2018 HIGHLIGHTS
Looking back at 2018 and ahead to the future!

DINOSAUR RIDGE COMES OF AGE WITH HIGH HONORS
See the full story on page 12
MISSION STATEMENT

The mission of the Friends of Dinosaur Ridge is to educate the public about, and ensure the preservation of, the natural and historic resources of Dinosaur Ridge, Triceratops Trail, and the surrounding areas.

Dinosaur Ridge and Morrison Natural History Museum Partner on Pass.

The Morrison Dino Pass offers discounted access and tours to both the Morrison Natural History Museum and Dinosaur Ridge when used within 10 days of purchase. This successful partnership is bringing the ties between our dynamic dinosaur sites closer together!
2018 was a year of tremendous growth at Dinosaur Ridge – and mostly, that’s a great thing!

**Visitors**

Attendance: We welcomed more than 235,000 visitors to Dinosaur Ridge, the Discovery Center, and Triceratops Trail in 2018 – our highest visitation numbers ever. This milestone is a dramatic increase from just 6 years ago when we had 50,000. More than 100,000 people visited our gift shop and 40,000 visited our exhibit *Trek Through Time* – these visitor numbers surpassed previous records.

Tourist Destination: Almost half of our Visitor Center visitors are from out-of-state or from other countries. While we have always been a science and academic point of interest, we have seen substantial growth as a tourist destination. On websites like Yelp and TripAdvisor, we are often listed as one the top things to do in the Denver area.

**Partnerships**

Partnerships: We are evolving our relationships with partners in the community. We initiated a program with the Morrison Natural History Museum to sell a joint ticket to our sites and are deepening our relationship with Jefferson County Open Space and other Jefferson County agencies. There is more detail about these partnerships in this report.

**People**

Staff: Our staff continues to grow to meet the needs of the organization, the community, and our visitors. In addition to 20 full-time staff, we had about 20 summer seasonal staff who worked as additional gift shop clerks, bus drivers, summer camp counselors, and snack shack staff.

Volunteers: Even with increased staff, the need for additional volunteer engagement was great. Volunteer recruitment and training increased with special attention to teaching volunteers to help students of all ages understand and become excited by the geology and paleontology in their backyard! Special thanks to staff members Barbara Farley and Erin LaCount for leading this effort.

Summer camps: Attendance grew by 60% thanks to new themes and extra weeks developed by staff members Erin LaCount and Fran Taffer, as well as more aggressive marketing. Parent focus groups praised the camps as better than ever, even with more kids involved.

**Programs & Events**

Special Events: Thanks to Blake Sullivan, our “Wild Wanderers” Field Trip to Kemmerer, WY, for a Fossil Fish Dig was full for the second year, prompting us to plan more trips for 2019. In addition to four Dino Discovery Days, several special events are covered in another story.

Program Evaluation: For the first time in organizational history, we have staff resources dedicated directly to program evaluation led by staff members Fran Taffer and Barbara Farley. They focused on qualitative and quantitative evaluation of school tours and Dino Discovery Days, and started laying plans for bus tour and exhibit hall evaluations in 2019.

**Funding & Marketing**

Funding: We received our largest Science and Cultural Facilities District (SCFD) contribution ever in 2018, more than $238,000, which is an increase of $57,000 over 2017 funding. This meaningful increase helped us meet the new and increasing demands on the organization.

Endowment: We initiated a formal endowment with Community First Foundation to be managed by a third-party investment house. At the end of 2018, the endowment contained about $32,000; we foresee this growing steadily and becoming a source of real long-term financial stability for FODR.

Marketing: We have a new, modern, polished and easy-to-navigate website thanks to Sara Miller and Brian LaCount. We are working to better engage with our web visitors to provide relevant and timely information through digital channels, including our newly revised website and Facebook.

All this growth has implications for our work, of course, including very tight quarters in our gift shop, exhibit hall, and parking areas. This growth increases the urgency to build a new Visitor Center and compels us to focus on how to successfully juggle our bus tours with other programs. For more thoughts on our future, see the article on Preservation in the report.

Thanks for your support and keep on visiting us!

Jeff Lamontagne, Executive Director
**President/Chair Report**

A smooth Chair transition from Charles Meyers to Lou Taylor early in 2018 allowed many of the projects begun under Charles’ leadership to continue moving forward seamlessly.

One of the most important of these projects was the presentation and approval of a five-year strategic plan. Designed using suggestions from a variety of Friends of Dinosaur Ridge (FODR) stakeholders, this plan should successfully carry the organization into the future. Finalization of the plan occurred during and after the Board’s April retreat.

A second major board project has been working with Jefferson County Open Space on a Master Plan for Dinosaur Ridge and the surrounding areas. This project has helped create a renewed partnership between FODR and JCOS. The board provided information about a possible new Visitor Center and other facilities for the ever-increasing number of visitors to the Ridge.

The board welcomed three new members: Melissa Morris was elected, and Steve Strachan and Paul Wilson were appointed during the year. The Governance Committee created or updated a number of policies for review and approval by the board.

Under the directorship of Jeff Lamontagne, FODR continues to be financially secure. Board members supported FODR in fundraising both by attending the annual Rock Out for the Ridge fundraiser as well as 100% of board members making a financial commitment to the organization.

In the coming year we are committed to having all the board’s archival records reviewed and digitized for easy access. We will continue to monitor the planned development for that portion of Rooney Valley close to FODR facilities. The board will continue to provide leadership through policies that keep FODR on a successful path.

*Dr. Louis Taylor, FODR Board Chair*
**Education Report**

Building on 30 years of history and success, the Friends of Dinosaur Ridge (FODR) education programs placed new emphasis on helping every visitor find excitement in our 2018 learning programs. Visitors included:

- The toddler who listened to a volunteer read stories about dinosaurs as part of a TriceraTOTS program,
- The third-grader on a school tour who was curious about why the rocks are tilted up and how dinosaur bones became fossilized in the rocks,
- The 6th grader retelling a story of how dinosaur tracks give evidence about the behavior of dinosaur families walking along a beach,
- The adults who were excited to walk along Dinosaur Ridge or nearby Triceratops Trail with their children.

Staff and volunteers updated the education programs to align program message points with revised school curriculum objectives. Teacher evaluations helped shape the design of new programs. Student curiosity was encouraged with tools such as hand lenses, student-generated questions, and guided field observations. These strategies were also used to engage summer campers and visitors to *Trek Through Time*, our exhibit hall.

Building an interest in young minds to help preserve and protect unique sites like Dinosaur Ridge is important to maintaining the quality of life we aspire to in the Denver Front Range area. Bring your family out to visit in 2019 as we continue to celebrate 30 years of building our future!

*Marsha Barber,*
2018 Education Committee Chair/2019 FODR Board Chair

---

**Preservation Report**

2018 was a year to focus on long-range plans for preservation, one of the pillars of the FODR mission.

FODR has been working for the past two years to deepen its collaborative relationship with Jefferson County Open Space (JCOS) and other Jefferson County agencies that own the land on the Ridge and at the Visitors Center. As we worked to move forward on individual projects, including a track site cover, it became clear that several regulatory hurdles needed to be considered.

At the same time, JCOS believed that to best preserve the antiquities on the Ridge it needed to bring its technical expertise to study rockfall hazard mitigation and drainage patterns. With growing attendance raising concerns about crowd management, a new Visitor Center on the horizon, and future preservation projects proposed, JCOS asked that attention go first to creating a Master Plan for the site. A 10-year Master Plan, developed by Norris Design with the help of a variety of technical contractors, includes recommendations for a track site cover, the long-planned stairway and viewing deck at Crocodile Creek, as well as work at the Bulges and the Bone Quarry sites. In 2019 it is being circulated by JCOS.

The Master Plan provides general Jefferson County approval for each project in the plan. Although details of each project are not laid out in high resolution, project parameters are specified. The Master Plan also lays out a process for public engagement and regulatory and permitting requirements, naming the specific steps required for projects to achieve final approval.

The Master Plan gives FODR an approved blueprint for preservation-related projects on the Ridge for the next 10 years.

*~ Jeff Lamontagne, Executive Director~*
**FUND BALANCES AS OF 12/31/2018**

Cash and Cash Equivalents: $195,885  
Total Assets, Including Cash and Cash Equivalents: $1,007,494

**INCOME AND EXPENSES**

**INCOME**

Merchandise Sales: $366,225  
Tours and Program Fees: $354,496  
SCFD Grant: $238,515  
Individual Contributions/Special Events/Membership Dues: $169,170  
Other and Investment Income: $1,140  
Total 2018 Income: $1,129,546

**EXPENSES**

Salaries plus Payroll Taxes and Benefits: $585,683  
Contract Services: $63,537  
Vehicles: $35,819  
Program Supplies: $32,528  
Insurance: $24,632  
Utilities: $24,990  
Office Supplies: $19,558  
Telephone: $17,152  
Repairs and Maintenance: $14,060  
Information Technology: $9,192  
Professional Development: $5,863  
Printing: $5,352  
Advertising and Promotion: $5,243  
Project Expenses: $4,481  
Travel: $3,548  
Postage: $2,707  
Payroll Processing: $2,420  
Dues and Subscriptions: $2,032  
Meals and Entertainment: $1,289  
Other: $4,120  
Depreciation and Amortization: $49,158  
Total Expenses: $930,993  
Net Gain: $930,993

**2018 Major Donors**

Rocky Mountain Association of Geologists  
Colorado Chemistry Teachers Association  
Colorado Mining Exhibit Foundation  
Colorado Association of Science Teachers  
Scientific and Cultural Facilities District (SCFD)  
Mikkelson Education Foundation  
Kneller Family Foundation  
Anadarko Petroleum Corporation  
The National Environmental Education and Training Foundation  
The Gibbet Hill Foundation  
Susanne Leininger  
Stephen & Linda Strachan  
The Denver Foundation  
Golden Civic Foundation  
Adam and Ashley Johnson  
Lou & Mary Taylor  
Marsha Barber  
The Denver Foundation  
Richard Nielsen  
Exxon Mobil Foundation  
Kermit & Beth Shields  
Dave & May Raynolds  
Sandra Smith  
Sam & Eileen Bartlett  
Peter Martin  
Mitzi Leaver  
Jon Charles Graff  
Wayne Belcher  
Linda Baker  
Chevron  
Elnore Grow

**Endowment Fund Protects Dinosaur Ridge into the Future**

Since the discovery of the first *Stegosaurus* fossil during the legendary Bone Wars to the recently identified raptor track, Dinosaur Ridge has been a place of wonder and discovery. Three decades ago, members of the scientific community and neighborhood surrounding Dinosaur Ridge joined together to protect the world-class paleontological treasures from erosion, vandalism, and theft. Friends of Dinosaur Ridge has now established an Endowment Fund to help continue to educate about and ensure the preservation of the natural and historic resources for Dinosaur Ridge for generations to come. Please give and support the future of Dinosaur Ridge.

To give online, please visit: [www.dinoridge.org/support-dino-ridge/donate/](http://www.dinoridge.org/support-dino-ridge/donate/)

To make a gift by phone, call Michelle Davis, Development Director, 303-697-3466 x113.

Friends of Dinosaur Ridge is a registered 501(c)3 nonprofit organization. Contributions are deductible for federal income tax purposes.
2018 was a record year for not only Dinosaur Ridge overall, but for many of our programs.

This year marked a great change for how we do and how we lead our programs. Focusing heavily on gathering data for evaluation, not just from teachers but from students, staff, and volunteers, we were able to create goals and teaching methods that express what we want visitors, especially school-aged children, to walk away with after participating in one of our tours, camps, or programs. This drive and focus helped us find that teachers were searching for “more hands-on and interaction!” This led to the creation of two redesigned tour programs and three new summer camp sessions.

**School & Scheduled Tour Programs**

The two tour programs were revamped with the new focus in mind and saw a massive success in only the first few months! **Dinos, Fossils and Miners, Oh My!** and a revamp of our **Junior Paleontologists** program were created for grades pre-kindergarten through second. These students participate on a dig in our Backyard Bones area and two new rotations focusing on mineral and rock identification with sluice mining, and finding clues from fossils utilizing replicas and the life-size dinosaurs in the main area of the Visitor Center.

The new methods of interaction incorporated into these tours ask kids to observe, wonder, and learn focusing on the statements “I notice…”, “I wonder…”, and “this reminds me of…”, letting them go with minds full of curiosity and empowerment!

**Summer Camp**

For 2018, we set a goal to increase our Summer Camp programs not only by numbers and money generated, but also in programming. This led to the creation of three new weeks of camp: **Rock Stars** (ages 10-13), **Junior Scientists** (ages 8-11), and **Nature Trekkers** (ages 6-10). These new camps in concert with our tried-and-true **Fossils and Fun** (ages 6-10) gave us our most successful year of camp to date!

A record number of 184 campers filled every camp slot for the first time since the camp programs were revamped and restarted in 2012! These new camps introduce elements of our new goals and impacts formulated by our education staff as well as implementing for the first time ever an online registration system making it fast, easy, and reliable to register for any or many sessions.

continued on next page
Outreach

Libby Prueher began overseeing Community Outreach in 2018, creating two new outreach themes: *Tyrannosaurus rex* and *Triceratops*. The outreaches took place last year across the Denver Metro Area reaching nearly 10,000 people providing information on our events and programs as well as educational information on two Colorado locals – the rex and the trike. Fossil replicas of the teeth, claws, brain, and horns of these Late Cretaceous giants allow kids to see and feel parts of their favorite dinosaurs!

Dino Discovery Days

FODR held successful DDDays in 2018, and none were more well-attended than our Girl Scout Day in October. The perfect storm of record sign-ups and a 70° day had more than 1,000 people attend, including more than 700 Girl Scouts and their families. We’re hoping for a similar turn out in 2019 and will be revamping the badges earned and booth partners for both Boy and Girl Scout Days.

Special Events

Special Events are increasingly creative and cater to serve a wide variety of audiences and interests.

In February, Friends of Dinosaur Ridge’s Education Manager, Erin LaCount, joined forces with Jeffco Open Space Visitor Services Manager Mary Ann Bonnell to deliver a hilarious and informative lecture on the love lives of dinosaurs and snakes. More than 200 people came to laugh and learn about “Sex and Saurians” at the Mountaineering Museum in Golden.

In June, we put on a three-part event at our Visitors Center, “Brontos and Brews,” which featured a beer garden populated by local craft brewers, a children’s dino-themed carnival, and an attempt at a world record for the most people dressed in dinosaur costumes. While the latter effort fell short, the carnival was a huge success and there was a steady stream in and out of the beer garden all day, with close to 500 people attending the events.

September saw the return of the 2nd Annual Dinosaur Ridge Science Spelling Stomp, and a return to the Mountaineering Museum. The Stomp was an all-ages spelling bee focusing entirely on science words, especially words related to paleontology and geology. Our winners were as high as a brachiosaurus as they claimed their prizes.

In November, we had another installment of our annual “Rock Out for the Ridge” fundraiser, with the 2018 crowd being larger and raising more money than ever. This year, it featured Dr. James Hagadorn, Denver Museum of Nature and Science paleontologist, as our guest speaker. Board Chair Dr. Louis Taylor was honored with the Arthur Lakes Legacy Award for his years of dedicated service at Dinosaur Ridge. We also remembered our long-time volunteer, T. Caneer.

Smaller events included a Dinosaur Ridge Night at the Museum during Denver Arts Week when the best museums in town are open late and admission is free. At Dinosaur Ridge, this included a 30-minutes flashlight tour of the track site. To end the year a dinosaur holiday ornament-making workshop gave young folks some creative ornaments for their family Christmas trees.

Erin LaCount

Education Programs Manager
Friends of Dinosaur Ridge was started in 1989 by volunteers and continues to be supported by volunteers contributing to our mission to preserve and educate the public about the unique natural features found on Dinosaur Ridge, Triceratops Trail, and surrounding areas. In 2018, 150 volunteers, including 27 new volunteers, contributed some 9,000 hours to this mission.

Volunteer opportunities include customer service and interpretation in our exhibit halls, creating casts of dinosaur tracks and teeth for education programs and sale, leading school and special tours for groups from pre-K to high school, and supporting special events. Volunteers also provided office assistance, data entry, and fossil cataloging. Volunteers recorded 825 hours at 26 different training opportunities – programs including an introduction to Dinosaur Ridge, how to effectively lead school tours, stories and explanations for the exhibit hall, and a series on dinosaurs offered weekly and monthly!

Volunteering teaches collaborative leadership, builds new friends, and is down-right fun. Contact Barbara Farley at volunteer@dinoridge.org or at 303-697-3466 x107 if you are interested in any of the Dinosaur Ridge Volunteer Opportunities or for more information.

Warren Slodowske | 2018 Volunteer of the Year

You can find Warren Slodowske volunteering at almost every Dinosaur Ridge event – other than perhaps the Dinosaur Ridge Science Spelling Stomp. “When I entered college, I was told I spelled at a 4th grade level,” Warren said. “Since then my spelling has gotten worse!”

Spelling didn’t stop Warren from a successful career as a fuel and lubricant specialist for Chrysler Engineering. An alum of Alma College, Alma, MI, and Michigan Technical University, Houghton, MI, Warren was a college cross country runner, still winning age races in his 70s. He served on national professional boards and committees and was recognized for papers and presentations in his field.

A way of making a difference is to volunteer. I knew nothing about dinosaurs and geology, but I wanted to volunteer at Dinosaur Ridge. I was excited to learn new things and share my new knowledge with others. I studied. It was like going back to school. Now I’m fond of saying, “You can teach an old dog new tricks!”

In retirement, Warren has put his passion for learning to the topics of dinosaurs and geology, volunteering more than 200 hours a year and regularly attending all available education and training programs. “I can always learn something new,” he said. Other interests are travel, yard work, baseball, reading, and Sudoku puzzles. He and his wife Yi Min Zhang have lived in Colorado since 2010.

You will find Warren in Trek Through Time, Dinosaur Ridge’s exhibit hall, twice a week, where new volunteers regularly seek him out to learn his skills at storytelling and building excitement among visitors. Warren also helps with many other special day and outreach events at the Ridge. “There are wonderful people on staff and working as volunteers,” he said. “I cherish the friendships I’ve made. My fervent hope is that I can continue to volunteer at Dinosaur Ridge for a very long time.”
Front Range Fossil Footprints: Fruitful Finds Foment Fame and Fortune.

Martin Lockley1,2, Neffra Matthews3, Brent Breihaupt3, Beth Simmons3,4, Sue Hirschfeld6

1 University of Colorado, 2 Friends of Dinosaur Ridge, 3 U.S. Bureau of Land Management, 4 formerly Metro State University, 5 City of Boulder Open Space Mountain Parks.

As paleontologists working at Dinosaur Ridge, Fossil Trace, and other well-known locations along the Front Range and elsewhere in Colorado, we are often asked if we still make new discoveries. On the understanding that ‘new’ means previously unknown to science, the answer is a definite YES! Although fossils (bones, tracks, and plants) from Dinosaur Ridge and Fossil Trace have been known since the late 19th and early 20th centuries, further important finds have been made and reported in the scientific literature through the late 20th century and up to the present day. Important 21st century footprint reports include:

- ~66-67 million-year-old mammal tracks, named Schadipes, from Triceratops Trail, in 2003
- ~97-98 million-year-old courtship traces, named Ostendichnus from Dinosaur Ridge, in 2016
- ~110 million-year-old raptor tracks, named Dromaeosauripus from Dinosaur Ridge, in 2016
- ~66-67 million-year-old dinosaur and other tracks from near Marshall, Boulder County, in 2018

It takes time for new discoveries to find their way into the scientific literature, and then into local guidebooks and educational media, interpretative signs, and brochures. For example, while mammal footprints and courtship and raptor traces made it into the 5th edition of the Dinosaur Ridge guidebook in 2017, the discovery of abundant dinosaur tracks from Boulder County (item 4 above) was only made in 2018. In this short article we continue to update readers on the latest research finds and developments, with emphasis on new discoveries from near Marshall in Boulder County, which we designated as the Cherryvale Site.

Fruitful Findings from Cherryvale. Surprisingly, although the Marshall area has been known since the late 1880s for coal mining operations in the Late Cretaceous (Maastrichtian: 65-70 million-year-old) Laramie Formation, no tracks had been reported. Thanks to the economic importance of coal, especially in the pioneer days of the late 19th century, the site has been visited by many generations of geologists interested in the structure, stratigraphy, and other features, but no one suspected that the area might yield fossil footprints. We heard via the trackers grapevine that a colleague, Jerry Harris, had found a three-toed track in the vicinity of Marshall when he was working at the Denver Museum of Nature & Science in the 1990s, but no illustration or details of the specimen are known. Initially we were unaware that this clue was significant, as we had gone to the site to look at other geological features. In short, the results were rather spectacular. We discovered at least two relatively abundant dinosaur track types, as well as other less common dinosaur and turtle tracks. In total we documented more than 30 tracks representing at least six distinct trackmaker groups.

The abundant and easily identified tracks include Saurexallopus, a slender-toed bird-like track up to about 30-35 cm (12-14 in), wide with widely splayed toe impressions up to 100-115° (Figure 1A,B on next page), and usually a fourth, reversed toe trace. Saurexallopus, interpreted as the track of a bird-like oviraptorosaurid dinosaur, and also known from Triceratops Trail, where the tracks are poorly preserved, occurs from at least seven sites in North America, always in the latest Cretaceous (Maastrichtian): i.e., at three sites in Colorado, two in Wyoming, and one each in Utah and British Columbia. At first sight Saurexallopus looks rather like Magnoavipes the familiar three-toed, bird-like (probably ornithomimid) track from Dinosaur Ridge. However, besides registering four toe traces in most cases, Saurexallopus is larger and about 25 million years younger than Magnoavipes. The second common track type from the Cherryvale site is Hadrosauropodus, attributed to the large duck-billed dinosaurs or hadrosaurs (Figure 1C,D), which had large fleshy feet that left wide toe impressions. The largest of these tracks are 60 cm (2 feet) long and wide. These are also common in the latest Cretaceous, including at Triceratops Trail, where there is a hadrosaur pit with some footprints up to 90 cm (3 ft) long. Other dinosaur tracks from the Cherryvale Site include other 3-toed (theropod) and 4-toed ceratopsian (horned dinosaur) footprints and turtle tracks. Traces of invertebrates and other enigmatic features are still being studied. So stay tuned.

The steady march of Science at Dinosaur Ridge and beyond.

As discussed in a companion article this issue, Dinosaur Ridge and Triceratops Trail (Fossil Trace), like Red Rocks and other Colorado Front Range locations, have become important, globally-ranked geo-destinations in the world of paleontology, geoscience, and environmental education. As background to the new 21st century discoveries mentioned here we draw attention to the 30-year history of Dinosaur Ridge (1989-2019) and the 65 or more scientific
publications which have appeared on the subject of fossil footprints alone in this period. This is to say nothing of the articles by academic and applied geologists on the rocks, fossils, and economic geology of the Front Range and Denver Basin, or the large number of popular dinosaur books and film documentaries that mention Dinosaur Ridge, sometimes in detail. This is why the Dinosaur Ridge guidebook, also covering Triceratops Trail and the Golden area, has run to five editions, each one with new, updated information.

The 2018 Cherryvale discovery site is the most recent, but the above-listed identification of the nest scrape display traces made by large theropods (Figure 2 A-C) and the first raptor tracks from Colorado (Figure 2D-F) are also significant. The scrapes show carnivorous dinosaurs, like their modern bird descendants, used nest scrape display as part of their sexual display rituals. The largest scrape from Dinosaur Ridge is ~two meters (~six feet) long and a meter (3.3 ft) wide, and was featured in the *Secrets of the Underground* documentary. Paleontologists have suggested for years that carnivorous dinosaur courtship likely resembled that of modern birds. However, this educated guess was pure speculation until the scrapes from Colorado provided the physical evidence. This potent combination of dinosaurs and sexual display activity received much international press attention in 2016.

**Figure 1.** Dinosaur Tracks from Cherryvale, discovered and reported in 2018. A and B show photogrammetric 3D images of a *Saurexallopus* track in false color and with contours. C and D show two hadrosaur track casts: tape is 60 cm (2 ft) in C and 40 cm (1 ft) in D. All finds and illustrations by the authors. **continued on next page**
The two-toed raptor tracks, *Dromaeosauripus*, are the first ever found in Colorado. They are quite vulnerable to erosion, and so have been enshrined in a protected area. Now that they are described in the new guidebook, they will soon have accompanying interpretative signs. We hope dinosaur trackers will be excited to reflect on these new discoveries at Dinosaur Ridge and Cherryvale. Both sites are on open space properties, the former in Jefferson County, the latter site on City of Boulder Open Space Mountain Parks land in Boulder County.

Please read on to the accompanying article, *Dinosaur Ridge comes of Age*, to learn more about the importance of paleontological resources and the science, management, and record keeping behind them at Dinosaur Ridge, Triceratops Trail, and along Colorado’s Front Range.

Further Reading:
2) Lockley, M. G. *et al.* (14 authors) 2016. Theropod courtship: large scale physical evidence of display arenas and avian-like scrape ceremony behavior by Cretaceous dinosaurs. *Scientific Reports.* 6, 18952; doi: 10.1038/srep18952,  

Figure 2 A and B. 3D images of the large and medium sized nest scrape display traces, named *Ostendichnus* from Dinosaur Ridge, with a reconstruction (C) of how they were made. D and E show the raptor track *Dromaeosauripus*, with a 3D image (F). See A Field Guide to the Dinosaur Ridge Area for more details.

Dinosaur Ridge comes of Age with high honors.

Martin Lockley¹, Neffra Matthews², Brent Breihaupt², Beth Simmons¹,²,³, ¹ University of Colorado & Friends of Dinosaur Ridge, ² U.S. Bureau of Land Management, ³ formerly Metro State University

Before Friends of Dinosaur Ridge was formed as a 501(C3) non-profit corporation in 1989, Dinosaur Ridge was already famous under different names for its geology and paleontology. It was then called the Dakota Hogback, and in 1973 parts of the area had been designated The Morrison Fossil Area National Natural Landmark (MFANNL), due to the world-famous bone discoveries of 1877. The Dinosaur Ridge name was coined more than a century later in the 1980s, in the same decade that the Grand Valley in western Colorado named one of its three Museum of Western Colorado sites as Dinosaur Valley. Soon after the U.S. Geological Survey board of geographical names formally gave the name Dinosaur Ridge to the entire hogback between Morrison (Bear Creek Water gap) and Colfax Avenue at Lena Gulch. Jurassic bones and Cretaceous footprints have been found from at least a dozen sites along this 5-mile (8 km) stretch. Then, in 2011, the MFANNL became the Golden-Morrison Fossil Area National Natural Landmark, to include the Triceratops Trail part of Fossil Rock.

*continued from previous page*

*continued on next page*
Trace and the historic bird and crocodile tracksites within the northern boundary of the City of Golden.

In 2019 Friends of Dinosaur Ridge celebrated its 30th Anniversary, with various memorable events reported in this issue of the Ridge Report. It would take a book to write the history of Dinosaur Ridge, dating back to the historic dinosaur discoveries in 1877, in what is now the world-famous Morrison Formation. Rather, we here summarize more recent history, already touched on in the previous article with the suitably flamboyant and celebratory title Front Range Fossil Footprints: Fruitful Finds Foment Fame and Fortune. In that contribution we focused on new track finds from the last few years, why they are scientifically important, and why, paleontologically, Dinosaur Ridge is the gift that keeps on giving. In this follow-up article we continue our scientific, tracks specialization theme, but take a broader view as to why Dinosaur Ridge has achieved ‘gold-medal’ status as the number one dinosaur tracksite in the USA with nearby Fossil Trace also on the podium with the 3rd place ‘bronze medal.’

First, a nod to the geologists who in the 1960s and 1970s, realized the importance of the hogback as a gift of an outdoor geological laboratory: an easy place to learn geology as one paper, Studies for Students makes very clear. At this time there was also growing interest in the tracks, trails, and burrows of lowly worms, clams, snails, arthropods, and other invertebrates, which are sensitive indicators of ancient environments and ecology. This study of trace fossils (ichnology) was soon to take on new life: invertebrate ichnology took a symbolic evolutionary leap forward with new interest in vertebrate and dinosaur ichnology. Why study worm trails when you can go stegosaur or brontosaur tracking? The ecological renaissance spread to the ecology of dinosaurs and a much-celebrated ‘Dinosaur Renaissance,’ and then the ‘Dinosaur Footprint Renaissance.’ It soon became obvious that footprints spoke, evocatively to the dynamic, living trackmakers, whereas bones dealt with death and burial.

A pivotal event in the Dinosaur Tracks Renaissance was the First International Symposium on Dinosaur Tracks and Traces held in Albuquerque at the newly built New Mexico Museum of Natural History, with an extended field trip through New Mexico, Arizona, Utah, Colorado, Oklahoma, and Texas. The field trip guidebook produced by the University of Colorado Denver (UCD) Geology Department, referred to only a handful of dinosaur tracksites then known in these six states. At the time only two Jurassic and five Cretaceous sites were known in any detail from Colorado, and most of these had only recently been documented by the UCD group. Among these only two sites represented the ~100 million-year-old Dakota Sandstone, one being what we now call the main Dinosaur Ridge tracksite (Figure 1). It is a measure of how many new sites have been discovered since the mid-1980s that today about 125 sites have been reported from the Dakota Sandstone alone, with ~100 of these from Colorado. Clearly Dinosaur Ichnology is an ever-evolving field, with a cumulative history and statistics to give context to the big picture. Whereas only two significant Dakota Sandstone tracksites had been described by the mid-1980s from all of Colorado, we now know of at least 12 that have been documented along the Front Range between Roxborough and Boulder, as well as at least a half dozen more from other formations in the same area, including the 2018 Cherryvale discovery described in the previous article.

Other statistics indicate the scope of the burgeoning field of dinosaur ichnology. For example, the University of Colorado Museum of Natural History (UCM) fossil footprint collections contain ~3000 tracks, including ~150 tracks from the Front Range (Roxborough-Boulder area). The majority of these come from the Morrison-Golden Fossil Area National Natural Landmark area, and all can be seen as online images via the

---

**Figure 1. Members of the First International Symposium on Dinosaur Tracks and Traces field trip looking at dinosaur tracks in 1986, before Dinosaur Ridge was Dinosaur Ridge: note Green Mountain in background. These participants from seven nations went on to study fossil footprints, in some cases intensively. The Dinosaur Ridge ornithopod tracks named Carrichnium leonardi honor Leonard’s observation that they resemble tracks he named Carrichnium from the Carir Basin in Brazil.**
UCM website. https://www.colorado.edu/cumuseum/research-collections/paleontology/vertebrates-ichnofossils. The back-up data includes about 65 published papers and reports, and many unpublished reports submitted to the various state and federal resource and land management agencies that grant research and collecting permits.

Turning to the question of how the importance of fossil footprint sites is evaluated, we keep in mind the observation that science is ever evolving. Thus, a site unknown, overlooked, or of little importance yesterday may become important today or tomorrow, as a result of new discoveries or studies. Although one says, “comparisons are odious,” it is standard practice to evaluate the importance of resources. All sites are on land owned or managed by someone. If one proposes a site for the exalted (protected) status of a National Park or a World Heritage Site one is required to submit formal proposals comparing features of the nominated site with similar sites to show why it is important. For this reason, multiple measures have been devised to compare important sites. These include easily-measured parameters such as site size, number of tracks and published scientific papers, number of track types new to science (holotypes or type specimens), and number of visitors attracted. Today Dinosaur Ridge visitation numbers approach 250,000. Other measures like accessibility, management, and quality of preservation are also considered. A paper in Dinosaur Tracks: the next steps, a leading book published in 2016, ranked Dinosaur Ridge as the number one tracksite in the USA, based on 16 criteria (Figure 2). Dinosaur Ridge also made the top 30 on the global list of the “biggest and best dinosaur tracksites … for which reliable data has been compiled.”

The specialist reader of dinosaur tracks literature will know that the published data that go into these rankings is in need of periodic updating. Like sports rankings they change, though perhaps not so rapidly. A Bolivian site, a vertical quarry wall with a little over 5000 tracks, was ranked ‘number one’ on many global lists, based on site size and number of tracks. But when a large part of the wall collapsed, its importance and attractiveness as a destination was compromised. Meanwhile, various Korean sites have been documented with large numbers of tracks, which elevate them on global lists. Likewise, as more important sites are documented in the western USA the top ten list will likely be revised. For example, a site on public (BLM) land near Moab called the Mill Canyon Dinosaur Tracksite has recently been developed as a destination and will surely rank high on the USA scale in future evaluations.

The punch line is that, after 30 years, Dinosaur Ridge and Fossil Trace have come a long way, fomenting an important public education message to the community. Our additional “scientific” message is that the excellent work done by all those who have supported these developments are underpinned by scientific discoveries and documentation. This work does more than provide raw material for our guidebooks, it also impacts perceptions of specialist geoscientists and those who evaluate and rank paleontological resources on the global stage.

Further Reading:
2019 Upcoming Events

September 4 – TriceraTOTs Preschool Program
September 7 – Walk with a Geologist
September 16 – Dinosaur Talks: Talk 1: Paleontology 101
September 23 – Dinosaur Talks: Talk 2: What IS a Dinosaur?
September 25 – Dinosaur Talks: Talk 9: Ceratopsians
September 28 – Boy Scout Day
September 30 – Dinosaur Talks: Talk 3: Sauropods
October 2 – TriceraTOTs Preschool Program
October 5 – Walk with a Geologist
October 7 – Dinosaur Talks: Talk 4: Theropods
October 10-13 – Dinosaur National Monument Dig Trip
October 14 – Dinosaur Talks: Talk 5: Thyreophora Part 1 (Stegosaurs)
October 18 – Behind the Scenes at Denver Museum of Nature & Science
October 19 – Girl Scout Day
October 21 – Dinosaur Talks: Talk 6: Thyreophora Part 2 (Ankylosaurs)
October 28 – Dinosaur Talks: Talk 7: Iguanodons.
October 30 – Dinosaur Talks: Talk 10: Pachycephalosaurs
November 2 – Dino Ridge Science Quiz Bowl at Lakewood High School
November 4 – Dinosaur Talks: Talk 8: Hadrosaurs
November 6 – TriceraTOTs Preschool Program
November 11 – Dinosaur Talks: Talk 9: Ceratopsians
November 16 – SCFD Free Day
November 18 – Dinosaur Talks: Talk 10: Pachycephalosaurs
November 25 – Dinosaur Talks: Talk 11: Archosaurs
November 27 – Dinosaur Talks: Talk 11: Archosaurs
November 28 – CLOSED
December 2 – Dinosaur Talks: Talk 12: Mammals
December 4 – TriceraTOTs Preschool Program
December 10 – Colorado Gives Day
December 18 – Dinosaur Talks: Talk 12: Mammals
December 2 – CLOSED
January 1 – CLOSED

2019 STAFF

Jeff Lamontagne .......................Executive Director
Robin Morris .........................Operations Director
Barbara Farley .......................Director of Volunteers & Program Growth
Michelle Davis .......................Development Director
Erin LaCount .........................Education Programs Manager
Candace Joice .........................Education Program Coordinator
Sue Kaberline .........................Gift Shop and Office Manager
Tammie Kingsley ....................Discovery Center Gift Shop Manager
Libby Landen .........................Marketing Director
Kat Rivers ............................Education Assistant/Field Trips Coordinator
Libby Prueher .........................Education Assistant/Outreach Coordinator

2019 FRIENDS OF DINOSAUR RIDGE BOARD OF DIRECTORS

Marsha Barber (Board Chair): Retired, Science Coordinator, Jefferson County Public Schools*
Stephen Strachan (Board Vice-Chair): Owner, Strachan Exploration*
Melissa Morris (Board Secretary)*
Peter Martin (Board Treasurer): Retired, U.S. Bureau of Reclamation, Technical Writer/Editor*
Amy Boulas: Executive Director, Arthritis Foundation
Craig Curry: Director of Marketing, Pinnacle Real Estate Advisors
Nicole Peavey: State of Colorado Department of Transportation, Program Manager of Paleontological Resources
Bob Raynolds: Denver Museum of Nature and Science, Geologist/Research Associate
Kermit Shields: Retired, Geologist, Exxon Mobil
Sharon Tinianow: Museum of Natural History, University of Colorado–Boulder, Special Projects Manager
Paul Wilson: BizOps Controller, CLA CliftonLarsonAllen

*Member of the Executive Committee
BECOME A MEMBER OF DINOSAUR RIDGE

Enjoy your own Jurassic (and Cretaceous) Park year-around! Support education and preservation of amazing fossils and geology at Dinosaur Ridge, Triceratops Trail, and nearby designated areas.

- Be eligible for discounts and free tours
- Learn about special events and programs
- Support education and preservation programs

Visit www.dinoridge.org or stop by the gift shop at the Main Visitor Center.