National Park Service
U.S. Department of the Interior

State of the Park Report

John Day Fossil Beds National Monument

Oregon

December 2013

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On the cover: The Clarno Palisades at John Day Fossil Beds National Monument (Clarno Unit,) painted in watercolor by Artist in Residence Susan Spears. Fossil seeds, nuts, ans vines from the Clarno Unit are also featured in the foreground. Each of the monument's three units is dominated by different geologic layers, which in turn provides distinctly different scenery at each location. These same layers contain a diverse fossil record spanning 40 million years of the Age of Mammals, providing a phenomenal view into Oregon's past. Used with permission from the artist.

Disclaimer. This State of the Park report summarizes the current condition of park resources, visitor experience, and park infrastructure as assessed by a combination of available factual information and the expert opinion and professional judgment of park staff and subject matter experts. The internet version of this report provides the associated workshop summary report and additional details and sources of information about the findings summarized in the report, including references, accounts on the origin and quality of the data, and the methods and analytic approaches used in data collection and assessments of condition. This report provides evaluations of status and trends based on interpretation by NPS scientists and managers of both quantitative and non-quantitative assessments and observations. Future condition ratings may differ from findings in this report as new data and knowledge become available. The park superintendent approved the publication of this report.

Executive Summary

The mission of the National Park Service is to preserve unimpaired the natural and cultural resources and values of national parks for the enjoyment, education, and inspiration of this and future generations. NPS Management Policies (2006) state that "The Service will also strive to ensure that park resources and values are passed on to future generations in a condition that is as good as, or better than, the conditions that exist today." As part of the stewardship of national parks for the American people, the NPS has begun to develop State of the Park reports to assess the overall status and trends of each park's resources. The NPS will use this information to improve park priority setting and to synthesize and communicate complex park condition information to the public in a clear and simple way.

The purpose of this State of the Park report is to:

- Provide to visitors and the American public a snapshot of the status and trend in the condition of a park's priority resources and values;
- Summarize and communicate complex scientific, scholarly, and park operations factual information and expert opinion using non-technical language and a visual format;
- Highlight park stewardship activities and accomplishments to maintain or improve the State of the Park;
- Identify key issues and challenges facing the park to help inform park management planning.

John Day Fossil Beds National Monument, located in east central Oregon in Grant and Wheeler counties, encompasses 14,000 acres in the John Day River valley. The monument features sedimentary rocks that contain a plant and animal fossil record spanning 40 million years of the Age of Mammals. The monument is geographically dispersed over three widely separated units: the Clarno Unit, the Painted Hills Unit, and the Sheep Rock Unit. All three units provide a variety of opportunities for recreation and study and serve to introduce the paleontological story of the much larger basin to the public.

The purpose of John Day Fossil Beds National Monument is to preserve, and provide for the scientific and public understanding of the paleontological resources of the John Day region, and the natural, scenic, and cultural resources within the boundaries of the national monument. While there are other large paleontological sites in North America, including many protected by the National Park Service, the John Day region's diversity of fossil resources and the nearly continuous record of rocks over the last 50 million years are unique (Fremd 2010). There are few other places on Earth, if any, where the past 50 million years is as accessible as it is in the John Day region, for the collection and analysis of both a continuous fossil record and repeated layers of datable volcanic ash. Eight distinct fossil assemblages preserve a great variety of vertebrate, invertebrate, plant, and trace fossils, representing remains of hundreds of species (Dilhoff et al. 2009, Fremd 2010). Dating of volcanic layers provides time constraints on the age of these fossil assemblages, and in some cases the age of a particular fossil can be narrowed down to less than a hundred thousand years, exceptional precision for a fossil record from millions of years ago. Well known ages for each fossil assemblage permit comparisons to other deposits throughout the region and elsewhere in the world, providing a framework to examine evolutionary and environmental changes through time. The rich paleontological and geological records of this region combine to make it one of the best places in the world to study the Earth's history.

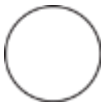
Significance statements express why the park unit's resources and values are important enough to warrant national park unit designation. John Day Fossil Beds National Monument is significant because:

- The John Day region contains one of the longest and most continuous Tertiary records of evolutionary change and biotic relationships in the world; this outstanding fossil record heightens our understanding of earth history. John Day Fossil Beds National Monument contains a concentration of localities that are a major part of that record.
- The John Day region is one of the few areas on the planet with numerous well-preserved and ecologically diverse fossil biotas that are entombed in sedimentary layers and are found in close proximity with datable volcanic rocks; these biotas span intervals of dramatic worldwide paleoclimatic change.
- John Day Fossil Beds National Monument contains regionally representative scenic, natural and cultural landscapes—notably, the James Cant Ranch Historic District, which represents the history of sheep ranching in the region.

The summary table, below, and the supporting information that follows, provides an overall assessment of the condition of priority resources and values at John Day Fossil Beds National Monument based on scientific and scholarly studies and expert opinion. The internet version of this report, available at http://www.nps.gov/stateoftheparks/joda/, provides additional detail and sources of information about the resources summarized in this report, including references, accounts on the origin and quality of the data, and the methods and analytical approaches used in the assessments. Reference conditions that represent "healthy" ecosystem parameters, and regulatory standards (such as those related to air or water quality) provide the rationale to describe current resource status. In coming years, rapidly evolving information regarding climate change and associated effects will inform our goals for managing park resources, and may alter how we measure the trend in condition of park resources. Thus, reference conditions, regulatory standards, and/or our judgment about resource status or trend may evolve as the rate of climate change accelerates and we respond to novel conditions. In this context, the status and trends documented here provide a useful point-in-time baseline to inform our understanding

of emerging change, as well as a synthesis to share as we build broader climate change response strategies with partners.

The Status and Trend symbols used in the summary table below and throughout this report are summarized in the following key. The background color represents the current condition status, the direction of the arrow summarizes the trend in condition, and the thickness of the outside line represents the degree of confidence in the assessment. In some cases, the arrow is omitted because data are not sufficient for calculating a trend (e.g., data from a one-time inventory or insufficient sample size).

Condition Status		Trend in Condition		Confidence in Assessment	
	**Warrants Significant Concern**		**Condition is Improving**		**High**
	Warrants Moderate Concern		**Condition is Unchanging**		**Medium**
	**Resource is in Good Condition**		**Condition is Deteriorating**		**Low**

State of the Park Summary Table

Priority Resource or Value	Condition Status/Trend	Rationale
Natural Resources		web ▸
Climate		Temperature, precipitation, and related climate variables are key drivers of natural resource conditions and influence cultural resources, visitor experience and park infrastructure. During the last several decades mean annual temperatures have increased, particularly during winter, causing declining snowpack. The region has experienced acute drought conditions during much of the last decade. This trend of aridification is expected to continue during the next several decades.
Air Quality		Although the park is in a rural area remote from most sources of air pollution, estimated ozone, average visibility, and nitrogen wet deposition levels in the park for 2005–2009 warrant moderate concern based on NPS Air Resource Division benchmarks. Relatively distant pollution sources affect the entire region. Air quality is in good condition for estimated sulfur wet deposition for 2005–2009.
Paleontological Resources		Ongoing paleontological research has substantially improved knowledge of the monument's resources. Many new species have been discovered and there are now more accurate reconstructions of past ecosystems and better understanding of how plant and animal communities changed through time. Sites are closely monitored and paleontological resources are protected through active management.
Geologic Resources		Research in geology has improved knowledge of the monument's resources in recent years, yielding new radiometric dates and more detailed stratigraphy. Updated geologic maps and a Geologic Resources Inventory report are in progress. Exceptional geologic features are stable and rates of erosion are relatively constant.

Priority Resource or Value	Condition Status/Trend	Rationale
Water Quality		Elevated water temperatures pose a threat to cool water species. In addition, benthic macroinvertebrate samples indicate somewhat impaired conditions in the John Day River.
River Channel		Data collected in 2010 represents the first stream channel assessment of the John Day River. All data is baseline information to which future assessments can be compared. Initial data did not indicate severe resource issues.
Vegetation Communities		The health of native plant communities in both the uplands and riparian zones is declining due to accelerated rates of fire disturbance and weed invasion. Drought is also a likely factor influencing these patterns. Past land use also continues to influence contemporary conditions. Healthy stands of native perennial bunchgrass steppe vegetation are increasingly rare across the Monument, replaced instead by non-native invasive annual grasses. Likewise, non-native weedy vegetation dominates most riparian communities.
Terrestrial Invasive and Nuisance Species		Cheatgrass is found throughout the Monument and medusahead is rapidly expanding. Other non-native grasses such as Japanese brome and non-native forbs such as Dalmatian toadflax are also widespread. In riparian areas, reed canarygrass commonly forms monocultures.
Aquatic Invasive and Nuisance Species		The presence and expansion of the invasive rusty crayfish population is a threat to native aquatic species. The status and trend of other potential aquatic invasive and nuisance species within the Monument is not known.
Species of Management Concern		The Monument is home to a diversity of unique plants and animals, including the yellow-flowering endemic John Day Chaenactis which contributes to the spring wildflower bloom at Painted Hills. Other unique species include the rare spotted bat and the western whiptail lizard. According to inventories conducted in 2002–2006, populations of these plants and animals appear stable, although no recent surveys have been conducted. Some caution is warranted due to the extent of degraded vegetation habitat conditions.
Dark Night Sky		Due to the remote location of the park, the effects of population growth in large but distant urban centers will have a minimal effect on night sky quality resulting in an unchanging trend.
Soundscape/Viewscape		Unique geologic formations in a rainbow of colors highlight each of the three park units where wildlife abounds. The peacefulness of the region is only broken by highway traffic and the occasional military aircraft overflights. Structures and activities on private lands within the park boundary impact viewsheds.
Cultural Resources		web ▸
Archeological Resources		Most of the value of archaeological remains preserved in the John Day Fossil Beds National Monument resides in its capacity to provide meaningful information regarding long-term human processes and existence in the central John Day/Blue Mountain region. There are at least six different types of sites represented in the three units of JODA, the primary material identified in sites are stone tools and manufacturing waste. Pictographs are also present within the monument and hold significance to contemporary Tribes. The overall condition status for this resource is moderate concern due mainly to the ad hoc nature in which work is completed and the emphasis on inventory versus all other types of archaeological activity. Because of the sporadic nature of this work, a trend could not be identified.

Priority Resource or Value	Condition Status/Trend	Rationale
Cultural Anthropology		Affiliation studies have reliably identified three Tribes with a historical interest in the John Day area. The Umatilla, Warm Springs and Burns Paiute all express an interest in the activities supported by the National Park Service. Consultation with the Tribes is improving but needed studies, particularly traditional land-use studies, have not been undertaken.
Cultural Landscapes		The cultural landscape inventory was completed in 2009 and determined that the contributing landscape structures and features were in good condition with, "…few signs of major negative disturbance and deterioration." Some features, like the Titanic Ditch and the orchards, were noted in fair and poor condition, but treatments have been completed since 2009 to improve their conditions.
Historic Structures		Of the 19 historic structures at the Cant Ranch Historic District, all were found to be in good condition during the last assessment (2009). Preservation treatment continues on an as needed basis to maintain the structures in good condition.
History		Baseline documents for park history (Administrative History and Historic Resource Study) have been completed. The importance and role John Day Fossil Beds played in the early fossil prospecting and interpretations is fundamental to the establishment of the park.
Museum Collections		The park's museum collections are in stable condition due in large part to object housing that is appropriate for the items being stored and the exceptional quality of the repository at the Thomas Condon Paleontology Center, which exceeds the current museum facility standards. The frequent use and responsible tracking of objects also contributes to the overall good condition of assemblages.
Visitor Experience		web ▸
Number of Visitors		The total of 148,152 visitors to the park in 2012 is higher than that of 2010 (135,151) and 2011 (148,002) and also higher than the 10-year average of 123,614 visitors for 2002–2011.
Visitor Satisfaction		Based on the standard visitor satisfaction survey conducted each year, the percentage of visitors satisfied in FY12 was 100.0%, which is higher than the average for the previous five years (97.8%) and ten years (95.1%).
Interpretive and Education Programs – Talks, Tours, and Special Events		The monument continues to improve and expand the variety and quality of interpretive programming targeting 21st-century audience needs and incorporating new paleontological discoveries and concepts, while also increasing cultural interpretation.
Interpretive Media – Brochures, Exhibits, Signs, and Website		Replacement of outdated media is not keeping up with the shelf life of existing media. Plans and funding requests are being developed to address these needs.
Sense of Place		Historic buildings, corrals, and farm implements are set within a beautiful expanse of green, fertile land. One can view the pastoral setting and feel the sense of a busy, hard-working ranch. The combination of the well preserved ranch and surrounding landscape defines this historical place. Outside the historic ranch, the rugged and exposed landscapes give visitors a sense of the vast paleohistory of life on earth and a connection to the story of early scientific expeditions to the area.

Priority Resource or Value	Condition Status/Trend	Rationale
Accessibility		Accessibility improvements have been identified as a priority. The park is pursuing funding to improve accessibility for all visitors.
Safety		Safety of employees and visitors is a park priority. No recordable visitor incidents have occurred in the past several years. The park's safety committee is active, meeting once a month. More than a dozen new Job Hazard Analyses (JHAs) have been prepared in the last year. An Operational Leadership course has been scheduled for 2013.
Partnerships		John Day Fossil Beds cultivates numerous important formal and informal partnerships to accomplish park goals. Most notably, formal partnerships with BLM are vital to protection of park resources and visitors; we share responsibilities for paleontology, museum collections, archeology, and law enforcement.
Park Infrastructure		web ▸
Overall Facility Condition Index		The 140 assets at John Day Fossil Beds National Monument have an overall FCI of 0.037, which is Good based on industry and NPS standards. FCI is the cost of repairing an asset, such as a building, road, trail, or water system, divided by the cost of replacing it.
Energy Consumption		Energy usage (BTUs per gross square footage of buildings) at the park in 2012 was 3.3 % higher than the average for the previous 4 years
Park Carbon Footprint		John Day Fossil Beds NM belongs to a network of parks nationwide that are putting climate friendly behavior at the forefront of sustainability planning. The Park's climate action plan describes commitments to reduce emissions of greenhouse gases at the park by 2016. Combined emissions from park and concessioner operations and visitor activities within the Park during the 2007 baseline year were roughly equivalent to the emissions from the energy use of 12 households each year.

Summary of Stewardship Activities and Key Accomplishments to Maintain or Improve Priority Resource Condition:

The list below provides examples of stewardship activities and accomplishments by park staff and partners to maintain or improve the condition of priority park resources and values for this and future generations:

Partnerships

Partnerships with other agencies, tribal organizations, and educational institutions are integral to park management goals. Some examples of successful, ongoing partnerships include:

- Cooperative management of paleo resources with Bureau of Land Management and U.S. Forest Service.
- Cooperative law enforcement efforts with BLM, Oregon State Police, local sheriff offices.
- Invasive plant management and strategic planning through collaboration with North Cascades Exotic Plant Management Team, Grant County Cooperative Weed Management Area, Deschutes Native Plant Seed Bank, and USDA Agricultural Research Services (Ecologically-Based Invasive Plant Management planning).
- Fire management collaboration with BLM and NPS Fire Effects monitoring program (North Cascades team).
- Oregon Museum of Science and Industry – Hancock Field Station—this 10 acre parcel of private land within the Clarno unit is used for research and educational purposes. A General Agreement authorizes certain OMSI activities on monument lands.
- Tribal partnerships, including Pine Creek Conservation Area.

- Summer internship and guest scientist programs with Oregon Youth Conservation Corps, Northwest Youth Corps, Youth Conservation Corps, Student Conservation Association, and GeoCorp program.
- Supporting local community development with Oregon Paleo Lands Institute.

Natural Resources

- Paleontology: Intensive surveys within the Sheep Rock unit have covered more than 75% of the badlands exposures, and helped to preserve thousands of fossil specimens. New fossil species are regularly discovered in all three park units, and on adjacent BLM lands, by park paleontologists.
- Two recently published finds includes the earliest modern beaver in North America and the world's oldest fisher; press coverage of these finds created wide-spread general interest.
- The park hosted two recent field conferences—Society of Vertebrate Paleontology, and Geological Society of America.
- Recent geologic research has helped define stratigraphy of rock units in the Park, and combined with new radiometric dates allows more precise dating of fossils (usually within 1 million years).
- Park working with NOAA fisheries to increase threatened steelhead populations by restoring riparian vegetation and improving fish passage in Bridge Creek at the Painted Hills Unit.
- Collaboration with UCBN Inventory and Monitoring program for long-term monitoring and natural resource management.
    - Radio telemetry study with bat species to determine location of roosts
    - Vertebrate inventories (mammals, birds, reptiles, amphibians)
    - Butterfly and moth inventories
    - Upland and riparian vegetation monitoring
    - Water quality and stream channel monitoring
- Vegetation management program: Annually control invasive plant species through herbicide application (with an average of over 100 acres treated each year), manual pulling, and biological control agents (stem-boring weevil for Dalmatian toadflax).
- Restoration of abandoned agricultural fields to native grass communities. Initiated ecologically-based invasive plant management (EBIPM) in partnership with USDA-ARS to improve weed management effectiveness and sustainability of the program.

Cultural Resources

- Completion of the cultural landscape inventory for the Cant Ranch Historic District.
- Updated National Register of Historic Places nomination for the Cant Ranch Historic District.
- Preservation of historic fruit tree varieties in the Cant Ranch orchard by grafting scions to period root stock.
- Preservation treatment of the Cant Ranch outbuildings and landscape.
- Increased knowledge of archeology through archeological surveys and testing projects including the discovery of pit houses occupied by indigenous tribes.

Visitor Experience

- Thomas Condon Paleontology Center is a world class facility for educating the public about the region's fossil history and the on-going story of scientific inquiry.
- Social media—Significant updates to the website have substantially improved public access to information about the monument. The park has established a popular Facebook page, YouTube channel, and Twitter account to increase relevancy for virtual visitors.
- Major revisions to publications are ongoing. Six publications have already been revised and are now available, with many more on the way.
- Created a new Jr. Ranger book in 2012 that focuses on the full range of primary and secondary park resources.
- The popular horse kit traveling educational trunks are sent to schools as far away as Guam.
- Eight new wayside exhibits were developed and installed at two popular park locations, the Clarno Picnic Area and the Island in Time trail at Blue Basin.
- Rangers completed a monument-wide wayside exhibit inventory and assessment in 2012.

Park Infrastructure

- Prep lab and collection facility at Thomas Condon Paleontology Center are state of the art, allowing curation of park resources at a level unprecedented within the National Park Service.
- Energy efficiency: New residences were constructed at Painted Hills and Foree in 2009 and 2010. The Painted Hills house is a net-zero energy home that actually results in an annual surplus back to the park's energy bill.
- The Red Scar Knoll trail was built at Painted Hills in 2011, providing a spectacular and popular visitor experience.

Key Issues and Challenges for Consideration in Management Planning

Strategic Sustainability
The greatest management challenge at John Day Fossil Beds, as at many other parks, is development of a strategic management paradigm that will be sustainable into the future. We need to become lean and efficient with a focus on the core resources for which the park was established. This is going to require some very difficult choices between important resources and core resources. This will likely mean a conscious decision to let some important, but not core, resources and assets deteriorate.

A related significant challenge is maintaining employee skills and workplace satisfaction in the face of declining budgets, FTE ceilings and the need to do less with less, which is not easy for highly dedicated employees to accept. A significant portion of the long-term workforce at John Day Fossil Beds will be eligible for retirement within the next several years, so planning for workforce transition will be important to retain institutional knowledge.

Lands Issues
John Day Fossil Beds National Monument was established in 1975. As described in the park's Land Protection Plan, nearly one quarter of the area within the boundary is in non-federal ownership and much of this non-federal land is privately owned. Associated threats to park resources and visitor experience include trespass cattle, exotic plant control, access to NPS facilities and resources across inholdings, and encroachment of development on park lands.

Community/Partnerships
In the modern world, no park is an island. To effectively manage park resources and provide a quality experience for park visitors, John Day Fossil Beds National Monument needs to maintain multiple existing partnerships and seek to develop new partners in innovative, non-traditional ways.

The park and our visitors contribute positively to local economies; continued economic development in rural communities surrounding the park is important to provide necessary infrastructure for visitors to stay in the area long enough to experience the park's resources, as well as for support of NPS employees and management functions. We are part of the local communities and economies, and cooperation with local efforts to expand necessary visitor services is appropriate.

Paleontology
John Day Fossil Beds National Monument was established because of world-class fossil resources. The park has an active and exciting paleontology program with new species being described on an almost routine basis. This program is world renowned and very well-respected. Since scientific integrity of paleontological resources is lost if the specimens erode out of their geologic context, the park routinely prospects for new fossils becoming exposed through erosion. As a result, the park's museum collection is literally expanding every week. At some point, the park's capacity for curating these specimens will be reached. Pre-planning for this eventuality will be important for continued protection of these world-class resources.

The 2009 General Management Plan plans for opening the Hancock Mammal Quarry for research and interpretation. This site is of great importance to scientists' knowledge of vertebrate fossils from the early Tertiary Period. Preliminary analysis suggests that this is the best late Eocene vertebrate site found in the western United States. Much information likely would be gained by reopening the quarry, and it would add a new facet to the visitor experience. However, significant pre-planning and facility development would be necessary to insure that this important resource could be adequately protected and interpreted.

Vegetation Management
Decisions regarding sustainable management of vegetative communities within John Day Fossil Beds National Monument will be important in the future, possibly necessitating re-evaluation of desired future conditions and perhaps even applicability of traditional NPS policy regarding native communities. Invasive plant species are widespread and expanding within all three units, posing a significant threat to native communities. Even if the entire park budget and all staff were to be dedicated solely to exotic plant management, invasive plants could not be eradicated. The park is working on an innovative planning process to establish realistic priorities and goals for treatment of exotic plants; however this will continue to be a huge management challenge for the foreseeable future.

Although junipers are native to the monument, scientists believe that this species is encroaching on new areas and in densities that may require some management action (Miller et al. 2005). Prescribed fire has been used over the past few decades to control junipers, but there is disagreement over the application of burning because of the aggressive establishment of exotic understory species in areas opened up by fire.

Cultural Resources
The Cant Ranch Historic District is one of the most intact locally significant examples of a historic sheep/cattle ranch in Wheeler and Grant Counties, Oregon, and is currently managed to maintain the historic features. This includes multiple historic structures including four agricultural fields actively managed for harvest. Sustainable management of this district into the future may become increasingly difficult as budgets and staffing declines.

A management plan for the park's archeological resources, especially pictographs, is a critical need to protect these irreplaceable resources. In 2013 meetings with each of the traditionally associated American Indian governments, the need for a formal plan to manage and protect pictographs was raised as the tribes' highest priority. The park lacks technical expertise to complete this planning process and will require assistance from Pacific West Region staff to do so. Timely completion of this planning process is important for resource protection and for maintaining good relations with traditionally associated tribal governments.

Visitor Opportunities and Relevancy
First-time visitors to the park often exclaim in awe that they had no idea there is such a fascinating resource right here in Oregon and declare that they will be back to visit again now that they know about the amazing paleontology story. This park is quite remote. Digital infrastructure that has become expected elsewhere is not available here. We do not have cell phone coverage in most of the park or the surrounding areas. Internet infrastructure capabilities are limited. Even telephones often malfunction. Although the park has an active following on Facebook and Twitter, as well as two web cameras, finding a way to provide digital experiences that the modern visitor (both on-site and virtual visitors) expect continues to be challenging.

The Clarno Unit is the least developed of the park's units. There is an extensive trail system that was informally created over time rather than planned. The park's 2009 General Management Plan calls for formalizing these unofficial trails. Careful planning and development could result in a much expanded visitor experience, including new interpretive opportunities.

Chapter 1 - Introduction

The purpose of this State of the Park report for John Day Fossil Beds National Monument is to assess the overall condition of the park's priority resources and values, clearly communicate complex park condition information to visitors and the American, and to inform visitors and other stakeholders about stewardship actions being taken by park staff to maintain or improve the condition of priority park resources for future generations. The State of the Park report uses a standardized approach to focus attention on the priority resources and values of the park based on the park's purpose and significance, as described in the park's Foundation Document or General Management Plan. The report:

- Provides to visitors and the American public a snapshot of the status and trend in the condition of a park's priority resources and values.
- Summarizes and communicates complex scientific, scholarly, and park operations factual information and expert opinion using non-technical language and a visual format.
- Highlights park stewardship activities and accomplishments to maintain or improve the state of the park.
- Identifies key issues and challenges facing the park to inform park management planning.

The process of identifying priority park resources by park staff and partners, tracking their condition, organizing and synthesizing data and information, and communicating the results will be closely coordinated with the park planning process, including natural and cultural resource condition assessments and Resource Stewardship Strategy development. The term "priority resources" is used to identify the fundamental and other important resources and values for the park, based on a park's purpose and significance within the National Park System, as documented in the park's foundation document and other planning documents. This report summarizes and communicates the overall condition of priority park resources and values based on the available scientific and scholarly information and expert opinion, irrespective of the ability of the park superintendent or the National Park Service to influence it.

John Day Fossil Beds National Monument, located in east central Oregon in Grant and Wheeler counties, encompasses 14,000 acres in the John Day River valley. The monument features sedimentary rocks that contain a plant and animal fossil record spanning 40 million years of the Age of Mammals. The monument is geographically dispersed over three widely separated units: the Clarno Unit, the Painted Hills Unit, and the Sheep Rock Unit. All three units provide a variety of opportunities for recreation and study and serve to introduce the paleontological story of the much larger basin to the public.

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- The John Day region is one of the few areas on the planet with numerous well-preserved and ecologically diverse fossil biotas that are entombed in sedimentary layers and are found in close proximity with datable volcanic rocks; these biotas span intervals of dramatic worldwide paleoclimatic change.
- John Day Fossil Beds National Monument contains regionally representative scenic, natural and cultural landscapes—notably, the James Cant Ranch Historic District, which represents the history of sheep ranching in the region.

The Fundamental Resources and Values as documented in the park's General Management Plan are as follows:

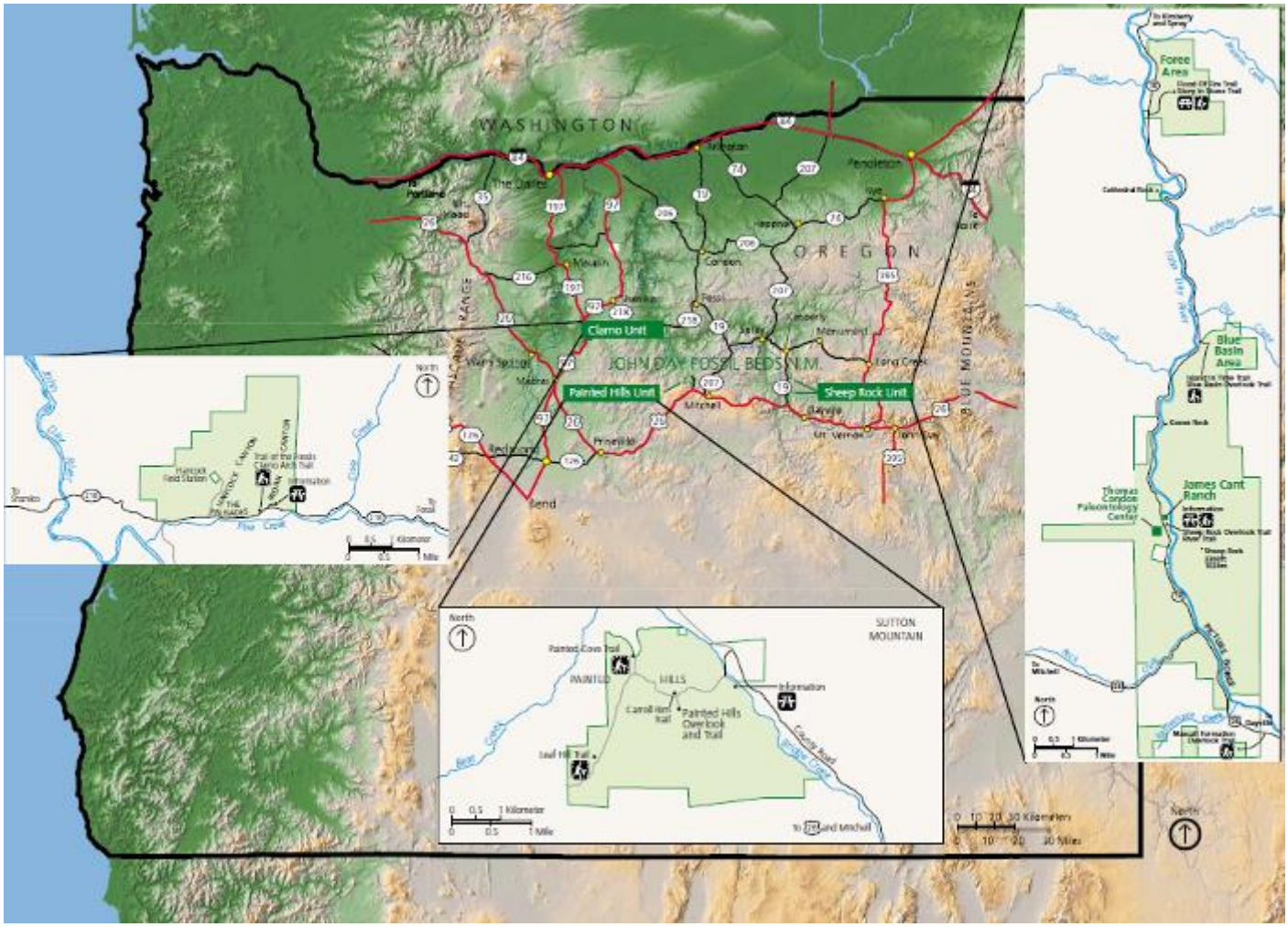
- John Day Fossil Beds National Monument contains important geological formations that contain fossil-bearing sedimentary strata, fossil soils, and numerous datable volcanic rock layers. Special paleontological resources include vertebrate, botanical, and invertebrate fossils; conformable layers of rocks (strata); fossil localities; datable ash layers; and identified paleosol units.
- The paleontology museum, archives, databases, and library collections at John Day Fossil Beds National Monument allow scientists to conduct important paleontological research on the history of life on planet Earth during the past 40 million years.

Other Important Resources and Values identified in the General Management Plan include:

- The colorful and diverse landscape presents scenic and educational features and vistas. Examples of these scenic resources are found in Sheep Rock, Painted Hills, Cathedral Rock, Picture Gorge, Blue Basin, Foree, and the Clarno Palisades.
- The ecosystem of the monument contains examples of protected, regionally representative, native plant and animal species.
- The John Day River and its tributaries are valued resources for: (a) their position and integrity within the Columbia River system; (b) habitat for threatened and endangered species; (c) free flowing water important to anadromous fish; (d)

recreation; (e) water quality and quantity; (f) fisheries; (g) important hydrological resources within the near desert ecosystem; (h) tribal interest in traditional use; and (i) riparian area habitat.

- Archeological sites and pictographs are valued for their association with and representation of the cultural heritage of American Indians and others.
- The James Cant Ranch Historic District, listed on the National Register of Historic Places, contains irrigated bottomlands, corrals, buildings, and landscape characteristics within the Sheep Rock Unit. It is valued for its intact cultural landscape that represents ranching history.



Locations and maps of the Clarno, Painted Hills, and Sheep Rock units of John Day Fossil Beds National Monument in northcentral Oregon.

Chapter 2 - State of the Park

The State of the Park is summarized below for four categories—Natural Resources, Cultural Resources, Visitor Experience, and Park Infrastructure—based on a synthesis of the park's monitoring, evaluation, management, and information programs, and expert opinion. Brief resource summaries are provided below for a selection of the priority resources and values of the park. Clicking on the web ▸ symbol found in the tables and resource briefs below will take you to the internet site that contains content associated with specific topics in the report.

The scientific and scholarly reports, publications, datasets, methodologies, and other information that were used as the basis for the assessments of resource condition are referenced and linked throughout the report and through the internet version of this report that is linked to the NPS IRMA data system (Integrated Resource Management Applications). The internet version of each report, and the associated workshop summary report available from the internet site, provide additional detail and sources of information about the findings summarized in the report, including references, accounts on the origin and quality of the data, and the methods and analytical approaches used in data collection and the assessments of condition. Resource condition assessments reported in this State of the Park report involve expert opinion and the professional judgment of park staff and subject matter experts involved in developing the report. This expert opinion and professional judgment derive from the in-depth knowledge and expertise of park and regional staff gained from their being involved in the day-to-day practice of all aspects of park stewardship and from the professional experience of the participating subject matter experts. This expert opinion and professional judgment utilized available factual information for the analyses and conclusions presented in this report. This State of the Park report was developed in a park-convened workshop.

The status and trends documented in Chapter 2 provide a useful point-in-time baseline measured against reference conditions that represent "healthy" ecosystem parameters, or regulatory standards (such as those related to air or water quality). We also note that climate change adaptation requires us to continue to learn from the past, but attempting to manage for conditions based on our understanding of the historical "natural" range of variation will be increasingly futile in many locations. Thus, these reference conditions, and/or our judgment about resource condition or trend may evolve as the rate of climate change accelerates and we respond to novel conditions. Our management must be even more "forward looking," to anticipate plausible but unprecedented conditions, also recognizing there will be surprises. In this context, we will incorporate climate considerations in our decision processes and management planning as we consider adaptation options that may deviate from traditional practices.

2.1. Natural Resources

Climate

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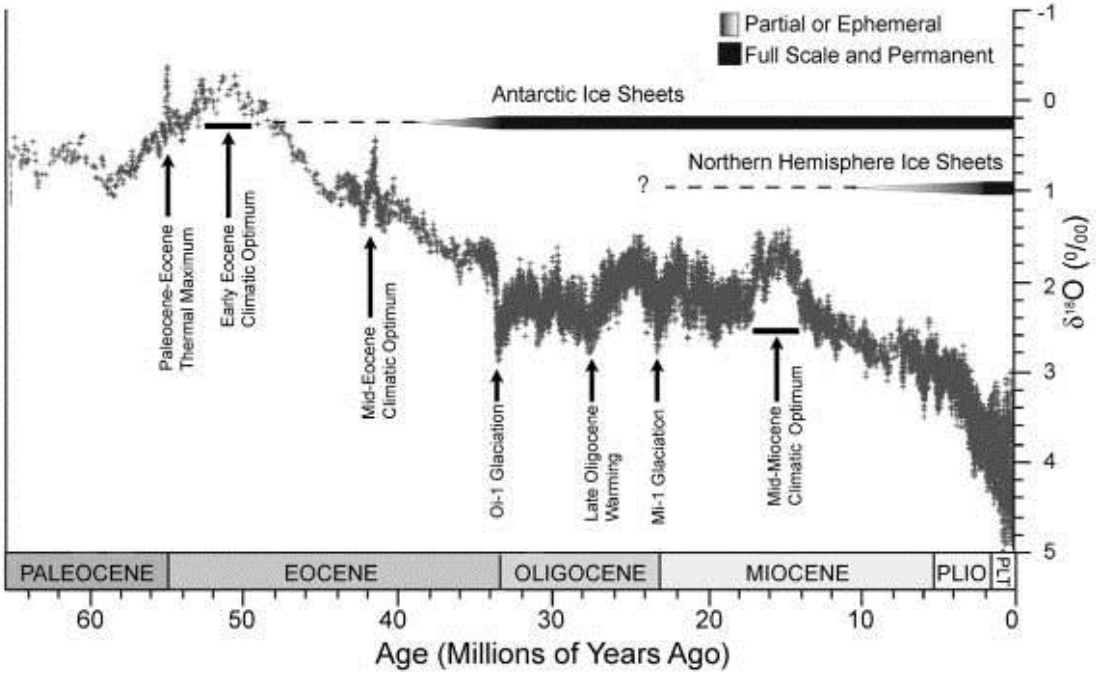
Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Temperature (historical)	Mean annual temperature		Over the 117 year instrumental record (1895–2011) mean annual temperature showed an increasing linear trend (+0.09 °F) per decade. Seasonal temperature changes were strongest in winter (+0.2 °F per decade). Data from weather station near the park (Fisichelli 2013).
Temperature (projected 2100)	Mean annual temperature		Mean annual temperature, compared with the 1971–1999 average, is projected to increase 3–4 °F by mid-century and 4–7 °F by the end of the century, depending on the greenhouse gas emissions scenario (Fisichelli 2013).
Precipitation (historical)	Mean annual precipitation		Annual precipitation increased slightly over the instrumental record period (+0.2 inches per decade). Seasonal precipitation showed the strongest increases in winter (+0.1 inches per decade) and spring (+0.1 inches per decade), which in combination with warmer winters is increasingly falling as rain rather than snow. (Fisichelli 2013). Precipitation has been below average throughout most of the last decade.

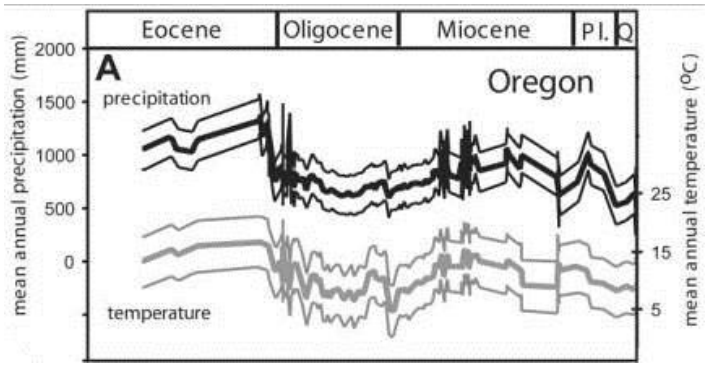
Precipitation (projected 2100)	Mean annual precipitation		Annual precipitation by mid-century may increase slightly (+1 to +5%), with the greatest increase coming in winter (+5 to +10%) and a projected decrease in summer (-10%), compared with 1971–1999 values (Kunkel et al. 2013). In combination with warming temperatures and declining snowpacks, this is expected to result in an overall net aridification and increasing drought stress.
Drought Index	Normalized Palmer Drought Severity Index		The region has been ranked as experiencing moderate (-2) to extreme (-4) drought for most of the last decade (NOAA National Climatic Data Center).

Resource Brief: Past Climate Change

Climate change, and our role in causing it, is an important issue today. In the past, climates have changed dramatically, but gradually through time. Overall, the Earth's climate has become cooler and drier through the Cenozoic, over the last 65 million years (Zachos et al. 2001, 2008). As climate has changed through time, so have environments throughout the world, and the fossil record demonstrates how plants and animals have responded.



Global climate curve over the last 65 million years (modified from Zachos et al. 2008).



Regional temperature and precipitation curves for Oregon based on paleosol data (Retallack 2007).

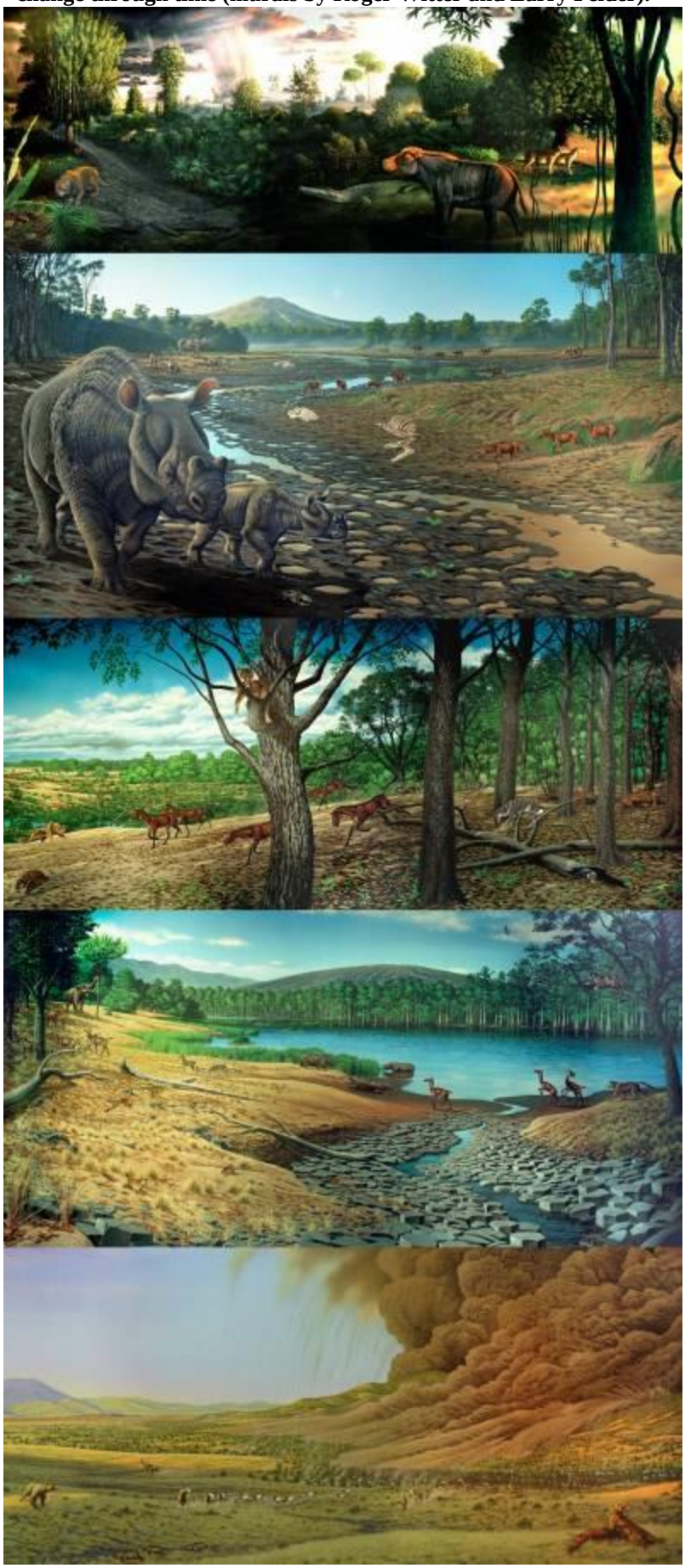
The rich paleontological and geological records of the John Day region combine to make it one of the best places in the world to study the how climate and ecosystems have changed through the time. Scientists have examined paleobotanical records and paleosols (ancient soils) to reconstruct how ecosystems have changed in this region through time (paleobotany – Chaney 1924, 1948, 1952, 1956, 1959, Chaney and Axelrod 1959, Manchester 1994, Meyer and Manchester 1997, Wheeler and Manchester 2002, Dillhoff et al. 2009; paleosols – Bestland et al. 1999, 2008, Retallack et al. 2002, Retallack 2004, Retallack 2007).

Paleobotanical studies document transitions from subtropical forest in the Eoceone to broadleaf deciduous forest and mixed woodland in the Oligocene, more open shrub and grasslands in the Late Oligocene and Early Miocene, savannah-like woodland in the Middle Miocene, and finally sagebrush and bunchgrass steppe from the Late Miocene to recent. Paleosol data, much of it gathered from within the park, largely support these reconstructions and provide temperature and precipitation curves for the region**.**

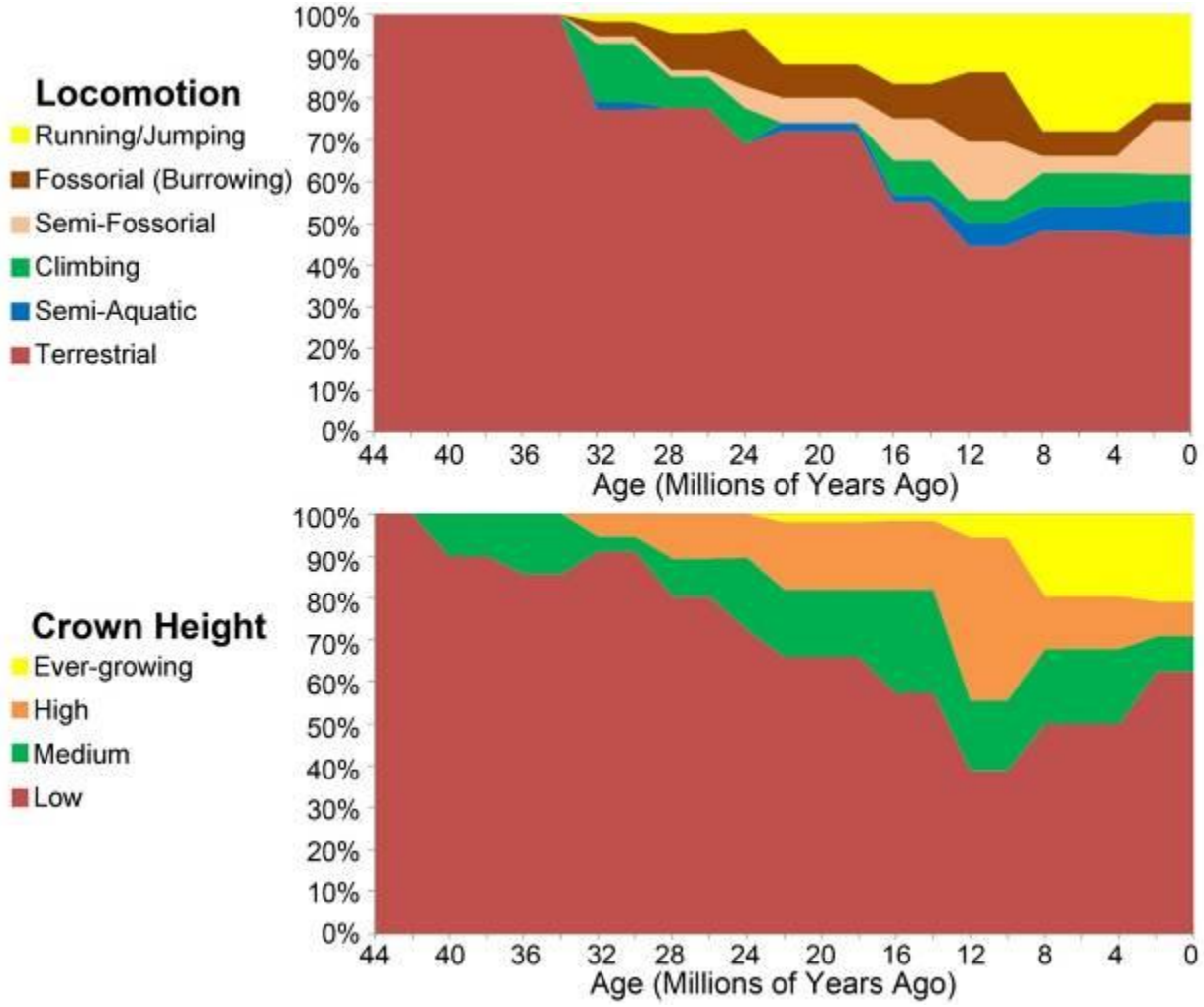
As climate changed through time, the plants and animals that once inhabited the John Day area, and the ecosystems they lived in, changed dramatically. Similarly, the fossil record of animals in the region documents substantial changes in faunas. The oldest fossil bearing deposits in the monument, the approximately 50–40 million year old Clarno Formation, preserves an Oregon very different from today. Clarno has one of the most important paleobotanical sites on Earth, representing a subtropical forest with plants that included palms, cycads, and even bananas (Manchester 1994, 1995, Wheeler and Manchester 2002, Dillhoff et al. 2009). Living in this warm, wet forest were early horses, rhinos, brontotheres, and crocodiles (Hanson 1996, Fremd 2010). The John Day Formation represents a complex series of strata, spanning over 20 million years (about 40 to 18 million years ago). The oldest fossils from this formation include the Bridge Creek Flora, which has over 100 species of plants and represents a deciduous hardwood forest (Chaney 1924, 1948, 1952, 1956, Meyer and Manchester 1997, Dillhoff et al. 2009). These flora and paleosol records document a significant change in climate, with trends toward cooler, drier conditions, and greater seasonality. The animals of the John Day Formation, particularly mammals, are amazingly diverse, with over 100 known species. Among these are three-toed horses, rhinos, oreodonts, entelodonts, and many species of dogs and saber-tooth nimravids (Hunt and Stepleton 2004, Fremd 2010). This time represents the first appearance of open habitat adapted animals, like camels and burrowing beavers. The Mascall Formation, about 16–13 million years old, represents a savannah-like environment, with a mixture of wooded environments and sod grasslands (Chaney 1959, Retallack 2007). Living in these savannah-like environments were gomphotheres, mastodons, camelids, dromomerycids, and horned gophers, as well as the first grazing-adapted horses. The youngest deposits in the monument, from the approximately 8–5 million year old Rattlesnake Formation, preserve mostly open grassland and shrubland habitats with riparian woodlands (Retallack et al. 2002). Running and grazing adapted ungulates (one-toed horses and pronghorn) and burrowing mammals (gophers, ground squirrels, and moles) are abundant, but the fauna also includes beavers, mastodons, ground sloths, and saber-tooth cats.

Like the paleobotanical record, not only do animal species become more recognizable through time, with the extinction of some families and the appearance of "modern" animals, but the ecology of these animals changed as well. As environments became more open,

Murals from the Thomas Condon Paleontology Center, depicting change through time (murals by Roger Witter and Larry Felder).



adaptations for life in open spaces tended to be favored and many species evolved specializations for these types of habits. In general, there is a distinct shift from forest adapted to open adapted mammal species through time (Samuels and Janis 2010). The number of running, jumping, and burrowing species increased dramatically; today, more than a third of mammal species show one of these types of locomotion. Similarly, feeding in open spaces tends to increase the amount of ingested grit, which can wear out an animal's teeth. The average tooth crown height has increased substantially and other grazing adaptations are common; today, nearly a third of species have high crowned or ever-growing teeth.



Regional locomotor and dietary ecology of mammals through time (Samuels and Janis 2010)

Air Quality

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Ozone	Annual 4th-Highest 8-Hour Concentration		Although the park is in a rural area remote from most sources of air pollution, relatively distant pollution sources affect the entire region. The estimated ozone level for 2005–2009 at John Day Fossil Beds NM was 63.2 parts per billion (ppb), therefore, the condition status warrants moderate concern based on NPS Air Resource Division benchmarks. No trend information is available because there are not sufficient on-site or nearby ozone monitor data (NPS ARD 2013). List of ozone-sensitive plant species.

Deposition	Sulfur Wet Deposition		For 2005–2009, estimated wet sulfur deposition was 0.2 kilograms per hectare per year (kg/ha/yr), therefore, the resource is in good condition. John Day Fossil Beds NM may be moderately sensitive to acidification effects from atmospheric deposition relative to all Inventory & Monitoring parks (Sullivan et al. 2011a; Sullivan et al. 2011b). Acidification effects include water chemistry that impact aquatic vegetation, invertebrate communities, amphibians, and fish. No trend information is available because there are not sufficient on-site or nearby wet deposition monitor data. (NPS ARD 2013).
	Nitrogen Wet Deposition		For 2005–2009, estimated wet nitrogen deposition was 0.4 kilograms per hectare per year (kg/ha/yr). This level usually indicates that the resource is in good condition based on NPS Air Resource Division benchmarks. However, the condition is elevated to warrants moderate concern because the park ecosystems may be very highly sensitive to nitrogen-enrichment effects relative to all Inventory & Monitoring parks (Sullivan et al. 2011c; Sullivan et al. 2011d). Certain vegetation communities in the park—including wetland and grassland plant communities—may be vulnerable to excess nitrogen deposition, which can alter plant communities and reduce biodiversity. No trend information is available because there are not sufficient on-site or nearby wet deposition monitor data (NPS ARD 2013).
Visibility	Haze Index		Although the park is in a rural area remote from most sources of air pollution, relatively distant pollution sources affect the entire region. Locally, wildland and agricultural fires create temporary haze conditions in some seasons. For 2005–2009, estimated average visibility in John Day Fossil Beds NM was 5.0 deciviews (dv) above natural conditions; therefore, the condition status warrants moderate concern based on NPS Air Resource Division benchmarks. No trend information is available because there are not sufficient on-site or nearby visibility monitor data (NPS ARD 2013).

Paleontological Resources

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The John Day region of eastern Oregon contains a detailed and well-dated sequence of rocks that span nearly 50 million years of time, from the Eocene to the Late Miocene. These rocks, and the fossils preserved within, record a rich history of animal and plant evolution. Paleontologists and geologists have been visiting the area to collect fossils and study geology for nearly 150 years, and continue to do so today. Through hundreds of studies, scientists have pieced together large parts of the natural history of Oregon.

While there are other large paleontological sites in North America, including many protected by the National Park Service, the John Day region's diversity of fossil resources and the nearly continuous record of rocks over the last 50 million years are unique (Fremd 2010). Throughout the eastern Oregon there are sedimentary deposits containing fossils, interspersed with volcanic rock layers. There are few other places on Earth, if any, where the past 50 million years is as accessible as it is in the John Day region, for the collection and analysis of both a continuous fossil record and repeated layers of datable volcanic ash. Eight distinct fossil assemblages preserve a great variety of vertebrate, invertebrate, plant, and trace fossils, representing remains of hundreds of species (Dilhoff et al. 2009, Fremd 2010). Dating of volcanic layers provides time constraints on the age of these fossil assemblages, and in some cases the age of a particular fossil can be narrowed down to less than a hundred thousand years, exceptional precision for a fossil record from millions of years ago. Well known ages for each fossil assemblage permit comparisons to other deposits throughout the region and elsewhere in the world, providing a framework to examine evolutionary and environmental changes through time.

The rich paleontological and geological records of this region combine to make it one of the best places in the world to study the Earth's history. The animals and plants that once inhabited the area, and the ecosystems preserved here have changed dramatically through time. The importance of the paleontological resources at John Day Fossil Beds National Monument cannot be overstated. Fossils from the John Day region have been key to understanding the evolution of horses and dogs, and have provided insights into the spread of grassland habitats through time (MacFadden 1994, Wang 1994, Wang et al. 1999, Wang and Tedford 2008, Retallack 2004, 2007, Retallack et al. 2002). New discoveries are regularly made by paleontologists; helping to give us a fuller picture of the region's past. Ongoing research efforts are helping to better reconstruct past environments and how they changed through time, allowing us a more complete understanding of how species have evolved and became extinct. This paleontological research is informative to global trends of change through time in the past, and is relevant for our understanding of current events like climate change and the fates of endangered species.

While abundant in this region, paleontological resources represent non-renewable resources threatened by the constant, natural processes of erosion and weathering. As the value of paleontological resources is in the information they contain, active management of these resources is vital for their preservation. Given the abundance of scientifically significant fossils in the John Day region and rapid rates of erosion, proper management of paleontological resources in many situations requires collection to prevent the loss of specimens. "Cyclic prospecting" is the generally the preferred management strategy in the John Day region (Fremd 1995).

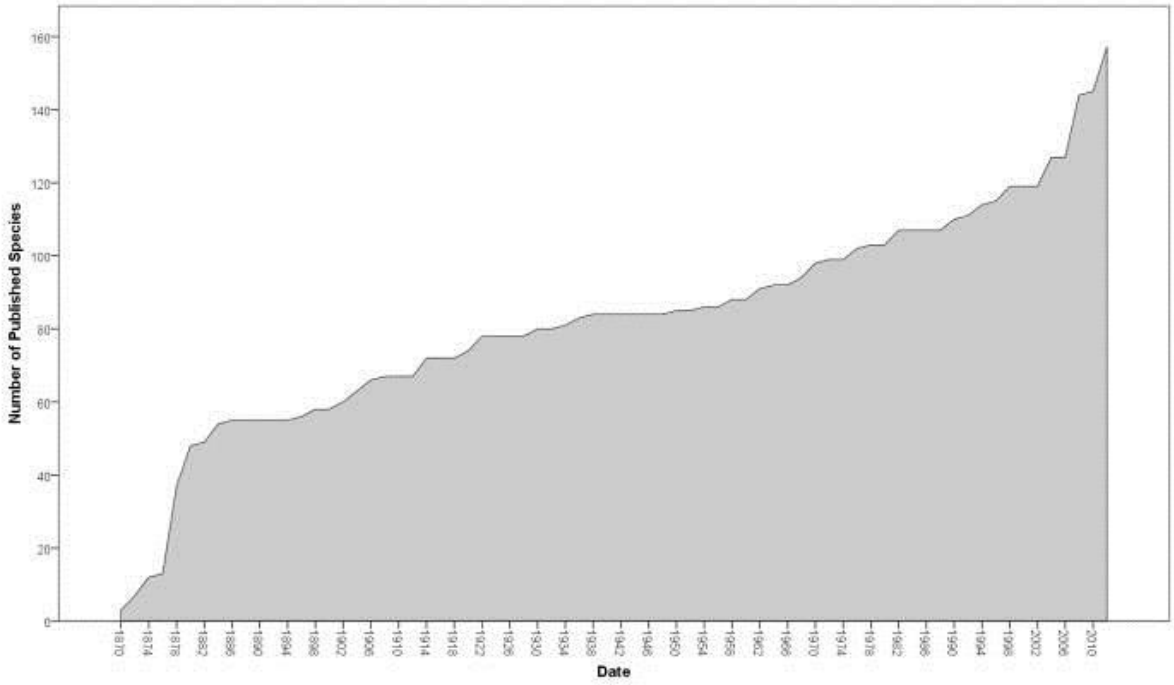
Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Knowledge	Species richness, ecosystem completeness, percentage of specimens with known age ranges, resources are understood in a broader context		Ongoing paleontological research has substantially improved knowledge of the monument's resources. Many new species have been discovered through work in the field and collections, resulting in a number of new publications (Samuels and Zancanella 2011, Calede and Hopkins 2012, Samuels and Cavin 2013). Research has also yielded more accurate reconstructions of past ecosystems and better understanding of how plant and animal communities changed through time (Samuels and Janis 2010, Samuels et al. 2013). New radiometric data and stratigraphic knowledge have helped refine the ages of specimens, particularly in the Mascall Formation and Turtle Cove Member of the John Day Formation (Schmitz 2013, Albright et al. 2008).
Inventory and Conservation	Percentage of park intensely surveyed, number of threatened fossil specimens collected, specimens are stabilized and prepared by professional staff		Sites are closely monitored and paleontological resources are protected through active management. Cyclic prospecting surveys have taken place in all three units of the monument in recent years, while intensive surveys of the Sheep Rock have covered more than 75% of badlands exposures in the last 3 years. Over 3000 threatened fossil specimens have been collected in the process from 2010 to 2012, a substantial increase over previous years (about 1400 from 2007 to 2009). Collected fossil specimens receive conservation treatment by professional staff in a state of the art fossil prep lab.
Resource Stability	Percentage of sites in good condition, completeness and diversity of specimens collected		Important fossil sites are stable in good condition in all three units of the monument. Completeness of recovered specimens is good, suggesting cyclic prospecting activities are sufficient for preservation of threatened resources. Diversity of recovered specimens is high, including both macro and micro fossils, with vertebrate, invertebrate, plant, and trace fossil materials represented.

Resource Brief: New Species

The paleontology of the John Day Basin has been studied for about 150 years, but there is still much more to learn. Working under a formal partnership with BLM, NPS paleontologists and researchers throughout the region discover new species regularly, both through work in the field and continued study in the museum collections. They also often find previously undiscovered parts of animals and plants, and more detailed information about when species lived. These new finds help scientists to continually refine our understanding of the region's history and allow them to build a more complete picture of Oregon's past.

Examination of the history of investigations from the John Day Basin reveals how these continued efforts have added to our knowledge of the region (Samuels, unpublished data). The first paper on John Day Formation was published by Leidy in 1870. In the late 1800s, a flurry of early publications by Marsh, Cope, and Scott appeared, describing a large number of animal species. In the early 20th century, the work of Merriam and his collaborators added substantially to knowledge of the John Day Formation. The second half of the twentieth century showed a relatively steady pattern of further publication, with a substantial increase since 2004.

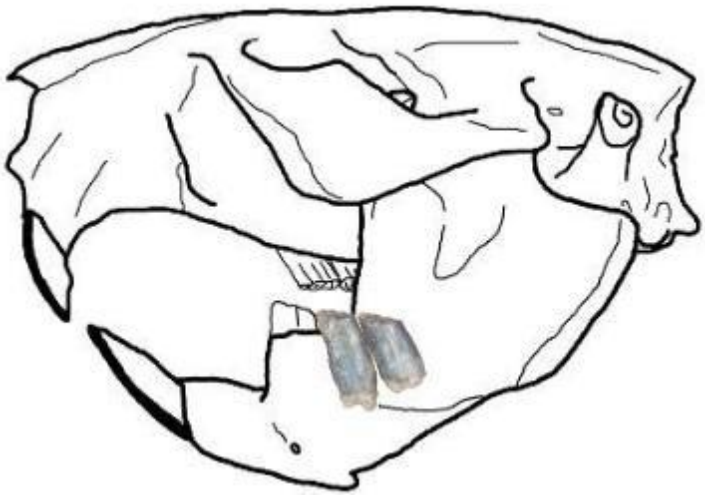
Consideration of the total number of described animal species provides a rough measure of the completeness of our knowledge about the John Day Formation. By 1900, following the early work of Marsh, Scott, and Cope, 37% of known species had been published. By the establishment of the monument in 1975, 63% of species were published. Since the arrival of the first NPS paleontologist, Ted Fremd, at JODA in 1985, the number of published species has grown by more than a third. Current efforts underway by a number of researchers will ultimately yield newly described species from each of the formations in the John Day Basin, these will be published in the next few years.



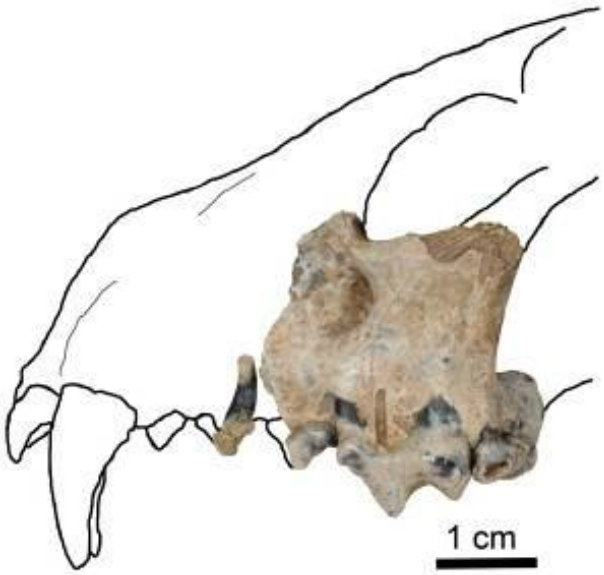
Cumulative number of animal species described from the John Day Formation through time.

Among the most notable new finds is a pair of beaver teeth from the Rattlesnake Formation, found in 2010 by a BLM paleontologist working on land just outside the monument. These teeth of *Castor californicus* represent the earliest record of a modern beaver in North America, and were described in a paper by JODA and BLM paleontologists (Samuels and Zancanella 2011). Modern beavers (the genus *Castor*) are well known for their tree-cutting and dam-building behaviors. By acting as ecosystem engineers, beavers help to create habitat for plants and other animals. The fossils are essentially identical to teeth of living beavers, showing beavers have changed little in the last 7 million years and suggesting that their appearance and role in the environment would have been the same in the past. It is fitting that the earliest known beavers in America should come from Oregon, the Beaver State.

Another find from the Rattlesnake Formation in 2012 was the partial skull of a new fisher species (*Pekania occulta*), which was recently published by JODA paleontologists (Samuels and Cavin 2013). The living fisher, *Pekania pennanti*, is an elusive member of the weasel family found in dense forests across the northern United States and Canada. Fishers and their relatives have a very poor fossil record and this new find is more than 5 million years earlier than other records of fishers in North America. Genetic studies show fishers are most closely related to wolverines, diverging about 7 million years ago. The robust teeth of the new species and its age suggest it may be the ancestor of both fishers and wolverines. This specimen (JODA 15214) also represents the first type specimen in the JODA museum collection. A type specimen is the fossil on which the description and name of a new species is based.



Molars of *Castor californicus* (JODA 13984), the earliest record of a modern beaver in North America.



Holotype partial skull of *Pekania occulta* (JODA 15214), the world's oldest known fisher.

Resource Brief: Society of Vertebrate Paleontology Field Conference

June 7th–11th, 2010 the monument was host to the Society of Vertebrate Paleontology (SVP) John Day Basin Field Conference. The conference was led by recently retired JODA paleontologist Ted Fremd, along with Skylar Rickabaugh and Barry Albright. There were 48 participants in the conference, including eight students. This was the second time John Day Fossil Beds National Monument hosted a SVP field trip, the first was in 1994 as part of the SVP Annual Meeting. SVP does not hold field conferences often (only 3 in the last decade), so the monument acting as host to two meetings in 16 years points to the significance of the John Day Basin and its importance to the scientific community.

The field trip followed a 150 page guidebook, written by Ted Fremd, and visited all three units of the monument. Many stops along the field trip path were within the monument, including the Thomas Condon Paleontology Center, Clarno Nut Beds, Painted Hills, Blue Basin, Foree, and Mascall overlook area. Through the course of the trip, Ted Fremd and a number of invited participants gave presentations on a diverse range of topics in paleontology, geology, and the management of paleontological resources.

SVP John Day Basin Field Conference 2010 Participants.

Geologic Resources

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John Day Fossil Beds National Monument is rich with exceptional geological features; the colorful rock formations provide beautiful scenery for visitors to the monument. Within the Sheep Rock Unit, exposed badlands composed of green and tan claystones are found at Sheep Rock, Blue Basin, Foree, and Cathedral Rock. All through the unit, Picture Gorge Basalts cap the surrounding ridges, most impressively within Picture Gorge itself. In the Painted Hills Unit, banded red and tan colored paleosols (ancient soil layers) stripe the Painted Hills and Red Scar Knoll, these red layers lie on top lavender and brown volcanic rocks in Painted Cove and Brown Grotto. At the Clarno Unit, ancient mudflows have eroded to form the Palisades and cliffs of Hancock Canyon, while brightly colored paleosols are present at Red Hill.

While the scenic value of the monument's geology is substantial, more important are the rock layers and the important information they contain about the region's history. There are many NPS units that preserve Cenozoic strata, but John Day Fossil Beds National Monument includes rocks from almost 50 million years of time, a span that encompasses most of the Cenozoic and far more than any other NPS unit. Within the monument are preserved many geological strata, including 4 fossil-bearing Cenozoic formations with at least 8 distinctive faunal and floral assemblages. Additionally, within the Sheep Rock Unit of the Monument there is one important Mesozoic formation exposed (Gable Creek Formation), as well as deposits of the Columbia River Basalts Group (Picture Gorge Basalts Subgroup).

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Knowledge	Knowledge of stratigraphic relationships, ages, and origin of geologic units within the park, placement of units within a broader regional context		Research in geology has improved knowledge of the monument's resources substantially in recent years. The monument's stratigraphy has been refined in a series of recent publications (Albright et al. 2008, Bestland and Retallack 1994a, 1994b, Bestland et al. 1999, 2008, Martin and Fremd 2001). An ongoing CESU agreement with Boise State University yields new radiometric dates and will ultimately result in well-constrained ages for more deposits within the monument (Schmitz 2013). The volcanic calderas that produced the John Day and Clarno Formations are also now much better understood (McClaughry et al. 2009).
Inventory	Percentage of park intensely surveyed and mapped, exceptional geologic features identified, baseline reports completed (geologic resources inventory, soil inventory)		The geology of the Painted Hills and Clarno Units have been studied in detail, and thoroughly mapped (Bestland and Retallack 1994a, 1994b). The Sheep Rock unit has also been studied in detail, but the current geologic map does not meet NPS standards. Exceptional geologic features have been identified within all units of the monument. Two GeoCorps guest scientists have been hired to produce a new detailed geologic map of the Sheep Rock Unit in the summer of 2013. A Soil Inventory for the monument has been completed and a Geologic Resources Inventory is currently underway (to be completed in 2013).
Resource Stability	Percentage of geologic units in good condition, with exceptional features documented, monitored, and threats identified.		Geologic units in the monument are stable, with no recent events substantially degrading their condition. Exceptional geologic features are well known and stable. Rates of erosion seem to be relatively constant, but warrant further study and documentation.

Resource Brief: Stratigraphy and Radiometric Dating

Over the last 20 years, knowledge of the stratigraphy and ages of rock units in the John Day Basin has improved dramatically. Multiple researchers have worked in all three units of the monument and surrounding areas to produce a detailed stratigraphic framework for this region. Contract work done by Greg Retallack and Eric Bestland provided a stratigraphic framework for the Clarno and Painted Hills units of the monument, primarily rocks from the Clarno and John Day Formations (Bestland and Retallack 1994a, b, Bestland et al. 1999). Hunt and Stepleton (2004) completely redefined the upper part of the John Day Formation, splitting the "Haystack Valley Member" into a series of four distinct members. Albright et al. (2008) expanded on these studies to produce a revised composite stratigraphy of the entire complex sequence of beds from the John Day Formation, including 7 members and more than 20 lithostratigraphic units (Fremd 1994 et al. 1994). Bestland et al. (2008) refined the stratigraphy of the Mascall Formation, while work continues on revision of the stratigraphy of the Rattlesnake Formation begun by Martin and Fremd (2001).

Radiometric dates from a number of sources have been combined with lithostratigraphic and magnetostratigraphic data to produce a highly refined chronostratigraphy of rock layers exposed throughout the region. Many dates were part of the doctoral dissertation of Carl C. Swisher, who used $^{40}Ar/^{39}Ar$ dating methods to provide ages for tuffs within the monument (Swisher 1992). To date, there are 20 radiometrically dated volcanic rock layers that occur within the monument and more layers that have been dated from surrounding areas. While this is very good, this is only a fraction of what is available for dating, and some large sections of the stratigraphic column do not have any volcanic rock layers dated. A current Cooperative Ecosystems Studies Unit (CESU) agreement with Dr. Mark Schmitz at Boise State University (BSU) is designed to provide new radiometric dates and further refine the chronstratigraphy of the region's strata. The BSU lab uses the highest precision dating methods available, with U/Pb analyses of zircons yielding dates with an error around 0.1%. Over the last several years, this collaborative project has yielded 3 new radiometric dates for units from within the monument, and more samples will be analyzed this year. Continuation of the work Ted Fremd started several decades ago will provide a better temporal framework for the region's history, providing a substantial benefit to scientists and the public.

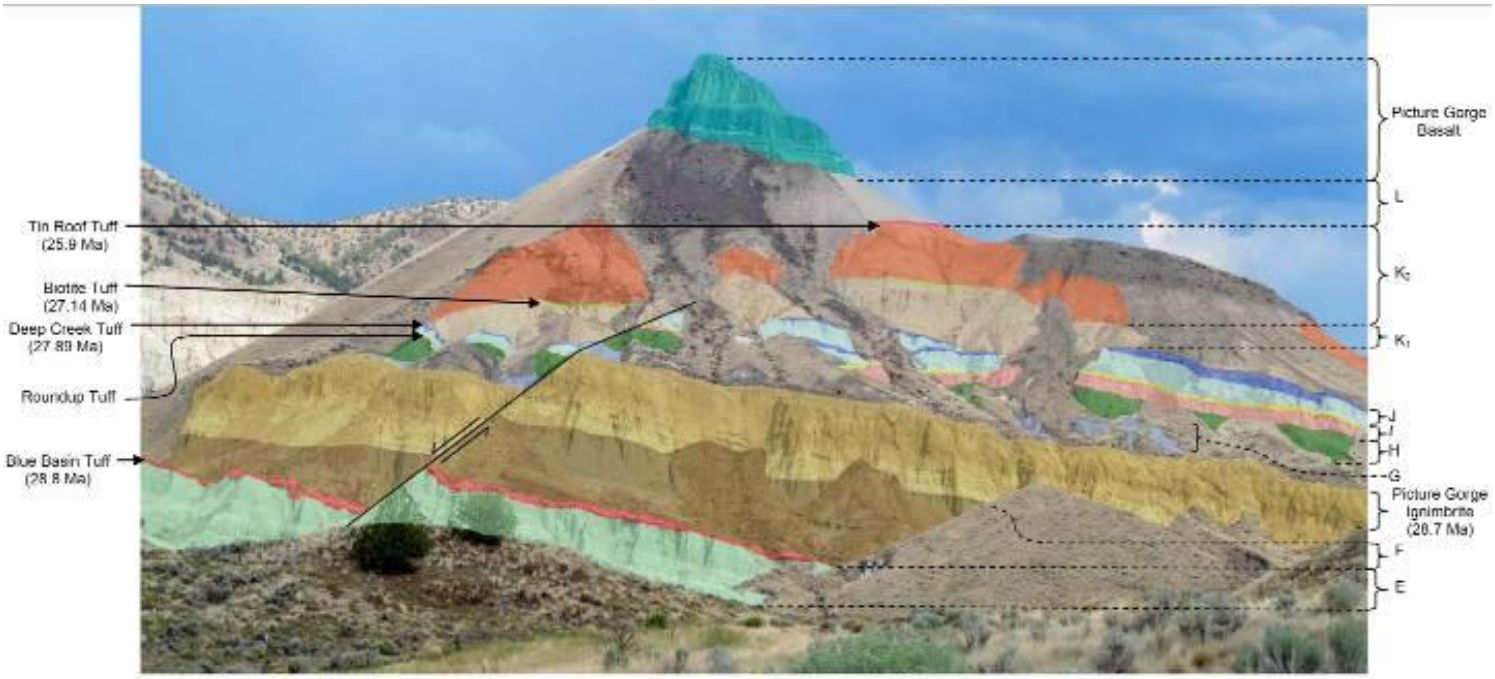
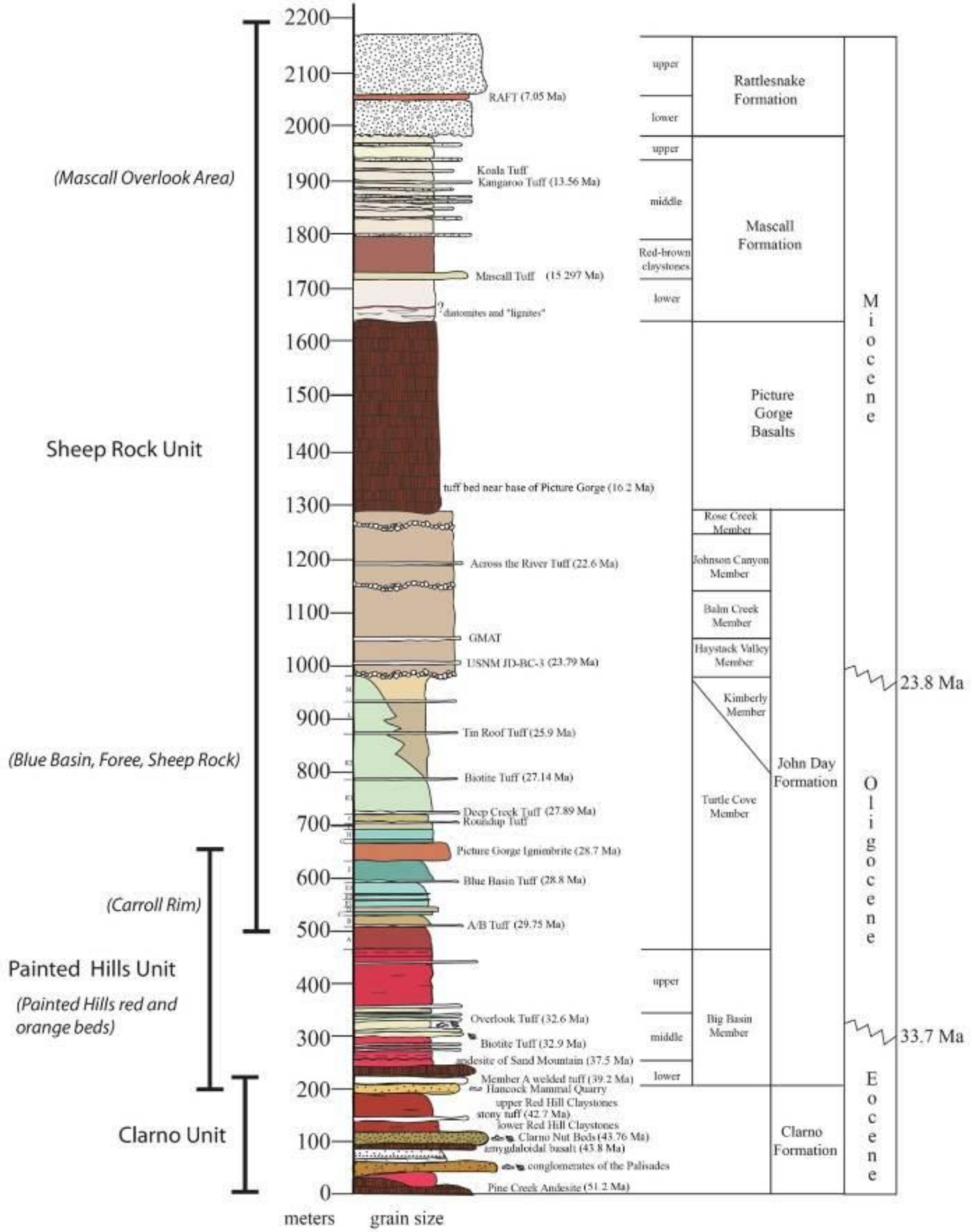


Photo of Sheep Rock with stratigraphy and faults mapped onto rock units. Image by 2012 GeoCorps intern Meghan McKnight.

Composite stratigraphy of deposits in the John Day Basin with radiometric dates of volcanic rocks included (from a variety of sources). Stratigraphy by Ted Fremd, graphic modified from Regan Dunn.



Water Quality

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Flow Rates	Median daily discharge July–September		USGS discharge data from the **Bridge Creek** gauging station above Coyote Canyon and from the Pine Creek gauging station near Clarno indicates that median daily discharge (July–September) decreased by 11% between 2007–2012. USGS discharge data from the **John Day River** gauging station near John Day indicates that median daily discharge (July–September) decreased by 58% between 1982 and 2012. (Bridge Creek Gage, Pine Creek Gage, John Day River Gage).
Water Chemistry	7-day average of the daily maximum water temperature.		**Bridge Creek**: The 7-day average of the daily maximum temperature during June–October 2010 exceeded 18.0 °C in 41.2% of observations (7 of 17 weeks). Between June 2011 and September 2011, the 7-day average of the daily maximum temperature exceeded 18.0 °C in 66.7% of observations. For waters designated as "salmon/trout rearing/migration", the 7-day average of the daily maximum should be < 18 °C. **John Day River**: June–October 2010, the 7 day average of the daily maximum temperature exceeded 18.0 °C in 73.7% of observations (14 of 19 weeks). June–October 2011, the 7-day average of the daily maximum temperature exceeded 18.0 °C in 80.0% of observations (12 of 15 weeks).
	pH (mean daily minimum and maximum)		**Bridge Creek**: The minimum and maximum pH in 2010 was 7.64 and 9.04 pH units respectively. pH exceeded the upper threshold of 9.0 pH units in 10 of 2,629 observations (0.38%). The lower pH threshold (6.5) was never exceeded. **John Day River**: June–October 2010, the minimum and maximum pH (7.83 and 8.81 respectively) were never outside the acceptable regulatory thresholds.
	Total dissolved solids		**Bridge Creek**: Mean total dissolved solids June–October 2010 was 200 mg/L and never exceeded the regulatory threshold of 500 mg/L. **John Day River**: Mean total dissolved solids was 210 mg/L in June–October 2010 and never exceeded 500 mg/L.
	Dissolved Oxygen (mean daily minimum)		**Bridge Creek**: Mean daily minimum dissolved oxygen June–October 2010 was 8.7 mg/L. All measurements were better than the regulatory threshold (6.5 mg/L). **John Day River**: June–October 2010, Mean daily minimum dissolved oxygen was 7.7 mg/L and dipped below the regulatory threshold (6.5 mg/L) during 56 of the 3,146 observations (0.02%).
Bacteria	*E. coli*		**John Day River**: In 2010, the Upper John Day River was listed as a water quality limited waterbody and has an approved TMDL to address pollution concerns. A UCBN grab sample in August 2010 indicated E. coli levels were well below state thresholds. Until the John Day River is no longer listed as a category 4A stream E. coli should be of moderate concern (Starkey 2013).

			http://www.deq.state.or.us/wq/tmdls/johnday.htm http://www.deq.state.or.us/wq/assessment/rpt2010/results.asp
Aquatic Macroinvertebrates	Hilsenhoff Biotic Index [HBI] and US Forest Service (USFS) community tolerance quotient		**John Day River**: The Hilsenhoff Biotic Index (HBI), which summarizes pollution tolerances of the macroinvertebrate taxa within the sample, ranged from 3.24 to 4.85. The mean HBI value (3.93) indicates "possible slight organic pollution" (Hilsenhoff 1987, 1988). HBI values generally increase (HBI ranges from 0.0 to 10.0) as nutrient enrichment increases. While HBI is most sensitive to organic pollution, it may also respond to sediment loading, low dissolved oxygen and elevated water temperatures. The US Forest Service (USFS) community tolerance quotient ranged from 68 to 79 and indicates that the John Day River's benthic macroinvertebrate community is somewhat impaired. Values of the USFS tolerance quotient range from 20 to just over100, with lower values indicating better water quality.

River Channel

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
River Channel Characteristics	Residual pool depth Percent stable banks Sinuosity (ratio) % pool tail fines <2 mm		**Bridge Creek**: Assessment of stream channel condition in Bridge Creek is primarily being conducted by NOAA Fisheries. Over the past 5 years, the park has worked extensively with NOAA Fisheries to restore riparian vegetation and stream channel function. Restoration efforts will create habitat more compatible with designated fish uses. Starting in 2013, the UCBN will assess river channel characteristics in Bridge Creek (Painted Hills Unit). **John Day River**: River/stream channel characteristics were evaluated along the John Day River (Sheep Rock Unit) in 2010; however, the data represents the first assessment of the resource. As a result, characterization of condition should be done with some caution. Initial assessment of the data does not indicate severe impairment yet future assessments will be compared to 2010 baseline data to more fully determine status and trend (Starkey 2011).

Resource Brief: Bridge Creek Restoration

In 2008, the park and National Oceanic and Atmospheric Administration – Fisheries began to restore instream and riparian habitat along Bridge Creek in the Painted Hills Unit to improve habitat for the population of threatened steelhead (*Oncorhynchus mykiss*). Bridge Creek is a straightened, incised stream that is disconnected from its floodplain and has lost most of its groundwater storage capacity and riparian vegetation. Stream temperatures are high in the summer due to both a lack of riparian cover and reduced flows from the loss of groundwater storage.

To restore floodplain connectivity and increase groundwater storage capacity, a series of instream structures are being installed to assist beaver (*Castor canadensis*) in the construction of stable dams that can trap sediment. From 2008 to 2011, approximately 3500 cottonwood and willow trees were planted along the creek to provide food and dam-building supplies for beaver, stabilize the creek bank, and shade the creek. Different tree planting and ungulate herbivory protection methods were tested (Hall et al. 2011). Monitoring efforts continue to determine the success of the project and the effect on steelhead populations.

Behind this four year-old tree planted in 2008, are newly planted trees protected by tree tubes.

Vegetation Communities

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Historically, native upland vegetation in the Monument was dominated by sagebrush steppe characterized by robust stands of large-stature bunchgrass species like bluebunch wheatgrass and shrubs like big sagebrush, with scattered savannah of mountain mahogany and western juniper in rocky slopes and draws where fires could not burn. The Monument still contains some excellent examples of this native Columbia Basin steppe, although much of the Monument's uplands have transitioned to exotic annual grasslands. Western juniper encroachment into steppe remains a long-term concern. Riparian communities along the John Day River and along Bridge Creek through Painted Hills were dominated by black cottonwood and willows, but today are also degraded by invasive weeds and channel incision. Some extensive beaver dam impoundments have created cattail-dominated wetlands along Bridge Creek. Restoration projects have also succeeded in re-establishing native willow and cottonwood communities along Bridge Creek in the Painted Hills and portions of the John Day River in the Sheep Rock Unit. Rock Creek flows through Picture Gorge and supports a unique riparian community dominated by white alder. Other communities present in the Monument include alkali flats of greasewood and saltbrush.

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Upland Steppe	Abundance (% cover) of bluebunch wheatgrass, big sagebrush, and other native perennial species		Bluebunch wheatgrass is a key foundation bunchgrass species in the Monument's upland communities. Past grazing and other land use activities greatly reduced the integrity of bunchgrass communities and allowed for exotic species to gain a competitive edge. Approximately 60% (2941 acres) of the monitored portion (i.e. 4896 acres of "sampling frame") of the Monument was estimated to contain no bluebunch wheatgrass cover during 2011 surveys. 90% contained no big sagebrush, another important native steppe shrub species. Overall, less than 50% of survey plots in each unit were ranked as being in good condition in 2011, based on composition and abundance of native perennial vegetation (Yeo and Rodhouse 2012).

	Western juniper encroachment (total acres)		Following a series of prescribed fires and mechanical thinning efforts from 1999 through 2007, juniper density has been significantly reduced in the Monument (Cansler and Kopper 2007, Drake and Kopper 2009). In 2009, approximately 168 acres of the uplands were mapped as closed-canopy (phase 3) woodland, 1080 acres as moderate density savannah (phase 2), and 1272 acres as scattered open savannah (phase 1) (Erixson et al. 2010). Juniper encroachment remains an ongoing management challenge. Control methods, including fire and thinning, present risks to upland steppe; the Monument is pursuing alternative strategies through its ecologically-based invasive plant management (EBIPM) planning.
Riparian Communities	Greenline wetland rating; cross-section wetland rating; percent effective ground cover; percent woody cover		**John Day River**: Wetland vegetation ratings and related measures from 2010 monitoring along the John Day River in Sheep Rock provide a baseline of riparian condition. These data represent the first assessment of the resource and, as a result, characterization of condition should be done with some caution. Initial assessment of the data does not indicate severe impairment. Future evaluation will be compared to 2010 baseline data to more fully determine status and trend relative to regional context (Starkey 2011, Coles-Ritchie et al. 2007). **Bridge Creek**: Monitoring will begin in 2013. Heavy infestations of invasive weeds occur in the riparian zone. Extensive native willow and cottonwood plantings have occurred from 2008 through 2011. **Rock Creek**: No monitoring is occurring but many white alder trees have died apparently as a result of drought stress and secondary insect infestation. Some regeneration of white alder is occurring.

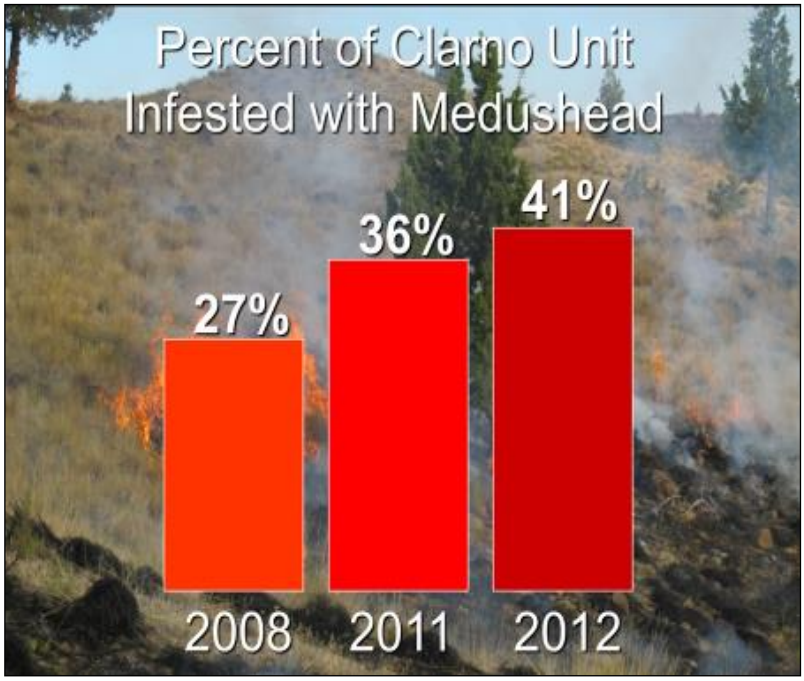
Terrestrial Invasive and Nuisance Species

web

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Invasive/Exotic Plants	Distribution and abundance of invasive annual grasses and invasive broad-leaved flowering plants (forbs)		Cheatgrass is ubiquitous in the Monument and medusahead is rapidly expanding. Medusahead has increased by 52% in Clarno since 2008. An incipient infestation of yellow-star thistle was found in Clarno in 2012. In the Foree area of the Sheep Rock Unit, Dalmatian toadflax has increased in frequency of occurrence from 7% in 2008 to 10% in 2011. Heavy infestations of Russian knapweed, yellow-star thistle and other forbs occur along Bridge Creek. Reed canarygrass cover ranged from 5–37% along greenline and cross-section monitoring surveys of the John Day River in 2010. (Starkey 2011, Yeo and Rodhouse 2012).

Resource Brief: Invasive Annual Grasses

The steppe uplands and the riparian communities of the Monument are heavily infested by aggressive non-native annual grasses and forbs. In the uplands, cheatgrass is ubiquitous, occurring in over 90% of the monitored portion (i.e. the "sampling frame"). Over 2000 acres (44%) are infested with cheatgrass at cover >25% (Yeo and Rodhouse 2012). Cheatgrass increased by 192% over 10 years following prescribed fire in three NPS fire effects monitoring plots associated with the Windy Point Burn in the Sheep Rock Unit (Drake and Kopper 2009). In 6 other fire effects monitoring plots in the unit, Drake and Kopper (2009) reported no change over 10 years, but cheatgrass density was already high at 74% cover prior to the burn. Of greater concern, another non-native invasive annual grass, medusahead, is spreading. In Clarno the species has increased in occurrence by 52% since 2008, and in 2012, following the 2011 wildfire, dense stands of medusahead with abundances >25% cover occurred in 21% (208 acres) of the monitored portion of Clarno, nearly twice the amount estimated in 2011 prior to the wildfire (Esposito et al. 2012). In the Painted Hills, a 2007 survey of invasive weeds reported 1,364 occurrences of 16 noxious weeds totaling approximately 232 infested acres (Beuchling 2008). Medusahead comprised 124 acres (53%) of these infestations. In 2011, medusahead occurred in 21% of monitoring plots and with >25% cover in 12% of plots (Yeo and Rodhouse 2012). Based on the 2011 monitoring survey, 124 acres of the monitored portion of the Unit (i.e. the "sampling frame") were estimated to be infested with medusahead. These two estimates cannot be compared for evidence of trend due to methodological differences but both are informative of current condition. In Sheep Rock, results from 2011 monitoring indicated that medusahead occurred in 13% of plots in the main area of Sheep Rock. There was greater infestation found east of the river in the main portion of Sheep Rock when compared with the west side, however. A total of 310 infested acres of the monitored portion were estimated for the east side, but only 38 acres on the west side. In the Foree area of the Sheep Rock unit, medusahead was much less common, occurring in only 1 of 165 plots in 2011 (Yeo and Rodhouse 2012). The Park is currently developing an ecologically-based invasive plant management (EBIPM) strategy to help address this challenge.



Medusahead is an aggressive Eurasian annual grass that is rapidly invading the Monument, and most aggressively in the Clarno Unit. Wildfires, such as the one that burned across Clarno in 2011, create opportunities for rapid medusahead expansion.

A pair of photographs from the southern boundary of the Clarno Unit from 1988 and 2012 showing the shift from sagebrush steppe to exotic annual grassland, following a series of wildfires in 1994, 1995, and 2011.

Aquatic Invasive and Nuisance Species

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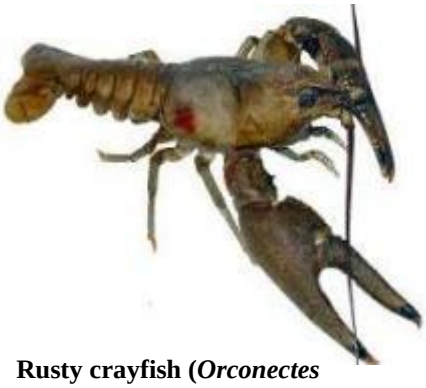
Aquatic and invasive nuisance species within the Monument are limited to the rusty crayfish (*Orconectes rusticus*) and several warm water fishes; however, a number of potential invasive species are noted within the Oregon Aquatic Nuisance Species Management Plan (Hanson and Sytsma 2001). One invasive species of particular concern due to its current proximity to the park and potential for introduction is the New Zealand mudsnail (*Potamopyrgus antipodarum*). Prevention of new introduced species is a high priority for all stakeholders within the watershed and ongoing water quality and stream channel monitoring will help detect new invaders.

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Rusty Crayfish	Distribution Abundance		The rusty crayfish (*Orconectes rusticus*) was found in the John Day River in 2005 (Olden et al. 2009), and since that time the known range has more than doubled to 145 river km along the mainstem John Day River (Sorenson et al. 2012). High densities of this species are known to have detrimental effects on native crayfish, aquatic plants, invertebrates and fishes.

Resource Brief: Rusty Crayfish

In 2005, rusty crayfish (*Orconectes rusticus*) were found in the John Day River (Olden et al. 2009). Since that time, the known range has more than doubled to 145 km along the mainstem John Day River (Sorenson et al. 2012). Rusty crayfish are native to the Ohio River basin and are thought to have been introduced by a local school following study of live specimens in the classroom. Rusty crayfish have been shown to displace native crayfish and alter food web dynamics after establishment. In locations sampled by Olden et al. 2009. native signal crayfish (*Pacifastacus leniusculus*) were generally not found in locations containing rusty crayfish. The status and trend of other potential aquatic invasive and nuisance species within the park is not known. The risk of introduction and establishment of other invasive species warrants moderate concern.



Rusty crayfish (*Orconectes rusticus*) photo courtesy of Jeff Gunderson, Minnesota Sea Grant.

Species of Management Concern

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Mammals	Species richness and abundance		An inventory in 2002–2003 documented 46 species of mammals in the Monument, over 90% of those expected to occur based on published range maps and historic information (Rodhouse et al. 2010). Three additional species have subsequently been confirmed for the monument. Bats are notably diverse and abundant and rare species such as the pallid bat use the Palisades and other important geologic features to raise pups during summer. No trend information is available. Some caution is warranted due to the extent of degraded vegetation habitat conditions.

Reptiles and Amphibians	Species richness and abundance		There are 12 species of reptiles and 5 species of frogs confirmed present in the Monument, including a unique disjunct population of the western whiptail (NPSpecies certified species lists). One frog species, the American bullfrog, is not native to the region and is considered a threat to native amphibians and some fishes. No trend information is available for reptiles and amphibians. Some caution is warranted due to the extent of degraded vegetation habitat conditions.
Birds	Species richness and abundance		There are 155 species of birds confirmed present in the Monument (NPSpecies). Five of these species are non-native, including several species of upland game birds and the European starling. No trend information is available. Some caution is warranted due to the extent of degraded vegetation habitat conditions.
Rare Plants	Species richness and abundance		A 2007 inventory by Beuchling (2008) documented 6 species of rare plants in the Painted Hills Unit, including 4 species endemic to the region. No trend information is available. Some caution is warranted due to the extent of degraded vegetation habitat conditions where these rare species are found.
Fishes	Species richness and abundance		There are 23 species of fishes confirmed present in the Monument (NPSpecies). Of these, 19 are considered native and 4 non-native species. No trend information is available. Some caution is warranted due to potential changes in species richness and abundance driven by elevated water temperature.
Steelhead Trout	Lower Mainstem John Day River Summer Steelhead population abundance and productivity		The lower mainstem tributaries to the John Day River showed no trend in natural-origin abundance 1996–2005 (NOAA Fisheries 2005). In addition, the 5-year review of Middle Columbia River Steelhead indicated that the "John Day River MPG [major population group] remain rated as maintained status" and that productivity estimates were generally lower than the status review in 2005 (above).

Resource Brief: Steelhead trout

Steelhead trout (*Oncorhynchus mykiss*) in Bridge Creek are part of the Middle Columbia River distinct population segment (DPS). This DPS is listed as threatened under the Endangered Species Act (ESA) (Final Listing Determination). Within this DPS the Lower Mainstem John Day River Summer Steelhead population is at "moderate risk based on current abundance and productivity" (Carmichael and Taylor 2010). Bridge creek is considered a major spawning area for the Lower Mainstem John Day River population (Carmichael and Taylor 2010). Limiting factors to the Bridge creek population include: impaired fish passage, degraded floodplain and channel structure, altered sediment routing, water quality (temperature), and altered hydrology.

Steelhead trout (*Oncorhynchus mykiss*) NOAA photo.

Monitoring of steelhead populations in the Lower Mainstem John Day River and Bridge Creek is largely done by Oregon Department of Fish and Wildlife (ODFW) and National Oceanic and Atmospheric Administration (NOAA) Fisheries. Numerous habitat monitoring projects and restoration efforts are underway within the watershed. JODA, in partnership with NOAA Fisheries, have played an important role in habitat restoration along the park's portion of Bridge Creek (Hall et al. 2011). This partnership has and will continue to positively influence stream habitat and the steelhead population in Bridge Creek.

Resource Brief: Bats

During the 2002–2003 inventory, it became apparent that bats are notably diverse and abundant in the Monument and surrounding area. One any given night during summer, as many as 14 species of bats can be found foraging and commuting along the John Day River and tributary canyons. Supplementing the inventory, a radio telemetry study provided information on summer roosting and maternity colonies. Large maternity colonies with several hundred individuals of the pallid bat, one of Oregon's largest and rarest species, were found in the Palisades, Goose Rock, and Carroll Rim cliff complexes, centerpiece geologic features of the Monument (Rodhouse and Wright 2010).

An even rarer species, the spotted bat, is a regular summer resident and likely roosts in the big cliff complexes as well (Rodhouse et al. 2005). Several other species of bats were also found roosting in the big cliff complexes, including western pipistrelles and western small-footed myotis, and even one male silver-haired bat who spent a week in July 2003 day roosting in the top of the Palisades (Rodhouse and Wright 2010). The Palisades, Goose Rock, and Carroll Rim are "bat hotels", hosting hundreds or possibly even thousands of bats from 5 or 6 species during summer.

In general, the condition assessment for bats and other vertebrate species in the monument is good with no imminent threats identified, although some caution is warranted due to the lack of trend information and because of the substantial changes occurring in upland and riparian habitats as a result of weed invasion. An emerging threat to bats, white-nose syndrome, is causing extremely high mortality in formerly common species like the little brown bat in the eastern and Midwestern US. This disease is expected to spread into the Pacific Northwest by 2030 and could cause rapid declines in regional bat populations that might affect those unique desert species living in the Monument (Maher et al. 2012).

Right: The spotted bat (*Euderma maculatum*) is rare in Oregon, but locally common in the Monument during summer, where it forages along the canyon bottoms and cliff complexes of the John Day Canyon and tributaries.

Resource Brief: Western Whiptail

Citizen scientist inspecting a western whiptail lizard (*Aspidoscelis tigris*) in the Foree area of Sheep Rock during a 2012 summer

A unique population of western whiptail lizards (*Aspidoscelis tigris*), disjunct from the core of the species range in the Great Basin, occurs in the south Foree area of Sheep Rock. During the 2002–2003 inventory, 18 individuals including both adults and juveniles were observed. Two voucher specimens from this isolated population were captured in 2002 and placed in the Oregon State University collection to be available for taxonomic work in morphological comparisons and molecular genetics studies. Despite repeated searches in seemingly suitable habitat in other sections of the Sheep Rock Unit (Blue Basin and the ash beds below Sheep Rock), and in the Clarno and Painted Hills Units, no other populations of western whiptails were located.

Like many other Great Basin lizards, the western whiptail requires open ground in the interspaces between shrubs and bunchgrasses to catch prey and avoid predators. Cheatgrass infestations which occupy these otherwise open habitats are thought to impede the movements of these lizards and increase their risk mortality risks. The increasing infestations of annual grasses in the Monument present a potential threat to the small whiptail population. In 2012 student citizen scientists from Oregon Museum of Science and Industry conducted a brief survey for whiptails in Foree. Several individuals were observed, confirming the population is still extant. A team of university researchers have recently initiated a study in the Foree area on the genetics and ecology of western whiptails and also on the side-blotched lizards, another unique species of the Great Basin that also ranges north into the John Day country and is common in Foree.

Resource Brief: Rare Plants

A 2007 inventory (Beuchling 2008) documented 6 species of rare plants in the Painted Hills Unit, including 4 species endemic to the region, with 1,125 occurrences located across an estimated area of 108 acres. Several species, including the locally endemic John Day chaenactis (*Chaenactis nevii*) associated with the showy spring blooms on the Painted Hills badlands that attract visitors to the park, were documented in over 100 occurrences in the Unit. The quality of these blooming events are very dependent on adequate winter and spring precipitation and are at risk under scenarios of increasingly frequent droughts. One species, Henderson's needlegrass (*Achnatherum hendersonii*), was found at only one location along the periphery of riparian vegetation along Bridge Creek. This single occurrence contained approximately 50 plants. The small population size, combined with threats from habitat degradation and weed management activities, puts *A. hendersonii* at risk of localized extirpation. Torrey's rush (*Juncus torreyi*) is a rare plant endemic to the area and associated with perennial streams and located on terraces adjacent to Bridge Creek. A total of 244 distinct occurrences were located with an average of 18 plants per occurrence. Another unique species, snowball cactus or hedgehog cactus (*Pediocactus nigrispinus*), is a locally endemic cactus found in upland areas within the Unit and was identified in 191 separate occurrences with an average number of 6 individuals per occurrence. Fuzzytongue penstemon (*Penstemon eriantherus* var. *argillosus*) grows on rocky substrates on ridges and within drainages within the Unit. Only 8 distinct occurrences were identified within the Unit and each contained a small number of plants. Yellowhair paintbrush (*Castilleja xanthotricha*) is another upland species endemic to the area. A total of 307 distinct occurrences were found with an average of 15 plants per occurrence. Competition from invasive plants is a potential risk to these species in the Monument, especially Henderson's needlegrass and fuzzytongue penstemon (Beuchling 2008).

***Left*: The Painted Hills Unit is home to 6 species of rare plants, including the hedgehog cactus shown here. *Right*: Golden cleome (bee plant) and John Day chaenactis a bright yellow wash to the Painted Hills badlands during spring. These wildflower blooms during wet springs are an important draw for visitors.**

Dark Night Sky

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The nighttime dark sky, or photic environment and its perception of it by humans (the lightscape) are important to many facets of park integrity. They are both a natural and a cultural resource and are critical aspects of scenery, visitor enjoyment, and wilderness character. Many wildlife species and ecological processes depend on natural darkness and a natural nighttime photic regime. John Day Fossil Beds has important ecological resources, and is situated in an extremely dark region of the United States; thus the park is considered to be among the darkest places in the Pacific Northwest. Further information is found in interim IRMA document Recommended Indicators of Night Sky Quality. The Hancock field station in the Clarno unit draws astronomers and night ski watchers such as the Rose City Astronomers from Portland, Oregon, who visit the Park several times each year.

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Anthropogenic Light	Anthropogenic Light Ratio (ALR)— the Average Anthropogenic Sky		Ground based observations are not yet available, though there is no local light interference. Modeled values of 0.08 ALR for the entire park fall within the Good condition. Due to the remote location of the park, the effects of

	Glow: Average Natural Sky Luminance		population growth in large but distant urban centers will have a minimal effect on night sky quality resulting in an unchanging trend.

Soundscape/Viewscape

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Solitude, quietness, remoteness, natural beauty	Solitude, quietness, remoteness, natural beauty		John Day Fossil Beds is located in sparsely-populated northeastern Oregon—a beautiful picturesque region surrounded by the Blue Mountains and interspersed with river valleys, steep canyons, and pastoral landscapes. Unique geologic formations in a variety of colors highlight each of the three park units where wildlife abounds. There is little anthropogenic noise; the peacefulness of the region is only broken by highway traffic and the occasional military aircraft overflights. Structures and some activities on private lands within the monument boundaries impact viewsheds.

2.2. Cultural Resources

Archeological Resources

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Knowledge	Percent of sites with known date ranges and analyzed material.		Since site testing has been limited, few sites have direct associative materials (like hearth wood or bone) that have been carbon dated. The greatest potential for identifying reasonable date ranges for sites is through analysis of diagnostic tool assemblages, like projectile points.
	Reliable understanding of the distribution and types of archaeology sites within the park unit.		Three documents summarize the archaeological resources at John Day: Archeology of JODA 1993 Inventory Data (Burtchard et al 1994), Archeology of JODA 1994 Inventory Data (Burtchard et al 1995), 2005–2006 Inventory (Burtchard et al draft). The presented information in these reports provides a summary of what is currently known about the human past at John Day and the surrounding area but the park is lacking a sufficient Research Design and Predictive Model that would ensure the interpretation of site types and distribution across the landscape reflects the time frames, activities and cultural adaptations of Native people throughout the Holocene.
Inventory	Percent of park adequately surveyed		Approximately 34% of the park has been surveyed. These surveys were led by Greg Burtchard in 1993–1994 and 2005–2006 and included both intensive surface surveys as well as some site testing. Currently, survey is conducted without guidance provided by a predictive model that

			identifies an adequate and reliable inventory sampling strategy.
	Percentage of survey data included in the Geographic Information System (GIS) meeting current cultural resource standards.		Paper and electronic survey and site data are maintained at JODA and MORA. This information is not yet fully archived. The percent of survey and site data documented in GIS is currently unknown. This is due in large part to the dispersed nature of the JODA data. MORA and PWRO have managed the archaeological data for JODA over the past decade. Thus, JODA does not have easy access to this information for planning, developing a law enforcement approach for protection or emergency response. Updating GIS data included in PMIS project for 2016/17.
Documentation	Percentage of known sites with adequate National Register documentation		ASMIS identifies 41 sites as potentially eligible for the National Register. 0% of documented sites have undergone the analysis for inclusion in the National Register (Determination of Eligibility Process). A National Register eligibility project is proposed for ONPS funding consideration (in PMIS) for FY18.
	Percentage of known sites with adequate site record documentation (Oregon State Site Forms and ASMIS)		99% of identified sites have been documented with both state and ASMIS site records. A few identified sites have not been documented but there are plans for this activity in the near future.
Physical Site Stability	Percentage of archeological resources in good condition identified through field analysis and documented in ASMIS		There are currently 140 sites recorded at John Day Fossil Beds. Of these, 26 sites (18%) have been assessed for the overall condition (physical stability + limited threats and documented damage). 20 (14%) are documented in good condition while 6 (4%) are noted as in fair condition. The other sites have not been assessed (ASMIS 2012 data), but a project to assess site conditions has been proposed in PMIS.

Cultural Anthropology

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Knowledge	Sufficient research exists to understand the relationship of affiliated Tribes to the resources, places and sites at John Day Fossil Beds National Monument.		Tribal affiliation studies have been completed but research focusing on traditional land use and species or places of Tribal significance have not been done. Research is proposed in PMIS to identify traditional land uses.
Inventory	Completeness of inventories.		No known inventory of the Monument has been done to identify landscapes or places important to contemporary Tribes.

Documentation	Tribal resource interests are documented in working files and archives.		Recent efforts in consultation and collaboration have begun to define management approaches of places and resources significant to Tribes.

Cultural Landscapes

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Knowledge	Sufficient research exists to understand the relationship of the park cultural landscapes to the historic contexts of the park.		The National Register Nomination for Cant Ranch Historic District was completed in 1984 and the Historic Resource Study was done in 2000. The Cultural Landscape Report defines the acceptable treatment of the Ranch and was finalized in 1996. A relatively new Cultural Landscape Inventory was completed in 2009. Together these documents consolidate current knowledge concerning the period of significance associated with the Cant Ranch.
	Adequate research exists to document and preserve the cultural landscape's physical attributes, biotic systems and uses when those uses contribute to historical significance.		The documents noted above required research and field assessments to identify the contributing features that convey the history of ranching in general and Cant Ranch in particular. Methods and strategies for the protection and preservation of the cultural landscape were also researched and guidance is provided in the Cultural Landscape Report. However, research on pollarded elm trees and appropriate tree selection for replacement is needed to meet the changing needs for park operations and stewardship of this cultural landscape.
Inventory	Percentage of landscapes eligible for the National Register with accurate, complete, and reliable Cultural Landscape Inventory (CLI) data.		To date, the Cant Ranch is the only identified cultural landscape at John Day Fossil Beds. The research, assessments, and documentation determined its eligibility and the information has been reviewed by landscape architects for completeness and reliability. 100% of known cultural landscapes at the park unit have current and valid data.
Documentation	Percentage of cultural landscapes with adequate National Register documentation.		100% of the Cant Ranch has been documented to meet the defined National Register standards.
	Research results are disseminated to park managers, planners, interpreters, and other NPS specialists and incorporated into appropriate park planning documents.		Research reports are housed in the park library (CLR, CLI) and in park archives. Cultural landscape preservation is addressed in the 2009 General Management Plan and 2004 Fire Management Plan.

Historic Orchard Preservation Project

Within the Cant Ranch Historic District is an orchard that was planted between 1890 and 1909. Of the projected original 43 fruit trees, only 14 remain. Some of these 100-year old trees are in poor condition due to age. To perpetuate the historic tree varieties and enlarge the orchard back to its original size, scions were cut from the original trees, grafted onto standard root stock, and planted in 2010. Each scion was given a matching number to its "parent" tree and mapped so that it can be located in the future.

Original "parent" pear tree.

Grafted "child" pear tree.

Historic Structures

web

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Knowledge	Percentage of historic structures evaluated using appropriate historical contexts.		All known historic structures have been evaluated for the Cant Ranch Historic District and are included on the List of Classified Structures. 100% of the historic structures at Cant Ranch Historic District have been evaluated.
	Documentary research and physical examination are sufficient to support treatment		The identified historic structures managed at John Day Fossil Beds are all listed on the LCS (2010) and FMSS assessments compliment determinations of physical and architectural integrity that are recorded. Guidance is also provided through the National Historic Preservation Briefs that discuss the Secretary of Interior's Standards for treatments and practices.
Inventory	Scope of historic structures in the park is understood and a determination has been made whether or not they are fundamental resources		The scope of the historic structures is well understood at John Day Fossil Beds since the Cant Ranch serves as the administrative offices and a visitor contact station.
Documentation	Percentage of historic structures with adequate National Register documentation.		100% of known historic structures have been assessed for inclusion in the National Register of Historic Places. The structures are contributing features to the Cant Ranch Cultural Landscape.

Physical and Architectural Integrity	Percentage of historic structures documented in good condition		All 19 structures on the LCS are assessed in good condition (LCS database—condition assessments completed in 2010).

Resource Brief: Cant Ranch

The Cant Ranch Historic District is located in the Sheep Rock Unit of John Day Fossil Beds National Monument and serves as the administrative and maintenance area as well as a secondary visitor services stop with interpretation of history and native cultures in the area. The Cant Ranch is an intact example of a successful, early 20th century ranch within the John Day River Valley and represents three historic periods: Floyd Officer Homestead era (1890–1909), Cant Sheep Ranch era (1910–1946), and the Cant Cattle Ranch era (1946–1975). While both the ranch complex and associated landscape features, like the agricultural fields, contain elements of all three historic periods, the majority of structures and features relate to the sheep ranch era and is the primary period of significance.

Newly built Cant ranch house circa 1920.

The land on which the Cant Ranch was built was first homesteaded by Floyd Officer, a member of one of the first Euro-American families to settle in the John Day River Valley. When the Cants first occupied the ranch, they expanded agricultural operations dramatically. As the Cant family grew the need for a larger house became evident. In 1917 the Cants began building a new home. The house was completed June 18, 1918 and in the fall of 1919 the Cants had a housewarming party that would mark the beginning of many memorable social gatherings at the house, gatherings that usually included members of the large Scottish community in the area. A number of small changes were made to the Ranch complex over the following decades with the expansion of the sheep ranching operation and the later transition to cattle ranching. The Cants left the ranch in 1975 when the National Park Service purchased the property for the use and management of the newly created John Day Fossil Beds National Monument.

The Ranch complex that is exhibited today includes the residential complex with its ornamental landscape, the working-ranch building complex, and the agricultural landscape. The residential complex consist of the ranch house and five outbuildings, ornamental trees and shrubs, stone columns, walkways, fences and two orchards. The working ranch complex consists of the barn, sheep-shearing shed, watchman's hut, and associated corrals. In addition to the structural complex, the ranch also includes a number of resources associated with agricultural operations consisting of four irrigated cultivated fields and irrigation ditches.

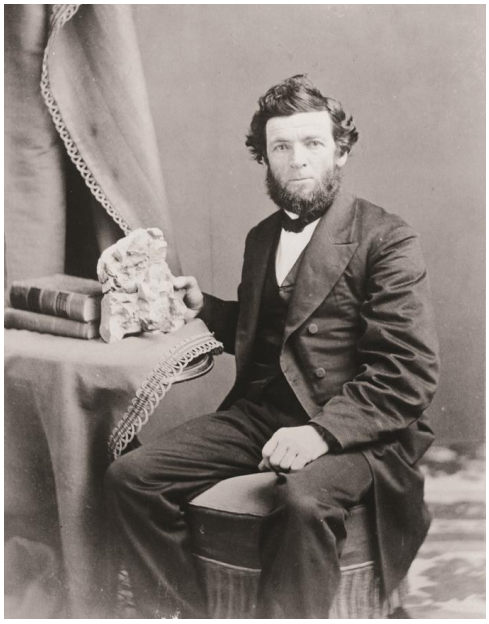
History

web

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Knowledge	Sufficient research is conducted to understand significance of site.		Baseline documents for park history (Administrative History and Historic Resource Study) have been completed.
	Sufficient research is conducted to convey the stories and provide context for park resources.		While there are a number of general history of paleontology books and articles available, the importance and role John Day Fossil Beds played in the early fossil prospecting and interpretations are fundamental to the establishment of John Day Fossil Beds National Monument.

Resource Brief: History of Paleontology in the John Day Basin

John Day Basin fossils were initially discovered at the time of the Civil War, by Union Cavalry soldiers travelling a proposed railroad route that passed through what are now known to be John Day Formation fossil localities. The soldiers carried some fossils along with them to Rev. Thomas Condon, a Congregationalist minister at Fort Dalles (now The Dalles, Oregon), who was known for his interest in geology and paleontology. Recognizing the significance of the fossil finds, Condon accompanied the soldiers the following year to survey the outcrops himself and sent fossils east to prominent paleontologists of the time, including Joseph Leidy, J.S. Newberry, and the famous rivals, Othniel Marsh and Edward Drinker Cope.



Rev. Thomas Condon. Photograph courtesy of the Oregon Historical Society, negative ORHI 55652.

Thomas Condon at the University of Oregon. Photograph courtesy of the University of Oregon Archives.

Published descriptions of the fossil material spread word of the significance of the John Day Basin deposits. A number of field expeditions, sponsored mainly by eastern institutions, were mounted to survey the area during the latter half of the 19th century. Despite harsh and rugged conditions, vast quantities of fossil material were collected and are now housed in the collections of American Museum of Natural History, Yale Peabody Museum, and Smithsonian Institution among others. This material served as the basis for publications naming many new species during the "golden age" of paleontology. Notable among these publications is what is commonly called "Cope's Bible" (Cope 1884), the classic treatment of the early John Day fossils.

In the late 1890s, University of California staff led by John C. Merriam began visiting the area. Merriam and his colleagues from California became the dominant collectors of the early 20th century, creating the first large collections from the John Day Basin in the western United States. Beginning with Merriam, who published the first detailed descriptions of the geologic units and stratigraphy of the John Day Basin, these workers also began to document their finds in a more systematic way.

Horses towing a specimen up an outcrop.

Work continued in the John Day Basin area throughout the 20th century as researchers like Merriam and Ralph W. Chaney learned more about the strata in the Clarno, John Day, Mascall, and Rattlesnake Formations. The work of these scientists and others contributed greatly to knowledge and broader appreciation of the importance of the paleontological resources of this area. New discoveries continued and radiometric dating techniques, developed in the 1960s, provided absolute dates for the abundant volcaniclastic sediments of the John Day Basin, which allowed for tremendous refinement of the stratigraphy of the area

and relative dating of fossils.

John C. Merriam and Loye Miller at Hatch's Gulch. Photo from Miller 1899.

Eustace Furlong, Chester Stock, John C. Merriam, and Ralph W. Chaney near Sheep Rock (visible in the background). Photo from Chaney 1948.

Following the recommendations of Merriam and other scientists, some critical areas in the John Day Basin were set aside as Oregon State Parks in recognition of their need for protection. The national importance of these parks was recognized by many; in 1975, these state park units received National Monument status and were transferred to the National Park Service for the creation of the three units of John Day Fossil Beds National Monument.

In 1984, Ted Fremd was hired to serve as the park's first paleontologist and he stayed at JODA for 25 years. Over that time, Ted developed the monument's paleontology program, conducted on-site research, and helped to greatly improve understanding of the region's fossil record and stratigraphy. The monument's paleontology and museum program is now housed in the Thomas Condon Paleontology center, with the monument's collections facilities and laboratory visible to the public, helping to educate visitors about ongoing work at the monument.

Right: Ted Fremd, JODA paleontologist for 25 years.

Museum Collections

web

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Inventory	The scope of museum collections in the park is understood. All resources have been surveyed to determine their appropriateness for inclusion in the		The Scope of Collection Statement was updated, approved and implemented in 2010. The JODA Museum Curator plans to update the document again in 2013. The SOCS clearly defines what materials are appropriate for inclusion in the museum collection. Both the assigned receiving officer and custodial officer are versed in museum practices and the standards of the disciplines relating to

	museum/archive collection.		most museum collections at JODA. They independently scrutinized all accessions, and collaborate in determining the relation of each to the mission of the monument and its preservation needs. Regional staff is consulted as needed.
	Percentage of objects accessioned and cataloged		Based on the 2012 Collections Management Report, 78% of the overall John Day Fossil Beds collection is fully accessioned and cataloged. Based on previous CMRs, this percentage is fairly constant since the rate of incoming specimens and artifacts is comparable to the rate of cataloging backlogged items. The greatest percentage (76%) of cataloging backlog is park archives while paleontology specimens are roughly 15%, and archaeology, biology, geology, and history items make up the remaining 9% of backlog.
Documentation	Accession and deaccession files are complete with all appropriate signatures and certifications.		All recent accession files are complete and signed. However, some older accession files do not meet current standards for documentation. The deficient files were created prior to the current standards and do generally meet the expectations of that era.
	Park has current and appropriate baseline documentation (Scope of Collections Statement, Collection Management Plan, Housekeeping Plans, IPM Plans, EOP, Security and Fire Safety Plans, Collection Storage Plan, etc.		JODA has a current SOCS (2010), Museum Management Plan (2008), and Museum EOP (2012). A Collection Condition Survey is needed and adequately reflected in PMIS. A park wide IPM plan that defines museum staff roles and a museum SOP for housekeeping are being followed. A Structural Fire Plan and Security and Fire Safety Plans are needed.
	Research results are disseminated to park managers, planners, interpreters, and other NPS specialists and incorporated into appropriate park planning documents.		Knowledge of monument resources has been incorporated into JODA planning documents. The museum curator has published three papers on JODA specimens in the last 3 years and these have been distributed to all staff.
Preservation and stability of Specimens, Artifacts & Objects	Museum items are appropriately housed and stored in a facility that meets or exceeds current NPS standards. The documented condition of the items are consistently reported as good /unchanged		The Thomas Condon Paleontology Center meets standards outlined in the Annual Checklist of Preservation and Protection, the NPS Museum Handbook and DO -24. The specimens, artifacts and objects that have been processed for storage are housed in materials designed to preserve the items. However, some items (primarily history and archaeology artifacts and objects) are stored in the attic at Cant Ranch, data recovered from relative humidity and temperature loggers as well as inspections for pests show that this area is unsuitable for some museum storage.

Resource Brief: Fossil Preparation Laboratory and Museum Collections

The Thomas Condon Paleontology Center (TCPC), which opened to the public in 2005, hosts the monument's visitor center and museum facilities. The TCPC provides the infrastructure necessary for a professional paleontology program, including a state-of-the-art fossil preparation laboratory, accessions storage, and museum collections. These facilities allow visitors to observe scientists at

work, both in doing preparation in the lab and research in the collections. Visitors can directly observe the monument's fossil preparator using a variety of tools (ex. air scribe, air abrasive, sewing needle) to remove rock matrix from around fossil specimens and a variety of consolidants (glues) to stabilize specimens. This delicate and time consuming process is vital for the conservation of fossils and is necessary for research on specimens in the museum collections.

The museum collection at John Day Fossil Beds National Monument includes over 70,000 objects, with the majority representing paleontological specimens. Unlike most other collections from the region, the specimens housed at JODA are accompanied by detailed locality and stratigraphic data, providing a better context for the age of species and how the region's faunas and floras changed through time. Among the highlights of the collections are a diverse sample of fossil dogs (Canidae) and saber-tooths (Nimravidae). Many of these specimens have been published, and components of the JODA collection have played an important role in our understanding of the evolution of these families. The collection also currently houses one type specimen (see New Species Resource Brief), and ongoing research by NPS paleontologists will be designating 8 more type specimens from the JODA collection.

View into the Fossil Preparation Laboratory at the Thomas Condon Paleontology Center.

Museum Collections Room at the Thomas Condon Paleontology Center.

JODA 1312 skull and arm of a sabertooth, *Nimravus brachyops*

JODA 3366 skull of an early dog, *Mesocyon coryphaeus*

2.3. Visitor Experience

Visitor Numbers and Visitor Satisfaction

web

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Number of Visitors	Number of visitors per year		The total of 148,152 visitors to the park in 2012 is higher than that of 2010 (135,151) and 2011 (148,002) and also higher than the 10-year average of 123,614 visitors for 2002–2011.
Visitor Satisfaction	Percent of visitors who were satisfied with their visit		Based on the standard visitor satisfaction survey conducted each year, the percentage of visitors satisfied in FY12 was 100.0%, which is higher than the average for the previous five years (97.8%) and ten years (95.1%). Source: 2012 Visitor Survey Card Data Report

Resource Brief: Visitor Experience at the Thomas Condon Paleontology Center

In 2005, the state of the art Thomas Condon Paleontology Center opened to the public. Named after the prominent 19th-century Oregon scientist who first recognized the significance of the fossil beds and did the first scientific collection and study of specimens, the 11,000 square foot center greatly improved the monument's ability to serve both the public and the scientific community. Performing a dual purpose, the Thomas Condon Paleontology Center is a National Park Service research facility dedicated to the study and public understanding of the paleontological resources of the John Day region.

The world-class museum displays over 500 fossil specimens chosen to represent the primary significance of the John Day Fossil Beds. Scientifically accurate murals visually represent the environments in which these animals lived and soundtracks provide an audible representation of these extinct species. These elements add emotional connections and a simulated natural ambience to the visitor experience. Viewing windows into the laboratory and collections area allow the public to watch scientists actively studying fossils. A webcam is connected to the lab microscope to closely show fossils being prepared for study. A short film provides another way for visitors to connect with the monument's significance. A small bookstore area provides educational products for sale to facilitate visitor understanding of the paleontological resources.

The entire facility is "green", with over 98% of the electricity coming from wind generators along the Columbia River. The remaining power comes from a photo voltaic system on the roof which produces between 500 and 1000 kilowatts of electricity each month. The sophisticated heating, ventilation and air conditioning (HVAC) system provides separate climate control zones for protection of museum collections and a comfortable atmosphere for visitors and staff. The HVAC system also takes advantage of constant-temperature water from the park's spring by running the water through a heat exchanger to significantly lower the heating and cooling costs. The Thomas Condon Visitor Center is carbon-neutral in its energy effect on the global environment.

The two prominent materials used on the building's exterior are regionally sourced wood and stone. The wood is red cedar from

southern Oregon and British Columbia forests milled in Eugene, Oregon. The hand cut, gray lava stone is basalt quarried in Camas, Washington, within the Columbia River Gorge. The quarry has basalt that is part of the same widespread Columbia Flood Basalts that can be seen cresting the ridgelines outside the center. These flood basalts cover over 60,000 square miles of Oregon and Washington, with the oldest layers being approximately 16 million years old.

Interpretive and Education Programs – Talks, Tours, and Special Events

web

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Education Programs	Number and quality of programs, and number of participants		Seven types of resource-based education programs tied to State K–12 Content Standards offer educators effective on-site curriculum. An average of 50 programs a year is presented to an average of 1,259 students. Traveling education kits are sent out on average 58 times a year reaching an average of 6,616 students. University classes visit the TCPC each year for formal tours and field trips.
Ranger Programs	Number and quality of programs and attendance		Through FY12, traditional ranger led interpretive programs increased in number and quality due to increased seasonal staffing and Interpretive Development Program training for both permanent and seasonal employees.
Junior Ranger Programs	Number of programs and attendance		A new Junior Ranger booklet was designed in 2012 with activities that encourage visitors to explore all three units of the monument. In 2011, 262 Junior Ranger badges were awarded, increasing to 345 in 2012.
Special Events	Variety and longevity of events, community involvement		Rangers conduct photo tours into sensitive areas, evening photography special events, National Fossil Day events, and they work with Camp Hancock, managed by the Oregon Museum of Science and Industry. The park paleontologist presents special talks to university and other student groups through the year outside the park.

Interpretive Media – Brochures, Exhibits, Signs, and Website

web

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Wayside Signs	Condition and currency of signs		Due to the dispersed nature of the monument, interpretive signage is critical to conveying resource messages. A wayside assessment in 2012 documented 151 signs, most in deteriorating condition and created prior to NPS design standards and ADA criteria. The park is planning content replacement and pursuing funding to address these needs.
Park Directional Signs (on and off-site)	Usefulness, quantity, and placement		The park is assessing directional signs in and near the monument and has initiated collaboration with the Oregon Department of Transportation to better serve visitors.

Exhibits	Thomas Condon Paleontology Center/Museum		The exhibits in the gallery are in excellent condition, opened to the public in 2005. Seven large murals featuring extinct animals cover the walls and a multitrack audio program replicates animal sounds. A large plate glass window allows visitors to watch scientists at work in a state of the art laboratory.
	Cant Ranch House		The first floor of the Cant Ranch House contains exhibits that explore major chapters of the cultural history of the John Day region. The exhibits were opened to the public in 2005 and are in excellent condition.
Print Media	Accuracy and availability of primary park publications		Outdated print media has been removed or revised. There are six new print publications available. Several more documents are being developed for publication. The park unigrid will only need moderate modifications when reprinted in 2014.
Audio-visual Media	Orientation Films		The orientation film was finished in 2001. It has an excellent script, message, and theme that is relevant today but is technically limited and shot in standard definition, which is no longer the standard and does not convey the grandeur of the landscape. The park is pursuing funds for a film that will include new scientific discoveries, computer animation, as well as meet ADA specifications.
	Other AV material		The monument has an education kit that includes a DVD with several videos showing various aspects of paleontology. One of the films about fossil horses has become outdated due to recent discoveries. A touchscreen exhibit on paleontology was removed from the visitor center in 2012 when it became unserviceable. Due to the popularity of the interactive exhibit, the feasibility for a new version of this exhibit is being discussed.
Websites	Currency and scope of website; number of website visitors		Updating and expanding the website is a priority, with most attention paid to the nature and science sections, particularly paleontology. Reliable usage numbers have only been available since 2011 but web use appears to be increasing and staff is responding to public requests for new specific content such as spring wildflower reports. A major addition to the History and Culture section was completed in 2013.
	Social media: Facebook updates and "likes," overall activity		Our Facebook page has been steadily increasing in popularity since it was created in 2010. In May 2013 the site had more than 2000 followers (“Likes”). The page is updated about 4–5 times per week. The number of views can vary widely, but about 700–1000 views per post is fairly common. The most popular post to date was viewed by almost 11,000 people. We also have about 1,500 followers on Twitter, which primarily retweets our Facebook posts. There are 17 JODA YouTube videos on the park channel, with a total of several thousand views. http://www.nps.gov/joda/photosmultimedia/social-media.htm

Sense of Place

web

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Historical Setting	Historical setting		The Cant Ranch Historic District preserves the 1890 to 1975 sheep and cattle ranching era in the John Day River Valley. Historic buildings, corrals, and farm implements are set within a beautiful expanse of green, fertile land. Gazing out from the ranch house porch or from the shade of a 100-year old fruit tree, one can view the pastoral setting and feel the sense of a busy, hard-working ranch. The combination of the well preserved ranch and surrounding landscape defines this historical place. Outside the historic ranch, the rugged and exposed landscapes give visitors a sense of the vast paleohistory of life on earth and a connection to the story of early scientific expeditions to the area.

Accessibility

web

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Mobility	ADA compliance		The Thomas Condon Visitor Center met ADA standards in 2004 when it was built, but it lacks powered entrance doors and adequate wheelchair accessibility at the information desk. A PMIS project has been submitted to replace the doors. A formal assessment is needed to evaluate park trails for accessibility standards.
Visual and Auditory Accommodation	ADA compliance		The park orientation film and podcasts lack audio description; podcasts also are not open captioned. A large print guide to the fossil gallery identifies specimens, but does not explain the exhibits or concepts covered on wall exhibits.
Multi-lingual resources	Audio and print materials in multiple languages		All foreign language brochures were discarded in 2013 because they were outdated and there was some uncertainty about content. The park website is in English. The park is pursuing new translations.
	Bi-lingual staff		Two of the three permanent interpreters and several other park staff speak a second language, including Spanish and German.

Safety

web

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Visitor Safety	Recordable incidents		Safety of visitors is a park priority. No recordable visitor incidents have occurred in the past several years. The park works to quickly identify and mitigate all potential hazards.
Employee Safety and Training	Active safety program		The park's safety committee is active, meeting once a month. More than a dozen new Job Hazard Analyses (JHAs) have been prepared in the last year. An Operational Leadership course has been scheduled for 2013.

Partnerships

web

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale Comments
Volunteers	Number of hours contributed		The volunteer program has grown significantly in the past several years. Volunteer hours increased from 1344 in FY08 to 5764 in FY12, including GeoCorps interns and Youth Conservation Corps (YCC). The park resumed the Artist- in-Residence program in 2012. http://inside.nps.gov/volunteers/reports.cfm?tab=rpts
Partnerships	Cooperating Association		Discover Your Northwest (DYNW) supports the monument through production of print products, bookstore outlet which is directly managed by NPS staff. Improved collaboration on new products increased sales in 2012 by 25%. In a new program, DYNW is auctioning artwork donated by Artists-In-Residence. DYNW employees a part-time clerk to assist at the visitor center.
	Number of official and unofficial partnerships		John Day Fossil Beds cultivates numerous important formal and informal partnerships to accomplish park goals. Most notably, the park's paleontology program provides professional cooperative management of resources on BLM and USFS lands in the John Day region, including curating fossils collected on other agency lands within the JODA collections; in exchange, BLM provides archeological expertise for the park. Under another significant formal partnership, the park shares a law enforcement ranger with BLM saving the NPS half of a ranger salary. Exotic plant management and fire management are accomplished in cooperation with BLM, USFS and others Oregon Museum of Science and Industry's Hancock Field Station is located on a private parcel within the

			Clarno unit. NPS staff work closely with OMSI staff toward common research and educational purposes, including providing drinking water from the park's well. A General Agreement authorizes certain OMSI activities on monument lands.

Resource Brief: Partnerships

John Day Fossil Beds National Monument is located in a remote area of Eastern Oregon. In order to accomplish core visitor safety and resource management activities, the park works with multiple local, federal and private partners. The park's relationship with the Bureau of Land Management is particularly important.

Through an Interagency Agreement initially signed in 2003 under authority of the Economy Act, visitor and resource protection functions within John Day Fossil Beds National Monument are accomplished by a shared Field Staff Law Enforcement Ranger position. Each agency funds one-half of the position, with vehicle, office and required occupancy housing split between the two agencies. The agreement was recently renewed under authority of the National Service First Agreement and will be in effect through 2018. Prior to this agreement, park management had difficulty recruiting and retaining NPS law enforcement rangers because of the remote location and relatively quiet law enforcement workload; the position tended to be viewed as a "starter position" with high turnover. This innovative shared law enforcement position may be unique within the NPS.

Another Interagency Agreement with the BLM provides for shared management of paleontological and archeological resources. Professional NPS paleontologists at John Day Fossil Beds National Monument conduct field management of fossil resources on both NPS and surrounding BLM lands. Fossil specimens collected from BLM lands are curated in the NPS museum collection. This arrangement allows for better management and integrated scientific study of the nationally and globally important fossil record in the John Day region. As part of this agreement, BLM archeologists provide technical assistance for NPS archeology needs within the national monument. This innovative approach allows both agencies to manage resources in a more effective and efficient manner.

Resource Brief: Education Programs

Education programs for school groups and visitors to John Day Fossil Beds National Monument are very successful due to the high quality and effectiveness of hands-on activities and outreach education kits.

Current on-site resource based programs for grade school through university level students cover a wide variety of topics and formats tied to Oregon Science K–12 Content Standards. They present effective and popular activities that engage students in learning about evolutionary change represented at John Day Fossil Beds National Monument. Use of resource-based curriculum promotes scientific inquiry, use of evidence, critical thinking, making connections, and communications. Park staff conducts approximately 50 education programs annually serving almost 1,300 students.

Schools continue to struggle with budget issues for field trip transportation. As a result, formal field trips to the John Day Fossil Beds have declined over the past several years. Since 2009, there has been an almost 50% increase in demand for education kits sent to schools all over the US and abroad. Horse and general fossil kits are sent out approximately 60 times each year, reaching almost 8,000 students.

2.4. Park Infrastructure

Overall Facility Condition Index

web

The National Park Service uses a facility condition index (FCI) to indicate the condition of its facilities and infrastructure. FCI is the cost of repairing an asset, such as a building, road, trail, or water system, divided by the cost of replacing it. The lower the FCI number, the better the condition of the asset. The condition of the buildings and other infrastructure assets at each park is determined

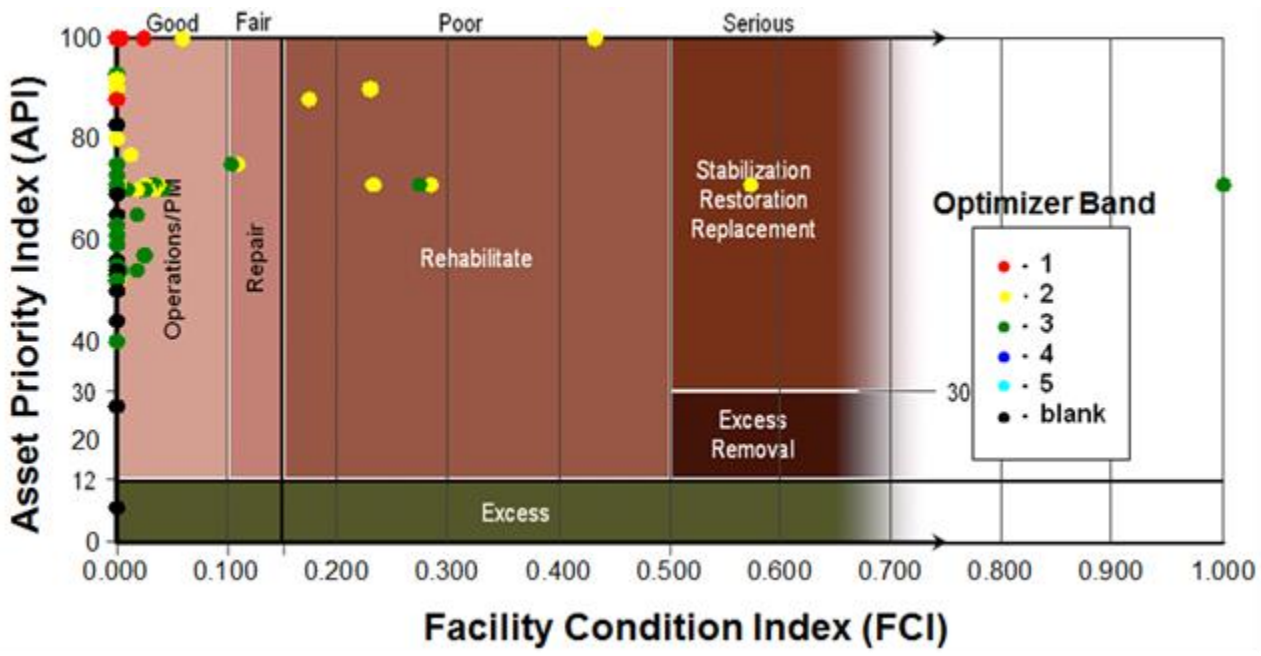
by regular facility inspections, or "condition assessments", including daily informal inspections and formal yearly inspections. Deficiencies identified from these assessments are documented in the NPS Facility Management Software System and the cost for each repair determined. Repairs that cannot be completed within the year count against the condition of a structure. The total cost of these deferred repairs divided by the total cost to replace the structure results in the FCI, with values between 0 and 1 (the lower the decimal number, the better the condition). The FCI is assigned a condition category of Good, Fair, Poor, or Serious based on industry and NPS standards. Deferred maintenance projects that require additional funding are identified based on FCI. Planned preventive maintenance on critical components occurs during the year, using a park's base budget. For additional information about how park managers use information about the condition of facilities and infrastructure to make decisions about the efficient use of funding for maintenance and restoration activities at the park, **Click Here**.

Asset Category	Number of Assets 2008 / 2012	FCI 2008 / 2012	Condition Status/Trend	Rationale
Buildings	38 / 39	0.010 / 0.006		The park has constructed and/or rehabilitated many park structures in the past 10 years including the Thomas Condon Visitor Center and the Historic Cant Ranch House. The ongoing facility operations and cyclic maintenance programs will continue to prolong the overall life of these buildings. Solar and energy efficient construction and improvements in Housing Units as well as in other park buildings assist the park in reducing their carbon foot print. A maintenance shop/visitor contact station is planned for the Clarno Unit.
Trails	16 / 17	0.131 / 0.026		25 miles of developed hiking trails are maintained at the park. Over the last five years the park has removed 8 miles of unauthorized trails that contributed to erosion within the Clarno Unit. The park is planning to formalize several more miles of trail within the Clarno Unit to enhance future visitor hiking opportunities.
Waste Water Systems	7 / 7	0.274 / 0.000		Waste water systems are annually assessed and maintained according to a service schedule. Employees are trained to safely inspect the systems and provide maintenance as needed.
Water Systems	7 / 7	0.058 / 0.011		The park's seven water systems are well operated and maintained. The park has several trained utility operators who are dedicated to monitoring and providing safe drinking water to the public.
Unpaved Roads, and Parking Areas	30 / 31	0.028 / 0.100		Most of the unpaved roads, pullouts, and overlooks are in good condition and will continue to be maintained through cyclic maintenance funding. The Camp Hancock Road in the Clarno Unit is in poor condition; a funding request to improve it has been included in the overall Clarno Unit plans.
Paved Roads, and Parking Areas	12 / 12	0.117 / 0.131		Paved roads are generally in good condition with the exception of a few parking areas that have deferred maintenance.

Communications – Radio, Internet Systems, Telephone Systems	1 / 3	0.000 / 0.000		The physical conditions of the park's communication systems are good. However, as technologies continue to advance, the park is looking to improve radio, telephone, and internet systems for staff and visitor use.
Historic Landscapes – corrals and gates, irrigation ditches	10 / 10	0.029 / 0.000		Preservation treatment on the Cant Ranch historic landscape occurs annually to keep the features in good condition. Within the past five years, treatments have preserved the corrals, irrigation ditches, agricultural fields, ornamental trees, and orchard.
All Others	9 / 14	0.006 / 0.011		The All Others category includes boundary fences, picnic areas, landscaping around buildings, fuel storage tanks, and the park's photovoltaic power systems. The Yellow condition evaluation and degrading trend is a result of deferred maintenance on the boundary fence for the Sheep Rock unit. Other assets in this category are in good condition.

Another important facilities management planning tool used at a park is the Asset Priority Index (API). It identifies the importance of the various infrastructure components at a park. The API is determined using five criteria, and is calculated out of 100 possible points. The criteria are weighted based on their importance to NPS core priorities. They are distinct to ensure that each aspect of the asset is measured independently. As a result, most assets will not rate high in every category.

The scatterplot (below) for 2012 shows the FCI for each of the infrastructure asset types at John Day Fossil Beds National Monument. It plots buildings, trails, roads, parking areas, and other infrastructure assets against its Asset Priority Index (API). Park managers and maintenance staff use the FCI and API data for each park asset to focus on preventive maintenance and repairs to facilities that are most critical to their parks.



Optimizer bands—the color of the dots in the scatterplot—are assigned to each facility or asset as a tool to prioritize use of limited funding to maintain park infrastructure. Optimizer Band 1 includes those assets with the highest maintenance priorities. These assets are most important to the park—often linked to the park's enabling legislation or have high visitor use—and usually are in the best condition. Band 1 assets receive the highest percentage of base funding for routine operations, preventive maintenance, and recurring maintenance to keep them in good condition with proactive, planned maintenance. These assets are important to park operations, but because fewer park base dollars are available after maintaining Band 1 assets, Band 2 assets receive a lesser percentage of remaining

funds. Assets in the lower priority bands may only receive preventive maintenance for the most critical components or may require special projects or partner funding to maintain them. For additional information about optimizer bands and how park managers use them to make decisions about the efficient use of funding for maintenance and restoration activities at the park, **Click Here**.

Energy Consumption

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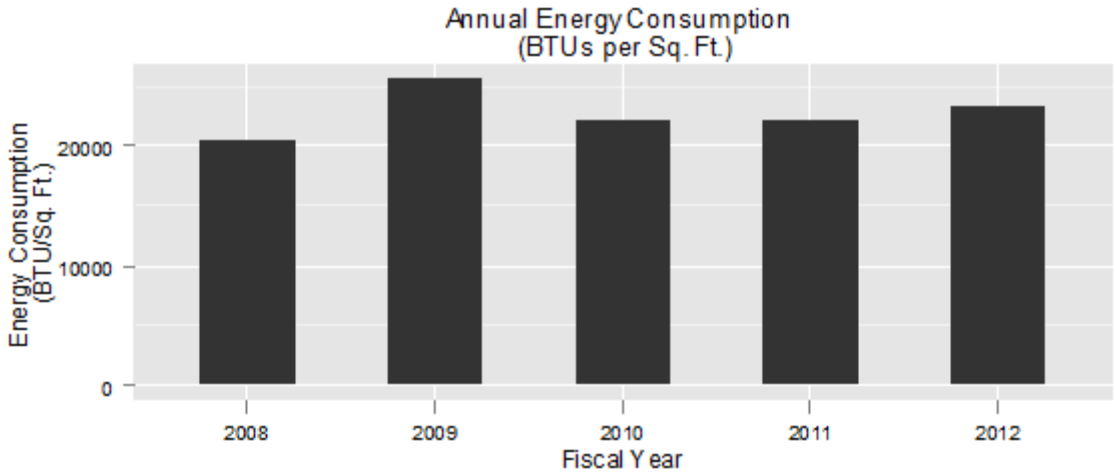
The production of energy to heat, cool, and illuminate buildings and to operate water utility systems is one of the largest contributors to greenhouse gas emissions in the United States. The National Park Service is committed to improving facility energy performance and increasing its reliance on renewable energy sources. The National Park Service has a goal to reduce Servicewide building energy consumption per square foot of building space by 35% by 2016 from the baseline set in 2003 (NPS Green Parks Plan 2012).

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Energy Consumption	BTUs per gross square footage of buildings		Energy usage (BTUs per gross square footage of buildings) at the park in 2012 was 3.3 % higher than the average for the previous 4 years (Source: NPS Annual Energy Report).



Park Carbon Footprint

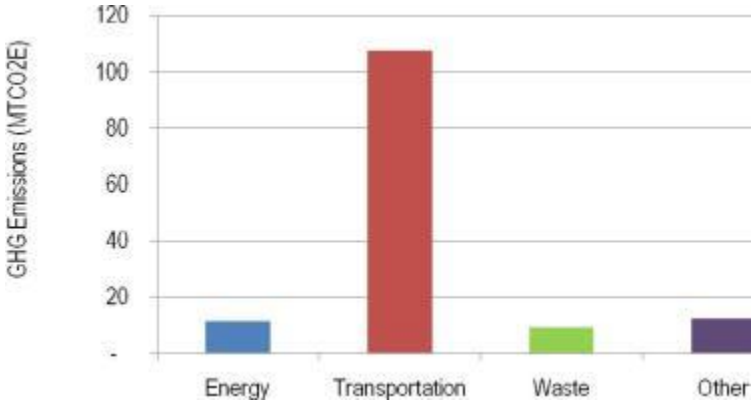
web

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Greenhouse Gas Emissions	Metric tons of CO_2 equivalent ($MTCO_2E$)		John Day Fossil Beds NM belongs to a network of parks nationwide that are putting climate friendly behavior at the forefront of sustainability planning. The Park's climate action plan describes commitments to reduce emissions of greenhouse gases by 2016. Combined emissions from park operations and visitor activities within the Park during the 2007 baseline year were roughly equivalent to the annual emissions from the energy use of 12 households.

Resource Brief: Park Carbon Footprint

Carbon Footprint is measured by greenhouse gas (GHG) emissions resulting from the combustion of fossil fuels for transportation and energy (e.g., boilers, electricity generation), the decomposition of waste and other organic matter, and the volatilization or release of gases from various other sources (e.g., fertilizers and refrigerants). A decreasing carbon footprint indicates the park is striving to reduce its impact on the climate change through mitigation efforts. In 2007, the baseline GHG emissions set within John Day Fossil Beds National Monument totaled 141 metric tons of carbon dioxide equivalent (MTCO2E). This includes emissions from park

operations and visitor activities, including vehicle use, within the park. To put this in perspective, a typical U.S. single family home produces approximately 12 MTCO2 per year (U.S. EPA 2011). Thus, the emissions from park operations are roughly equivalent to the emissions from the energy use of 12 households each year. The largest emission sector for John Day Fossil Beds National Monument is transportation, totaling 108 MTCO2E in 2007.



John Day Fossil Beds has committed to several GHG emissions reduction goals in various categories, including:

- Energy Use Management: Reduce GHG emissions to 20 percent below 2007 levels by 2016
- Transportation Management: Reduce park operations transportation emissions to 35 percent below 2007 levels by 2016
- Waste Management: Reduce park operations waste emissions to 15 percent below 2007 levels by 2016 through waste diversion and reduction

To learn more about what John Day Fossil Beds National Monument is doing to reduce their emissions and educate others, click on their Climate Action Plan, which includes their inventory and identifies the strategies the park intends to implement in order to achieve these reductions.

Resource Brief: John Day Fossil Beds completes net-zero energy building

The Painted Hills house is a solar-powered employee home at the John Day Fossil Beds National Monument and is the first net-zero home in the National Park Service. It was designed and built with the goal to generate as much or more energy than it uses. The house generates energy through photovoltaic solar panel system, solar hot water heater, and produces enough energy to cover the residents use and to charge the ranger's government-owned electric vehicle.

The house is a 900-square-foot structure constructed on a heavily insulated concrete slab. It utilizes non-standard construction using structural insulated panels (SIPs) for both walls and roof to provide a very air tight building envelope with extremely low heat transfer. SIP construction eliminates thermal bridging in the exterior walls caused by the wall studs used in standard construction. Because the SIP panels are manufactured to order with all window and door openings pre-cut, there is very little construction waste. The house incorporates several other innovative energy-saving measures including:

- A heat recovery ventilation (HRV) system that uses exhaust air to heat or cool incoming fresh air to avoid losing energy while providing a constant supply of fresh air. This HRV can also be used as an economizer, utilizing diurnal temperature differences to capture and store heat or cool air in the early morning or late afternoon, depending upon ambient air temperatures. These wide swings of temperature are common in dry environments, but are rarely used to conserve energy in a residential structure
- Better than Energy Star appliances throughout the house
- A mini-split, high efficiency heat pump to provide what little heating and cooling that is required
- Triple glazed, argon gas-filled windows
- Double- and triple-sealed doors to eliminate air leakage.
- A grid-tied photovoltaic system and drain-down solar hot water panels on a south-facing roof, optimally angled for solar gain

The house achieved an Emerald Rating, the highest possible, from the National Association of Home Builders through its National Green Building Standards program. The constructed house has a home energy rating (HERS) of -43. This compares to a rating of +100 for an average home constructed to code today, and a rating of +80 for an Energy Star-rated home constructed in central Oregon. What this extraordinary HERS rating means is that the home generates 43% more energy than it consumes. In practice, this house produces an excess of more than 5,000 kwh per year, resulting in a credit of almost $200 to the park's power bill every year!

Chapter 3. Summary of Key Stewardship Activities and Accomplishments

The list below provides examples of stewardship activities and accomplishments by park staff and partners to maintain or improve the condition of priority park resources and values for this and future generations:

Partnerships

Partnerships with other agencies, tribal organizations, and educational institutions are integral to park management goals. Some examples of successful, ongoing partnerships include:

- Cooperative management of paleo resources with Bureau of Land Management and U.S. Forest Service.
- Cooperative law enforcement efforts with BLM, Oregon State Police, local sheriff offices.
- Invasive plant management and strategic planning through collaboration with North Cascades Exotic Plant Management Team, Grant County Cooperative Weed Management Area, Deschutes Native Plant Seed Bank, and USDA Agricultural Research Services (Ecologically-Based Invasive Plant Management planning).
- Fire management collaboration with BLM and NPS Fire Effects monitoring program (North Cascades team).
- Oregon Museum of Science and Industry – Hancock Field Station—this 10 acre parcel of private land within the Clarno unit is used for research and educational purposes. A General Agreement authorizes certain OMSI activities on monument lands.
- Tribal partnerships, including Pine Creek Conservation Area.
- Summer internship and guest scientist programs with Oregon Youth Conservation Corps, Northwest Youth Corps, Youth Conservation Corps, Student Conservation Association, and GeoCorp program.
- Supporting local community development with Oregon Paleo Lands Institute.

Natural Resources

- Paleontology: Intensive surveys within the Sheep Rock unit have covered more than 75% of the badlands exposures, and helped to preserve thousands of fossil specimens. New fossil species are regularly discovered in all three park units, and on adjacent BLM lands, by park paleontologists.
- Two recently published finds includes the earliest modern beaver in North America and the world's oldest fisher; press coverage of these finds created wide-spread general interest.
- The park hosted two recent field conferences—Society of Vertebrate Paleontology, and Geological Society of America.
- Recent geologic research has helped define stratigraphy of rock units in the Park, and combined with new radiometric dates allows more precise dating of fossils (usually within 1 million years).
- Park working with NOAA fisheries to increase threatened steelhead populations by restoring riparian vegetation and improving fish passage in Bridge Creek at the Painted Hills Unit.
- Collaboration with UCBN Inventory and Monitoring program for long-term monitoring and natural resource management.
    - Radio telemetry study with bat species to determine location of roosts
    - Vertebrate inventories (mammals, birds, reptiles, amphibians)
    - Butterfly and moth inventories
    - Upland and riparian vegetation monitoring
    - Water quality and stream channel monitoring
- Vegetation management program: Annually control invasive plant species through herbicide application (with an average of over 100 acres treated each year), manual pulling, and biological control agents (stem-boring weevil for Dalmatian toadflax).
- Restoration of abandoned agricultural fields to native grass communities. Initiated ecologically-based invasive plant management (EBIPM) in partnership with USDA-ARS to improve weed management effectiveness and sustainability of the program.

Cultural Resources

- Completion of the cultural landscape inventory for the Cant Ranch Historic District.
- Updated National Register of Historic Places nomination for the Cant Ranch Historic District.
- Preservation of historic fruit tree varieties in the Cant Ranch orchard by grafting scions to period root stock.
- Preservation treatment of the Cant Ranch outbuildings and landscape.
- Increased knowledge of archeology through archeological surveys and testing projects including the discovery of pit houses occupied by indigenous tribes.

Visitor Experience

- Thomas Condon Paleontology Center is a world class facility for educating the public about the region's fossil history and the on-going story of scientific inquiry.

- Social media—Significant updates to the website have substantially improved public access to information about the monument. The park has established a popular Facebook page, YouTube channel, and Twitter account to increase relevancy for virtual visitors.
- Major revisions to publications are ongoing. Six publications have already been revised and are now available, with many more on the way.
- Created a new Jr. Ranger book in 2012 that focuses on the full range of primary and secondary park resources.
- The popular horse kit traveling educational trunks are sent to schools as far away as Guam.
- Eight new wayside exhibits were developed and installed at two popular park locations, the Clarno Picnic Area and the Island in Time trail at Blue Basin.
- Rangers completed a monument-wide wayside exhibit inventory and assessment in 2012.

Park Infrastructure

- Prep lab and collection facility at Thomas Condon Paleontology Center are state of the art, allowing curation of park resources at a level unprecedented within the National Park Service.
- Energy efficiency: New residences were constructed at Painted Hills and Foree in 2009 and 2010. The Painted Hills house is a net-zero energy home that actually results in an annual surplus back to the park's energy bill.
- The Red Scar Knoll trail was built at Painted Hills in 2011, providing a spectacular and popular visitor experience.

Chapter 4. Key Issues and Challenges for Consideration in Management Planning

Strategic Sustainability

The greatest management challenge at John Day Fossil Beds, as at many other parks, is development of a strategic management paradigm that will be sustainable into the future. We need to become lean and efficient with a focus on the core resources for which the park was established. This is going to require some very difficult choices between important resources and core resources. This will likely mean a conscious decision to let some important, but not core, resources and assets deteriorate.

A related significant challenge is maintaining employee skills and workplace satisfaction in the face of declining budgets, FTE ceilings and the need to do less with less, which is not easy for highly dedicated employees to accept. A significant portion of the long-term workforce at John Day Fossil Beds will be eligible for retirement within the next several years, so planning for workforce transition will be important to retain institutional knowledge.

Lands Issues

John Day Fossil Beds National Monument was established in 1975. As described in the park's Land Protection Plan, nearly one quarter of the area within the boundary is in non-federal ownership and much of this non-federal land is privately owned. Associated threats to park resources and visitor experience include trespass cattle, exotic plant control, access to NPS facilities and resources across inholdings, and encroachment of development on park lands.

Community/Partnerships

In the modern world, no park is an island. To effectively manage park resources and provide a quality experience for park visitors, John Day Fossil Beds National Monument needs to maintain multiple existing partnerships and seek to develop new partners in innovative, non-traditional ways.

The park and our visitors contribute positively to local economies; continued economic development in rural communities surrounding the park is important to provide necessary infrastructure for visitors to stay in the area long enough to experience the park's resources, as well as for support of NPS employees and management functions. We are part of the local communities and economies, and cooperation with local efforts to expand necessary visitor services is appropriate.

Paleontology

John Day Fossil Beds National Monument was established because of world-class fossil resources. The park has an active and exciting paleontology program with new species being described on an almost routine basis. This program is world renowned and very well-respected. Since scientific integrity of paleontological resources is lost if the specimens erode out of their geologic context, the park routinely prospects for new fossils becoming exposed through erosion. As a result, the park's museum collection is literally expanding every week. At some point, the park's capacity for curating these specimens will be reached. Pre-planning for this eventuality will be important for continued protection of these world-class resources.

The 2009 General Management Plan plans for opening the Hancock Mammal Quarry for research and interpretation. This site is of great importance to scientists' knowledge of vertebrate fossils from the early Tertiary Period. Preliminary analysis suggests that this is the best late Eocene vertebrate site found in the western United States. Much information likely would be gained by reopening the quarry, and it would add a new facet to the visitor experience. However, significant pre-planning and facility development would be necessary to insure that this important resource could be adequately protected and interpreted.

Vegetation Management
Decisions regarding sustainable management of vegetative communities within John Day Fossil Beds National Monument will be important in the future, possibly necessitating re-evaluation of desired future conditions and perhaps even applicability of traditional NPS policy regarding native communities. Invasive plant species are widespread and expanding within all three units, posing a significant threat to native communities. Even if the entire park budget and all staff were to be dedicated solely to exotic plant management, invasive plants could not be eradicated. The park is working on an innovative planning process to establish realistic priorities and goals for treatment of exotic plants; however this will continue to be a huge management challenge for the foreseeable future.

Although junipers are native to the monument, scientists believe that this species is encroaching on new areas and in densities that may require some management action (Miller et al. 2005). Prescribed fire has been used over the past few decades to control junipers, but there is disagreement over the application of burning because of the aggressive establishment of exotic understory species in areas opened up by fire.

Cultural Resources
The Cant Ranch Historic District is one of the most intact locally significant examples of a historic sheep/cattle ranch in Wheeler and Grant Counties, Oregon, and is currently managed to maintain the historic features. This includes multiple historic structures including four agricultural fields actively managed for harvest. Sustainable management of this district into the future may become increasingly difficult as budgets and staffing declines.

A management plan for the park's archeological resources, especially pictographs, is a critical need to protect these irreplaceable resources. In 2013 meetings with each of the traditionally associated American Indian governments, the need for a formal plan to manage and protect pictographs was raised as the tribes' highest priority. The park lacks technical expertise to complete this planning process and will require assistance from Pacific West Region staff to do so. Timely completion of this planning process is important for resource protection and for maintaining good relations with traditionally associated tribal governments.

Visitor Opportunities and Relevancy
First-time visitors to the park often exclaim in awe that they had no idea there is such a fascinating resource right here in Oregon and declare that they will be back to visit again now that they know about the amazing paleontology story. This park is quite remote. Digital infrastructure that has become expected elsewhere is not available here. We do not have cell phone coverage in most of the park or the surrounding areas. Internet infrastructure capabilities are limited. Even telephones often malfunction. Although the park has an active following on Facebook and Twitter, as well as two web cameras, finding a way to provide digital experiences that the modern visitor (both on-site and virtual visitors) expect continues to be challenging.

The Clarno Unit is the least developed of the park's units. There is an extensive trail system that was informally created over time rather than planned. The park's 2009 General Management Plan calls for formalizing these unofficial trails. Careful planning and development could result in a much expanded visitor experience, including new interpretive opportunities.

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See Also:

Collection of Natural Resource-Related References

Collection of Cultural Resource-Related References

Collection of Visitor Experience-Related References

Glossary

See the State of the Parks home page for a link to a complete glossary of terms used in State of the Park reports. Definitions of key terms used in this report are as follows:

Americans with Disabilities Act (ADA)	Law enacted by the federal government that includes provisions to remove barriers that limit a disabled person's ability to engage in normal daily activity in the physical, public environment.

Archeological Sites Management Information System (ASMIS)	The National Park Service's standardized database for the basic registration and management of park prehistoric and historical archeological resources. ASMIS site records contain data on condition, threats and disturbances, site location, date of site discovery and documentation, description, proposed treatments, and management actions for known park archeological sites. It serves as a tool to support improved archeological resources preservation, protection, planning, and decision-making by parks, centers, regional offices, and the national program offices.
Baseline Documentation	Baseline documentation records the physical condition of a structure, object, or landscape at a specific point in time. A baseline provides a starting point against which future changes can be measured.
Carbon Footprint	Carbon footprint is generally defined as the total set of greenhouse gas emissions caused by an organization, event, product or person.
Climate Friendly Park	The NPS Climate Friendly Park designation requires meeting three milestones: completing an application; completing a comprehensive greenhouse gas (GHG) inventory; and completing a Climate Action Plan, which is the actions, policies, programs, and measures a park will put into place to reduce its GHG emissions.
Cultural Landscape Inventory (CLI)	A Cultural Landscapes Inventory describes historically significant landscapes within a park. The inventory identifies and documents each landscape's location, size, physical development, condition, characteristics, and features, as well as other information useful to park management.
Curation	National parks are the stewards of numerous types of objects, field notes, publications, maps, artifacts, photographs, and more. The assemblage of these materials comprises a museum collection. Curation is the process of managing, preserving, and safeguarding a collection according to professional museum and archival practices.
Exotic Plant Management Team (EPMT)	One of the ways the NPS is combating invasive plants is through the Exotic Plant Management Program. The program supports 16 Exotic Plant Management Teams working in over 225 park units. EPMTs are led by individuals with specialized knowledge and experience in invasive plant management and control. Each field-based team operates over a wide geographic area and serves multiple parks.
Facility Condition Index (FCI)	FCI is the cost of repairing an asset (e.g., a building, road, bridge, or trail) divided by the cost of replacing it. The lower the FCI number, the better the condition of the resource.
Foundation Document	A park Foundation Document summarizes a park's purpose, significance, resources and values, primary interpretive themes, and special mandates. The document identifies a park's unique characteristics and what is most important about a park. The Foundation Document is fundamental to guiding park management and is an important component of a park's General Management Plan.
Fundamental and Other Important Resources and Values	Fundamental resources and values are the particular systems, processes, experiences, scenery, sounds, and other features that are key to achieving the park's purposes and maintaining its significance. Other important resources and values are those attributes that are determined to be particularly important to park management and planning, although they are not central to the park's purpose and significance. These priority resources are identified in the Park Foundation Document and/or General Management Plan. The short-cut name that will be used for this will be Priority Resources.
Historic Integrity	Historic Integrity is the assemblage of physical values of a site, building, structure or object and is a key element in assessing historical value and significance. The assessment of integrity is required to determine the eligibility of a property for listing in the National Register.

Indicator of Condition	A selected subset of components or elements of a Priority Resource that are particularly "information rich" and that represent or "indicate" the overall condition of the Priority Resource. There may be one or several Indicators of Condition for a particular Priority Resource.
Interpretation	Interpretation is the explanation of the major features and significance of a park to visitors. Interpretation can include field trips, presentations, exhibits, and publications, as well as informal conversations with park visitors. A key feature of successful interpretation is allowing a person to form his or her own personal connection with the meaning and significance inherent in a resource.
Invasive Species	Invasive species are non-indigenous (or non-native) plants or animals that can spread widely and cause harm to an area, habitat or bioregion. Invasive species can dominate a region or habitat, out-compete native or beneficial species, and threaten biological diversity.
List of Classified Structures (LCS)	LCS is an inventory system that records and tracks the condition of the approximately 27,000 historic structures listed in the National Register of Historic Places that are the responsibility of NPS.
Museum Collection	NPS is the steward of the largest network of museums in the United States. NPS museum collections document American, tribal, and ethnic histories; park cultural and natural resources; park histories; and other aspects of human experience. Collections are managed by professionally-trained NPS staff, who ensure long-term maintenance of collections in specialized facilities.
Natural Resource Condition Assessment (NRCA)	A synthesis of existing scientific data and knowledge, from multiple sources, that helps answer the question: what are current conditions of important park natural resources? NRCAs provide a mix of new insights and useful scientific data about current park resource conditions and factors influencing those conditions. NRCAs have practical value to park managers and help them conduct formal planning and develop strategies on how to best protect or restore park resources.
Priority Resource or Value	This term refers to the Fundamental and Other Important Resources and Values of a park. These can include natural, cultural, and historic resources as well as opportunities for learning, discovery and enjoyment. Priority Resources or Values include features that have been identified in park Foundation Documents, as well as other park assets or values that have been developed or recognized over the course of park operations. Priority Resources or Values warrant primary consideration during park planning and management because they are critical to a park's purpose and significance.
Project Management Information System (PMIS)	A servicewide intranet application within the National Park Service to manage information about requests for project funding. It enables parks and NPS offices to submit project proposals to be reviewed, approved and prioritized at park units, regional directorates, and the Washington Office.
Resource Management	The term "resources" in NPS encompasses the many natural, cultural, historical, or sociological features and assets associated with parks. Resource management includes the knowledge, understanding, and long-term stewardship and preservation of these resources.
Specific Measure of Condition	One or more specific measurements used to quantify or qualitatively evaluate the condition of an Indicator at a particular place and time. There may be one or more Specific Measures of Condition for each Indicator of Condition.
Upper Columbia Basin Network	One of 32 I&M networks established as part of the NPS Inventory and Monitoring Program. The Upper Columbia Basin Network provides scientific data and expertise for natural resources in nine parks located in Idaho, Montana, Oregon, and Washington.
Visitor and Resource Protection (VRP)	VRP includes, among other responsibilities, protecting and preserving park natural and cultural resources, enforcing laws that protect people and the parks, fire management, search and rescue, managing large-scale incidents, and on-the-ground customer service.