forest outside Arizona, and extensive trackways from the thick sandstone formations of the Jurassic.

### SVP Comments on Draft MMPs and EIS

1. We recommend that personnel and funding resources be explicitly included in the MMPs. GSENM and KEPA exist not only to protect paleontological resources, but also to develop them to their full potential. **Appendix 2** describes what we believe to be the minimal resources need to properly preserve, manage, and conserve paleontological resources there. These include:
  - Additional full-time paleontologists be hired to coordinate research, surveying and permitting;
  - Ongoing funding to survey and study the paleontological resources in the new monuments and the excluded areas be determined; and
  - Additional law enforcement staff to enforce paleontological laws and regulations.
2. We also recommend that the MMPs directly address research, education, and collection activities, which are integral components of preserving, managing, and conserving paleontological resources in such a way that they are of value to all. Our recommendations are fully laid out in **Appendix 4** and include:
  - cultivating partnerships with external researchers for effective management of paleontological resources;
  - providing support science communication through public programs, exhibits, interpretative materials, and scientific publications and presentations targeting both local communities and regional, national, and international audiences;
  - providing flexibility in the collecting techniques and methods that are allowed on GSENM and KEPA property, provided that there is reasonable justification;
  - mandating molding, casting, and digitization—as well as free distribution of digital models—of paleontological resources collected in GSENM and KEPA; and

- providing funding for preparing, preserving, and curating specimens at non-Federal partner repositories, and to make non-sensitive data on these specimens available to the public through the electronic dissemination.
3. For two primary reasons, our overarching preference for the alternative presented in the draft MMPs is Alternative A (making no changes to the management plan) for all areas of the former monument, including KEPA. First, paleontological resources are distributed throughout the entire area of the original monument (see Cultural and Paleontological Resources Poster at [https://eplanning.blm.gov/epl-front-office/projects/lup/94706/140146/172250/Cultural and Paleo Resources Poster.pdf](https://eplanning.blm.gov/epl-front-office/projects/lup/94706/140146/172250/Cultural%20and%20Paleo%20Resources%20Poster.pdf) and Table 3.5-1 on p. 121 of Volume 1). Second, the Paleontological Resources Preservation Act (**PRPA**) alone is insufficient for managing paleontological resources in these areas because: (1) it does not provide comprehensive protection against destruction of sites and their associated stratigraphy by mining, fracking, or other extractive processes; (2) it does not provide protection against casual collecting at known rare or scientifically significant fossil localities without specific regulatory actions; and (3) it does not prioritize research over other uses.
  4. **Chapter 2, Page 4, Section 2.3.2, Records 1009–1010, CR:1:** Any of the alternatives for management of Cultural and Heritage Resources are acceptable with respect to paleontological resources. Because SVP does not have a direct interest in these resources, we defer to the evaluations provided by groups who do.
  5. **Chapter 2, Pages 5–6, Section 2.3.3.1, Records 1011–1020, FW:1:** Any of the alternatives for Fish and Wildlife management are acceptable with respect to paleontological resources. The ground disturbing activities proposed in the alternatives are unlikely to substantially impact paleontological resources or scientific research on them. Because SVP does not have a direct interest in these resources, we defer to the evaluations provided by groups who do.
  6. **Chapter 2, Pages 6–9, Section 2.3.3.2, Records 1024–1043, SS:1:** Surface disturbing activities like off-road vehicle use, mining, or other mineral extraction activities are not only likely to impact special status species, but also paleontological resources. These activities should not be permitted in GSENM or KEPA except where they are consistent with the designated resources for which GSENM was established in 1996. SVP therefore prefers Alternative A.
  7. **Chapter 2, Pages 10–11, Section 2.3.5, Records 1046, PA:1:** Scientifically important paleontological resources are found in all areas of GSENM and KEPA (see Cultural and Paleontological Resources Poster at [https://eplanning.blm.gov/epl-front-office/projects/lup/94706/140146/172250/Cultural and Paleo Resources Poster.pdf](https://eplanning.blm.gov/epl-front-office/projects/lup/94706/140146/172250/Cultural%20and%20Paleo%20Resources%20Poster.pdf) and Table 3.5-1 on p. 121 of Volume 1). Mineral extraction is one of the greatest threats to paleontological resources, all the more so because coal, shale gas, uranium, copper, and rare earth elements are concentrated in the same geological formations that produce fossils abundantly. Leasing should not be permitted anywhere, therefore SVP prefers Alternative A.

8. **Chapter 2, Pages 10–11, Section 2.3.5, Records 1046 & 1047, PA:1:** PFYC categories should never be used as an *a priori* basis for management decisions. Requirements for when and where to survey and mitigate with regard to PFYC are written policy (see Instructional Memorandum 2016-124, <https://www.blm.gov/policy/im-2016-1240> and 8270 Program Guidance and Handbook H-8270-1 General Procedural Guidance for Paleontological Resource Management). According to Handbook H-8270-1 General Procedural Guidance for Paleontological Resource Management, paleontological resources must be given “full and equal consideration” in “land use planning and decision making” (section .06 policy, A 2) regardless of PFYC category. Further, BLM must “mitigate adverse impacts to paleontological resources as necessary” (section .06 policy, A 4) and “vigorously pursue the protection of paleontological resources from theft, destruction and other illegal or unauthorized uses” (section .06 policy, A 7). In particular, the PFYC guidelines state that “PFYC assignments should be considered as only a first approximation of the potential presence of paleontological resources, subject to change based on ground verification”, and “The [PFYC] classification is not intended to be applied to specific paleontological localities or small areas within units.” Thus, site-level assessment and survey is required for any activities that could impact paleontological resources, regardless of the PFYC of the geological units represented at the site.
9. **Chapter 2, Pages 10–11, Section 2.3.5, Records 1047, PA:1:** Scientifically important paleontological resources are found in all areas of GSENM and KEPA (see Cultural and Paleontological Resources Poster at [https://eplanning.blm.gov/epl-front-office/projects/lup/94706/140146/172250/Cultural\\_and\\_Paleo\\_Resources\\_Poster.pdf](https://eplanning.blm.gov/epl-front-office/projects/lup/94706/140146/172250/Cultural_and_Paleo_Resources_Poster.pdf) and Table 3.5-1 on p. 121 of Volume 1). SVP prefers Alternative A, all areas should be subject to proactive inventory. Indeed, areas with the lowest potential yield – which represent different parts of the stratigraphic column than areas with higher potential yields – also by definition contain the rarest fossils and therefore deserve as much (if not more) scrutiny than areas where fossils are more abundant.
10. **Chapter 2, Pages 10–11, Section 2.3.5, Records 1048-1051, PA:1:** All of GSENM and KEPA contain scientifically important paleontological resources (see Cultural and Paleontological Resources Poster at [https://eplanning.blm.gov/epl-front-office/projects/lup/94706/140146/172250/Cultural\\_and\\_Paleo\\_Resources\\_Poster.pdf](https://eplanning.blm.gov/epl-front-office/projects/lup/94706/140146/172250/Cultural_and_Paleo_Resources_Poster.pdf) and Table 3.5-1 on p. 121 of Volume 1). Because the ancient environments of this area were dominantly terrestrial, most of the invertebrate and plant fossils are rare and, importantly, they provide scientifically important context for sites containing vertebrate fossils (casual collection of which is prohibited under PRPA). SVP therefore prefers Alternative A to prohibit casual collecting of any kind because it is almost impossible to reliably educate visitors how to distinguish types of fossils from one another or from non-fossil objects.
11. **Chapter 2, Pages 10–11, Section 2.3.5, Records 1052, PA:1:** OHV use has a negative impact on paleontological resources, vegetation, and landscapes everywhere in GSENM and KEPA. SVP prefers Alternative A because it maintains the prohibition on OHV use everywhere.

12. **Chapter 2, Pages 12–19, Sections 2.3.6.2–2.3.10, Records 1058–1104:** Any of the alternatives in these sections are acceptable with respect to paleontological resources. The activities proposed in the alternatives are unlikely to substantially impact paleontological resources or scientific research on them. Because SVP does not have a direct interest in these resources, we defer to the evaluations provided by groups who do.
13. **Chapter 2, Pages 19–20, Section 2.3.11.1, “Lands and Realty”:** Alternatives B–D in records 2008 and 2010 are unlikely to have an impact on paleontological resources, so SVP defers to evaluations provided by groups with more direct interest. However, for the remaining records in this section, Alternatives B–D are likely to have moderate to strong negative impacts on paleontological resources and/or scientific research and SVP strongly prefers Alternative A. One additional comment particularly for Record 2009 is the need for clarification of the word ‘public interest.’ For example, the document states “Consider land exchanges and acquisitions so long as the current owner is a willing participant and so long as the action is in the public interest ...” (Alternative A) and “The adjustment... Is in the public interest and accommodates needs of state, local, or private entities...” (Alternatives B–D); however, the phrase ‘public interest’ is exceptionally vague and require some specific examples, such as “public interest such as preservation of cultural and paleontological resources.”
14. **Chapter 2, Pages 21–29, Section 2.3.12, “Livestock Grazing”:** Grazing, especially trampling by livestock and vehicular access to grazing areas can have a negative impact on paleontological resources near the surface. Alternatives that expand the area open to grazing or that increase its intensity are discouraged by SVP.
15. **Chapter 2, Pages 29–30, Section 2.3.13, “Minerals”:** Mineral extraction, including mining, shale gas fracking, and drilling (along with associated infrastructure such as roads, storage pits, staging areas, and slag heaps) are potentially destructive to fossils, sites, and their associated stratigraphic context. Furthermore, most of the mineral potential in the original monument boundaries is associated with the same geological formations as the most important paleontological resources (e.g., coal is in the Straight Cliffs and Naturita formations; uranium, copper, and vanadium in the Chinle Formation: see BLM Mineral Potential Report for additional information). All of the areas with mineral potential have proven to have scientifically important resources even though only a fraction has been systematically surveyed (see Cultural and Paleontological Resources Poster at [https://eplanning.blm.gov/epl-front-office/projects/lup/94706/140146/172250/Cultural\\_and\\_Paleo\\_Resources\\_Poster.pdf](https://eplanning.blm.gov/epl-front-office/projects/lup/94706/140146/172250/Cultural_and_Paleo_Resources_Poster.pdf) and Table 3.5-1 on Page 121 of Volume 1). Even with mitigation following the procedures in our minimal standards for Paleontological Resource Management on public lands (**Appendix 3**), the information and quality of specimens recovered by “salvage paleontology” are significantly less than from research-based fieldwork. For this reason, Alternative A is the only one that is compatible with responsible management of paleontological resources and associated in the new units, especially KEPA for all records in this section.

16. **Chapter 2, Pages 31–43, Sections 2.3.14 and 2.3.15, “Recreation and Visitor Services” and “Travel and Transportation Management”:** Some of the records in this section would have little or no impact on paleontological resources no matter which alternative is chosen, but those that permit off-road vehicle use could cause significant damage to fossils near the surface, including those on the surface that are critical for locating sites during surveys. Furthermore, vehicular transport makes it easier for people to purposefully or unwittingly disturb fossil sites or steal material from them, particularly in the absence of increased law enforcement activities or paleontological monitoring. Alternative A is preferred for all records where off-road vehicles or increased vehicular transports are in the other alternatives.
17. **Chapter 2, Pages 48, Sect. 2.3.21, “Social and Economic Considerations”:** For Record 4001, SVP favors Alternative C of continuing collaborative programs and developing a museum with local stakeholders to serve as a science and educational center for use by visitors and the local community.
18. **Chapter 2, Pages 48, Section 2.3.22, “Science and Monument Advisory Committee”:** For Record 4010, SVP favors Alternative C (develop active science learning center with dormitory). For Record 4011, SVP favors Alternative B (support and emphasize research on adaptive management actions across all resources).
19. **Chapter 2, Pages 51–52, Section 2.4.1, “No Grazing Alternative”:** Livestock trampling can damage paleontological resources near the surface. SVP prefers the no grazing alternative for the entire area of the former monument, including KEPA.
20. **Chapter 2, Pages 52–53, Section 2.4.5, “Additional Open Off-Highway Vehicle Areas”:** Off road vehicles can damage fossils and outcrops and facilitate purposeful or unwitting illegal removal of fossils. SVP recommends that this alternative not be considered.
21. **Chapter 3, Page 98, Section 3.13.2.2, “Direct and Indirect Effects”:** It states “Management for soil resources, special status plants, visual resources, recreation, water resources, fish and wildlife, lands and realty, cultural resources, ACECs, vegetation, WSAs, WSRs, special status animals, and lands with wilderness characteristics could result in direct, adverse impacts on minerals.” Paleontological resources, which are protected under the Paleontological Resource Protection Act, should be added to this statement.
22. **Volume 2, Appendix B, Page 18, Maps 11 and 12:** SVP prefers Alternative D (Map 12), but both cases offer casual collecting in southern area that includes Upper Cretaceous formations with extensive vertebrate fossil exposure areas that should not be open to casual collection. Specific regulatory actions are needed to adequately provide protection of paleontological resources particularly at known rare or significant fossil localities.

23. **Volume 2, Appendix C, Page 9, “Fossil” in Glossary:** “Fossil” in the glossary is defined as “The remains or traces of animals or plants that have been preserved by natural causes in the Earth’s crust exclusive of organisms that have been buried since the beginning of historic times.” Besides the fact that a fossil may not necessarily be represented by a plant or animal, we recommend that the definition be replaced with something simpler and more straightforward: ‘FOSSIL: Any remain or trace of prehistoric life.’
24. **Volume 2, Appendix C, Page 18, “Paleontology” in Glossary:** “Paleontology” in the glossary is defined as “The branch of geology that deals with life forms from the past, especially prehistoric life forms, through the study of plant and animal fossils.” We should note that paleontology is an interdisciplinary scientific field that usually crosses with other scientific fields, such as biology. Furthermore, it extends beyond the study of plant and animal fossils. We recommend that the definition be replaced with something simpler and more straightforward: ‘PALEONTOLOGY: The scientific study of prehistoric life based on the fossil record.’
25. **Volume 2, Appendix E, Page 16, “Paleontological Resources”:** Virtually all of the Naturita and Tropic Shale formations have been excluded from the Kaiparowits Unit such that the most abundant and fossiliferous outcrops are now in the KEPA units. These formations contain some of the rarest fossils in the former monument (notably the Cenomanian and Santonian small vertebrates [e.g., exceptional shark, fish, frog, salamander, lizard, and mammal fossils] that stimulated paleontological research in the region and provide a more complete record of Late Cretaceous vertebrate life than anywhere else in North America), as well as the most vulnerable (notably the fossils and geochemical traces in the Tropic Shale [including North America’s oldest mosasauroid reptile, extensive fossils of sharks, fish, marine turtles, plesiosaurs, and rare dinosaurs; and a world-class record of Cretaceous Oceanic Anoxic Event 2, which documents sudden climate change caused by increased atmospheric CO<sub>2</sub> associated with a mass extinction event], which could suffer widespread damage and alteration if that unit were subjected to shale gas fracking).

## Appendix 2

Excerpts ('RESOURCE NEEDS' section) from SVP's minimum-standard for Paleontological Resource Management, which we submitted to BLM in March of 2018. This sections describes infrastructural support necessary to adequately preserve, manage, and conserve paleontological resources at GSENM and KEPA, including Federal lands now excluded from the monument boundaries.

### I. RESOURCE NEEDS

Collaborative partnerships with volunteers, universities, and other research institutions as well as law enforcement should be pursued for the purposes of documenting, preserving, monitoring, and interpreting paleontological sites in a manner consistent with the overall objective of protecting paleontological resources. In addition to disseminating paleontological findings through conventional scientific channels, they should be disseminated to the public through appropriate educational and interpretative venues to improve visitors' understanding of paleontological resources and to prevent damage. To achieve these objectives, adequate personnel, funding, and protection enforcement are necessary.

#### A. Personnel

At least one full-time (FT) paleontologist is necessary for each of the new monument units, in addition to the existing FT senior monument paleontologist who would coordinate them and oversee paleontological resources at the excluded Federal lands. These staff should be charged with preserving, studying, and interpreting the paleontological resources of GSENM, including consulting with the GSENM Advisory Committee and coordinating the activities of external researchers and other BLM paleontologists. Each of the three unit paleontologists should be assisted by at least one trained FT monument paleontology technician. In addition, the three new monument units collectively need at least one FT education and outreach coordinator to promote the monument units' paleontology program and the awareness of paleontological resources protection and preservation to the general public. The senior monument paleontologist would continue to oversee the entire paleontology program in the new monument units and the areas now excluded from GSENM boundaries, and would prioritize tasks of each unit paleontologist and the education and outreach coordinator. Each paleontology unit should have relevant support staff housed at monument unit facilities.

#### B. Funding

In order to maximize the public and scientific value of the paleontological resources at the new monument units and the excluded areas, funding must be available not only to support monument paleontology staff (e.g., paleontologists, technicians, and coordinators), but also to facilitate paleontological resource surveys and monitoring programs, research, education and outreach (including internship opportunities), site protection and preservation, specimen collection, and specimen curation. In addition, there must be reliable annual funding to support sharing of research results with the public to demonstrate the effectiveness of each monument unit's research program and integration of local communities with its activities (e.g., paleontology staff and interns' participation in professional conferences and/or workshops,

sponsoring education and outreach activities, and presentations to the public and interested groups).

Specimens from the new monument units and excluded areas should continue to be curated in public-trust repositories. When cases where collection, preparation, and curation of a discovery are beyond the resources (financial or otherwise) of BLM alone, finding such resources, including possible cost sharing or cooperation with non-Federal public-trust repositories, is the responsibility of BLM. This includes cases of illegally collected paleontological resources seized through law enforcement activities where their curation is deemed necessary. In addition, funding to digitize paleontological specimens originating from the monument units and excluded areas should be available to researchers, and such digital representations should be freely available to researchers and the general public. To these ends, National Conservation Lands funds and other sources of BLM funding should be made available to appropriate projects selected by existing application procedures, in addition to other funding streams that may be available from other Federal and non-Federal programs.

### **C. Protection Enforcement**

The protection of paleontological resources and enforcement of paleontological protections should be maintained in accordance with their value as non-renewable scientific and educational resources. All monument paleontology staff should work closely with appropriate law enforcement to protect paleontological resources, active excavations, and access to sensitive areas. Effective communication between monument paleontology staff and law enforcement may include regular trainings and updates by paleontology staff. Enforcement of paleontological regulations should be among the highest priorities of law enforcement. A minimum of three BLM law enforcement officers (LEOs) should be assigned to GSENM exclusively (one per monument unit) to ensure protection of monument resources. Each LEO shall undergo additional training from monument paleontology staff on the significance and distribution of fossil resources within the new monument units and at excluded Federal lands, as well as training on how to detect and field stabilize looted fossil sites.

## Appendix 3

Excerpts ('ENERGY AND MINERAL ACTIVITIES' section) from SVP's minimum-standard for Paleontological Resource Management, which we submitted to BLM in March of 2018. This sections describes minimum standards for mitigation of paleontological resources that we think should be used on all Federal land. Because of the importance and abundance of paleontological resources at GSENM and KEPA, stronger protection is needed.

### V. ENERGY AND MINERAL ACTIVITIES

Paleontological resources are non-renewable and can often occur in intermittent concentrations. Damage to scientifically important paleontological sites from energy and mineral exploration and extraction operations must be avoided. Although energy and mineral extraction are prohibited within the boundaries of the new monument units, the areas that were previously included within the 1996 boundaries of GSENM are rich with scientifically important paleontological sites, many of them currently under study. PRPA does not protect sites or paleontological resources from destruction in cases where leases for mineral extraction have been granted. The excluded areas include several geological units that are rich with scientifically important paleontological resources and are known to contain commercially viable mineral resources: the type area of the Kaibab Formation in the Buckskin Gulch area, the Chinle Formation (which contains uranium and vanadium deposits), the Naturita (Dakota) Formation, the Tropic Shale (which could be impacted on a large scale by shale gas extraction), and the Straight Cliffs Formation (especially the John Henry Member, which bears coal, titanium, and zirconium deposits).

#### A. Prior to Commercial Energy and Mineral Activities

Preliminary surveys should cover the entire proposed area of disturbance, including proposed access roads, parking, spoil banks, and other infrastructure. Adequate time, normally at least one field season, should be allowed for each survey. The duration shall be extended (1) if inclement weather conditions prevent conducting an adequate survey during that field season, (2) if the proposed area is excessively large for the crew size to complete an adequate paleontological resource survey in one field season, or (3) if a large-scale excavation of paleontological resources by paleontologists prior to the proposed mining activity is required. Energy or mineral mining operation shall not begin until the chief monument manager or authorized officer carefully reviews and accepts recommendations made by the senior monument paleontologist based on the results of the paleontological resource survey.

#### B. During Commercial Energy and Mineral Activities

In cases where extraction activities are being conducted in areas with high potential for yielding paleontological resources as determined by the preliminary survey, periodic inspections by a professional paleontologist should be conducted to ensure scientifically important paleontological resources are not inadvertently destroyed or unlawfully extracted. These inspections should include newly disturbed areas and their spoil banks. Mining workers during operation must immediately report to the designated monument paleontologist should they encounter any paleontological resources that are suspected of having scientific importance. If the

discovery is determined to be scientifically important, the paleontologist shall immediately report to the senior paleontologist who will then request the chief monument manager or authorized officer to request an emergency excavation to collect the paleontological resources in question.

### **C. Individual Mineral Activities**

Casual mineral collection, especially in the newly excluded areas of the former GSENM, could easily extend to fossils in the minds of collectors. Individuals with rights to collect minerals may only do so within the limits of PRPA, which applies to all Federal lands and which explicitly excludes paleontological resources from the definition of minerals. Individuals should immediately report to one of the monument paleontologists any paleontological resources they suspect of having scientific importance.

### **D. Authority**

The senior monument paleontologist should determine who would serve to direct a paleontological resource survey should a mining proposal be submitted for an area of Federal lands previously included in GSENM that are now excluded from the monument boundaries. The senior paleontologist shall directly report to the chief monument manager.

## Appendix 4

Excerpts (‘RESEARCH AND EDUCATION’ and ‘COLLECTION’ sections) from SVP’s proposed Paleontological Resource Management Plan submitted to BLM in March of 2018 that describes additional infrastructural management plans necessary to adequately preserve, manage, and conserve paleontological resources at GSENM, including Federal lands now excluded from the monument boundaries.

### II. RESEARCH AND EDUCATION

Since the monument’s founding, scientific research in the field of paleontology has been a central purpose and focus of GSENM, and is highlighted as a priority in the original monument management plan. Furthermore, the fossil discoveries from the monument, made both by monument staff and external partners, have brought considerable positive attention to the monument and enhanced our understanding of Earth’s history. Associated education and outreach, in the form of news media coverage, documentary television programs, websites, museum exhibits, and visitor center exhibits have reached millions of people in the United States and worldwide. Yet, each new discovery raises additional intriguing scientific questions. Numerous sections of the monument still have not been paleontologically surveyed. Continued support of research and its associated education and outreach are necessary to ensure that the paleontological resources of the new monument units and the lands now excluded can be appreciated, protected, and shared.

#### A. Engagement and Support

The BLM’s partnerships with external organizations such as museums and universities have been effective in the past for cost-sharing, maximizing efficiency, and ensuring that appropriate experts oversee relevant paleontological research. In fact, the BLM’s partnerships with external scientists have been crucial for exploration, conservation, and interpretation of paleontological resources within GSENM. As such, the new monument units should facilitate research to the fullest extent possible, in accordance with the BLM policy and all applicable laws, including the Paleontological Resources Preservation Act (**PRPA**: P.L. 111-011 Omnibus Public Land Management Act of 2009). BLM staff who approve permitting should have relevant scientific degrees and appropriate paleontological research experience. Monument unit officials should review and render a rapid decision on all paleontological collection permit applications falling under their purview. Similarly, the staff who review special requests related to research on paleontological resources and related materials from the monument units (e.g., loans, consumptive sampling, and specimen replication) should have similar professional qualifications and process requests within a reasonable timeframe. Facilitation of collaborative work among researchers with similar research objectives, and avoidance of antagonistic relationships, should also be among the objectives of monument oversight.

The process for evaluating proposed research should consider whether it can be carried out in a manner consistent with the protection of the monument units’ other resources, and whether the disturbance proposed is the minimum necessary to achieve the desired research objective. All research and related educational activities shall require special-use permits. All research shall meet Monument data collection standards to be established by the chief monument

manager with the advice of the GSENM Advisory Committee, and shall provide information that feeds directly into the adaptive management framework. Except where specifically prohibited (e.g., in relict plant areas and wildlife protected activity centers), the BLM shall consider exceptions during the special-use permitting process for extremely high-value scientific research opportunities, especially for those opportunities that may not be available elsewhere. Research projects focused on protecting paleontological resources at risk should also be considered for exceptions. The GSENM Advisory Committee shall be consulted on whether research proposals that require restricted activities warrant the requested exceptions.

Recognizing that the tools available for paleontological research, such as 3D scanning and elemental analyses, are changing rapidly, novel research methods should be encouraged, with a particular emphasis on making the resulting data available to the scientific community and general public with minimal restrictions. Appropriate restrictions on site data to protect paleontological resources, in accordance with PRPA, should be applied. However, both field and laboratory work often rely upon the exchange of detailed site data among researchers. As such, all reasonable requests for locality data, or the exchange of locality information, should be granted to qualified researchers for legitimate research and/or management purposes.

## **B. Education and Outreach**

The BLM should engage in education and outreach in a manner consistent with ongoing efforts in the state of Utah and in BLM's paleontology program nationwide. Public education and interpretation should be emphasized to improve visitor understanding of paleontological resources and to prevent damage. Collaborative partnerships with volunteers, universities, and other research institutions should be pursued to document, preserve, monitor or interpret sites consistent with the overall objective of protecting paleontological resources. All investigators conducting research in GSENM and intervening lands should be encouraged to engage in, or initiate, education and outreach activities.

Visitor centers should promote scientific interpretation. Results of paleontological research should be disseminated to visitors through interpretative public displays, public programming, exhibitions, publications, and discussion forums. Each visitor center should include interpretative exhibits and programs on the paleontology of the monument unit and surrounding areas, with a particular emphasis on the paleontology of the region around the visitor center. In addition, the BLM should play a role in developing educational programs for grades K-12, emphasizing the area's scientific and cultural resources, as well as for undergraduate and graduate programs at universities as resources permit. The results of paleontological research should also be communicated to the broader public, including the scientific community, via news releases, publications, traveling exhibits, and other kinds of media. Special outreach efforts should focus on local and regional communities and on underserved communities around the nation. A monument website, educational brochures and publications, and collaboration with non-Federal organizations (e.g., universities) offering experiential-learning field courses and internships, should be incorporated into management programs to the fullest extent possible.

The BLM should permit and encourage molding and casting as well as 2D and 3D digitization of paleontological resources from the monument units and the excluded areas for research and educational purposes. Dissemination of digital representations of paleontological resources should be made available for free. Whether physical replicas or through photographs or digital files printable on a 3D printer, such activities enhance public knowledge of the monument

units' paleontological resources and reduce potential damage to material in repositories (i.e., by reducing handling) or those still in the ground (i.e., by providing an alternative to poaching and vandalism). Furthermore, they expand the ability of outside entities to provide hands-on access to physical replicas and digital representations of paleontological resources from the monument units, enhancing the types of educational opportunities relating to the monument units that are available at local, regional, and national levels.

### **C. Authority**

The senior paleontologist should (1) report directly to the chief monument manager; (2) work with and keep other BLM paleontologists informed; (3) work with and keep informed the state paleontologist for the state of Utah; (4) consult and articulate with similarly acting monument archaeologists as their activities overlap; (5) coordinate activities of permittees within the boundaries of the former GSENM, ensuring that research is conducted in such a way as to minimize interference among different projects. Unit paleontologists should report to the senior paleontologist, with technical assistants reporting to their corresponding unit paleontologist. The education-outreach coordinator for paleontology should work directly under the senior paleontologist and alongside the unit paleontologists.

## **III. COLLECTION**

Collecting and conserving paleontological resources require special skills and resources that are not only critical for scientific research and education but also for properly preserving America's natural heritage. This process includes proper field collecting, site preservation, specimen preparation and curation, logistical support for researchers and educators, management and dissemination of contextual data associated with paleontological resources, and consulting with law enforcement officers when paleontological resources received by a repository appear to have been collected or transported illegally. Funded partnerships between BLM and external institutions are critical for achieving these objectives.

### **A. Field Collecting and Permitting**

The collection of vertebrate and non-vertebrate paleontological resources must be conducted in accordance with PRPA and existing BLM regulations. Collecting of paleontological resources for non-scientific purposes should be prohibited within the new monument boundaries. As stipulated in PRPA, the collection of vertebrate fossils should only be conducted by qualified individuals under permit for research and/or educational purposes. Commercial collecting is prohibited on all federally administered lands.

Individuals receiving permits to conduct research on paleontological resources should have qualifications consistent with existing Federal guidelines outlined in PRPA, such as an advanced academic degree in paleontology or equivalent evidence of advanced paleontological knowledge and experience. Projects approved for permits should be compatible with management plans and whatever policies are applicable to the Federal land concerned. Projects should be compatible with the protection of other natural and cultural resources. Permits should indicate that all paleontological resources that are collected in the course of the project remain the property of the United States and should be preserved for the public in a public-trust

repository along with associated data. Specific site data should remain confidential to researchers except as specified in the (pending) PRPA regulations.

Collecting of paleontological resources may require the use of special tools and techniques. Given the remote location of many fossil-bearing rocks as well as the techniques required to stabilize, excavate, and remove paleontological resources (e.g., dinosaur skeletons), management of these activities requires appropriate flexibility. Hand tools (e.g., picks, shovels, hammers, and chisels) are often sufficient to safely remove small specimens (i.e., those typically covered under a surface collection permit). However, small power tools (e.g., jackhammers, generators, rock saws, and other tools) are often required to safely stabilize, collect, and prepare larger paleontological specimens for transport, in both front country and back country areas. Importantly, these small power tools may result in less net disturbance to the ground by permitting a quicker and more focused excavation than would be allowed by hand tools. Thus, all management plans should allow for flexibility in collecting techniques with reasonable justification. Similarly, management plans should allow for judicious yet appropriate use of wheeled and/or motorized vehicles and heavy equipment as necessary to protect, preserve, and recover paleontological resources.

## **B. Site Preservation**

Because irreplaceable paleontological resources are regularly exposed by erosion, and are at risk of damage by erosion or vandalism once exposed, regular monitoring of paleontological sites are strongly advised as part of an ongoing resource management plan. A monument paleontologist from the relevant management unit should coordinate efforts to maximize preservation of the site's context. For projects involving surveying and surface collection, there should be only limited disturbance, with little or no digging in accordance with existing BLM and PRPA regulations. For projects involving excavation, waste material should be piled immediately next to dig sites, and excavated sites should be cared for post-excavation to protect fossil-bearing pockets and to restore the outcrop to its pre-disturbance state. Whenever possible, each excavation permit should estimate the necessary amount of paleontological resources that are required to complete the project. Sites should not be marked by graffiti, and rock cairns should be dismantled when encountered in order to protect sites from potential vandalism.

Each management unit should also staff law enforcement to assist in site protection and monitoring. Law enforcement staff should be sufficiently trained in such protection and knowledgeable of laws governing natural and cultural resources on Federal public lands, including the Federal Land Policy and Management Act (FLPMA) and PRPA.

## **C. Repository**

Applications for research permits should include a repository agreement granted by an appropriate public-trust repository. Any paleontological resource collected under a permit as well as associated field records (e.g., photographs, field notes, and excavation maps) should be stored by that repository. Proof of receipt of these paleontological resources by the repository should be provided to the senior monument paleontologist and managing Federal office by the permittee in the form of an institutional accession number and an inventory of fossils collected (to be provided with annual and final reports). However, prior to formal accessioning, the repository should be allowed to discard paleontological resources that are determined not to be scientifically significant upon their preparation or evaluation. Such paleontological resources should ideally be transferred to educational collections to maximize their utility. Formally

curated and catalogued paleontological resources shall not be deaccessioned or discarded without permission of the BLM.

The BLM should financially support partnerships with non-Federal public-trust repositories to prepare, conserve, and curate Federal specimens and make non-sensitive data on these specimens available to the public through the electronic dissemination of these data in online databases. Day-to-day management of research on Federal specimens should be assigned to the repository with terms negotiated via the permittee's repository agreement, Memoranda of Understanding, or other approved agreement. To facilitate efficiency, each repository should be given permission to make basic collection-based decisions (including consumptive or destructive sampling) without requiring prior Federal approval, while still working with the concerned Federal agency to ensure that such decisions are documented. Which and how many repositories may house paleontological resources from the monument unit will depend on the scope and nature of the proposed project(s) and on the collections scope of the participating institutions acknowledged on the permit(s). The monument's collections should continue to be curated and housed by multiple public-trust repositories (Federal and non-Federal), sustaining those diverse collections and long-term projects. This is particularly true for management areas having high paleontological sensitivity and varied research priorities.

#### **D. Authority**

Decisions about collecting activities should be managed directly by the senior monument paleontologist in conjunction with other appropriate Federal officers as well as non-Federal partners and institutions.