COLORADO OPEN LANDS

Colorado Water Conservation Board
1313 Sherman Street
Denver, CO 80203

Attn: Ben Wade

RE:
Final Report Water Plan Grant—POGG1, PDAA, 202000002811
Sandhill Crane Water Education and Engagement

Dear Ben,

Please find attached the final report for the Sandhill Crane Water Education and Engagement project (POGG1, PDAA, 202000002811). The project finished at the beginning of this month with the finalization of our economic impact report. This funding helped us produce an educational video that reached thousands of people with a message of the multiple benefits of water use for agriculture and wildlife, and it allowed us to conduct in depth research about the economic benefits of wildlife tourism that depends on water in the Rio Grande Basin.

We would like to thank the CWCB for funding this project to help educate people on and preserve the natural heritage of the Rio Grande Basin. I am also attaching the Op Ed that was published in the Colorado Sun to publicize the educational video, and the final report on the economic impact study.

Please let me know if you have any questions.

Sincerely,

Max Ciaglo

COLORADO OPEN LANDS

Sandhill Crane Water Education and Engagement Grant
POGG1, PDAA, 202000002811

Final Report

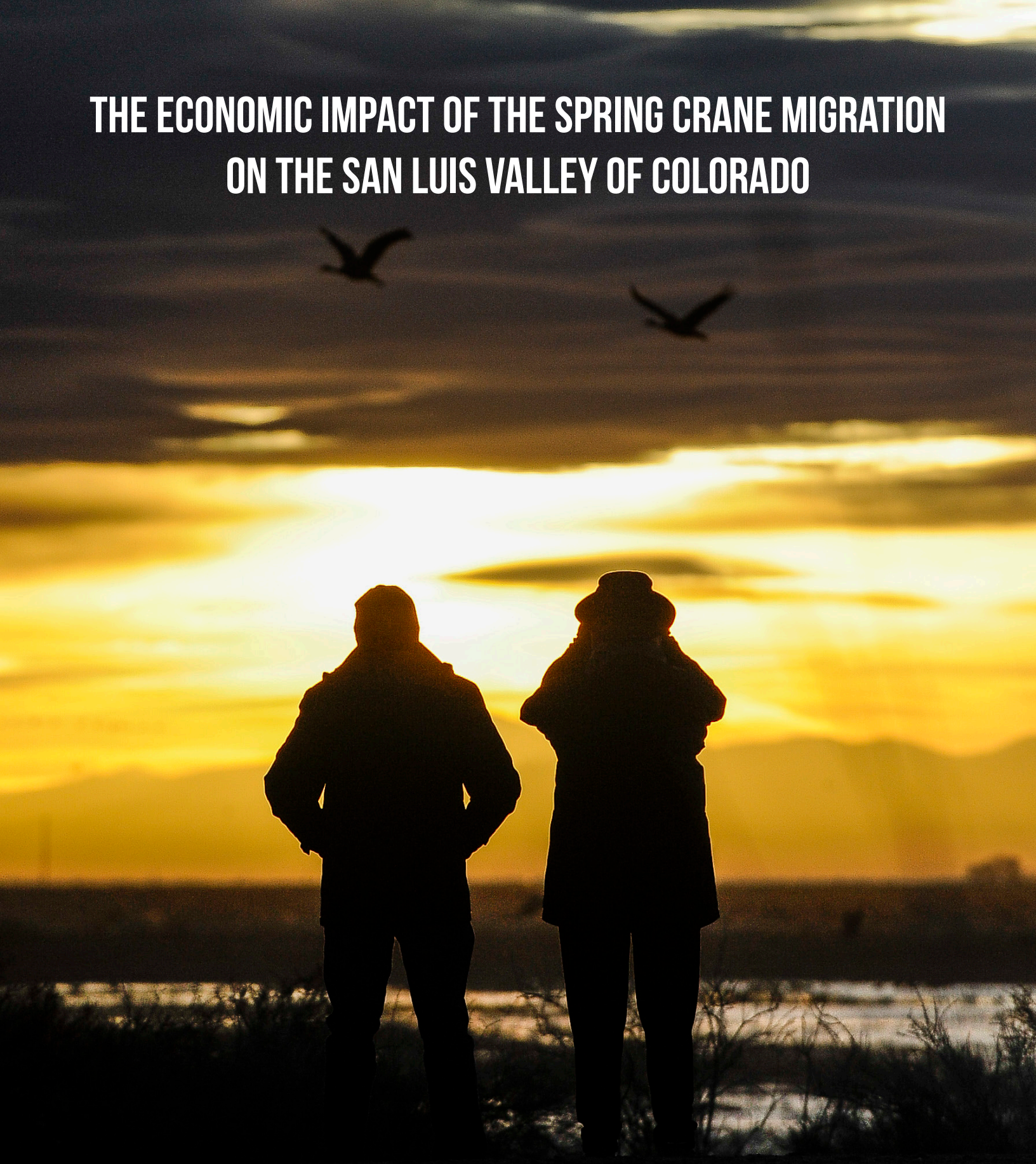
Colorado Open Lands requested and was awarded $7,730 from the Colorado Water Conservation Board to conduct a number of water education activities centered around sandhill cranes in the Rio Grande Basin of Colorado. Sandhill cranes are an iconic species in the San Luis Valley where they rely on a tapestry of public and private lands that use water which is decreed for both wildlife and agriculture. Every year when cranes migrate through the Valley they draw tourists from around Colorado and the country. Our project used this event as an opportunity to educate tourists and locals about the intricate relationship between water, wildlife, and agriculture by 1) studying the economic impact of crane related tourism to the Valley, 2) producing a short educational video about cranes, water and agriculture, and 3) using the video and economic report as tools to advocate for preserving the natural history of the San Luis Valley.

We produced the educational video in February and March 2020. The video highlighted local farmers and ranchers through various interviews where they shared their perspectives on their water use and the future of agriculture and wildlife in the basin. On March 7th 2020 the Monte Vista Crane Festival Committee hosted two talks that educated visitors on the multiple beneficial uses of water in the Upper Rio Grande Basin, and some of the water issues that the basin faces. We showed the educational video after both talks followed by a Q&A. We subsequently released the video through various websites and partners, we also published an op-ed in the Colorado Sun about the video (attached to this report). The video was later chosen to be shown at the Rio Reels Film Festival in Fall 2020 and will be shown again at the 2021 Crane Festival.

We finished the economic impact study (attached to this report) in February 2021. All research was conducted during the spring of 2020 in collaboration with the US Fish and Wildlife Service, Friends of the San Luis Wildlife Refuges, and Colorado Parks and Wildlife. We have now completed the final report of the study, however we are not planning to publicize any results for the foreseeable future. While we are very excited about these results, we have delayed reporting them due to the current Covid-19 pandemic. The 2021 crane festival has been cancelled which will result in fewer people visiting the San Luis Valley this year, and will only add to the issues that local businesses currently face. We therefore do not feel that the time is appropriate to publicly report these results, as much of this economic impact will be missed out on this year. We hope to publicize these results leading up to the 2022 crane festival and reach many more people with our important message.

All matching funds and in-kind commitments have been fulfilled by Colorado Open Lands and the Monte Vista Crane Festival.

THE ECONOMIC IMPACT OF THE SPRING CRANE MIGRATION ON THE SAN LUIS VALLEY OF COLORADO



BY:
MAX CIAGLO
KYLE BALINT
JENNY NEHRING

COLORADO OPEN LANDS

Monte Vista Crane Festival

U.S. FISH & WILDLIFE SERVICE

Friends of the San Luis Valley National Wildlife Refuges

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Acknowledgements

This project would not have been possible without so many partners and volunteers. Funding for this work was provided by the Colorado Water Conservation Board, Colorado Open Lands, and the Monte Vista Crane Festival. We would like to thank Dr. Bree Dority for her guidance throughout this project. Colorado Parks and Wildlife and their wonderful volunteers helped to administer the surveys, and this project would not have been possible without them or Brian and Diane Underwood from the Friends of the San Luis Valley Refuges. We would also like to thank the Rio Grande Basin Roundtable and the San Luis Valley National Wildlife Refuge Complex for their support of this project.

Cover photo by Michael Ciaglo

Background

Every year tens of thousands of Rocky Mountain greater sandhill cranes migrate through the San Luis Valley (SLV) of Colorado. This sub-population of sandhill cranes numbers about 25,000 and is endemic to the intermountain west. In Colorado and throughout their range, they face threats from habitat loss due to drought, human development, and changing agricultural practices.[1] Virtually the entire population of Rocky Mountain greater sandhill cranes migrates through the SLV, and the Valley represents a significant and vulnerable bottleneck in their yearly migration (Donnelly et al. In press). The SLV provides prime wetland roosting habitat and upland feeding grounds in the form of agricultural grains, but the wetlands have undergone historic change in recent decades,[2] and existential forces of water export [3] and fluctuating agricultural markets threaten the future of these habitats and the crane migration.

The natural wonder of this migration brings tourists from around the state and the country to the SLV. The Monte Vista Crane Festival was established in 1983 to celebrate the migration and has increased this draw by providing crane tours, educational programming, and a wide variety of other entertainment for crane tourists. As the tourism surrounding this migration has grown it has become a significant economic driver for the area, particularly Alamosa and Rio Grande counties which have hotels and businesses in closest proximity to crane viewing opportunities.

Outdoor recreation constitutes a large part of Colorado's economy, and in recent years it has become an increasing focus of economic opportunity for the state. Wildlife watching has also grown in popularity due to its relative ease and accessibility, and this sector alone contributes $2.4 billion dollars to the state's economy annually, according to a study conducted in 2017.[4] The same study reported that in the South-Central region of Colorado, which includes the SLV, wildlife watching activities generated $277 million dollars and was responsible for creating 1,916 jobs. Tourism specific to sandhill cranes has been shown to be a major economic driver in other areas. In Nebraska, where there is another large migration of sandhill cranes, it was found that sandhill crane tourism generated over $9 million in direct spending[5].

While wildlife watching, and crane tourism in particular, confer an obvious benefit to local economies, there is a lack of data specifically for the SLV. The counties within the SLV all rank in the bottom 10% of per capita income in the state and understanding specific economic drivers in the region would be of great value. The purpose of this study is to quantify the economic impacts of crane tourism to the SLV, and to provide local governments and a broad swath of stakeholders with the information necessary to understand, preserve, and capitalize upon this economic opportunity.

Methods

To conduct this study, we followed the methodology of two previous studies conducted to estimate the economic impact of the sandhill crane migration in Nebraska.[5,6]

Study Area— We estimated the economic impact of the annual crane migration on the San Luis Valley of Colorado (SLV), a geographic area defined by mountain ranges on the north, east, and west (the Sawatch, Sangre De Cristo, and San Juan ranges, respectively) that comprise the Upper Rio Grande watershed, and the border of New Mexico and Colorado to the south. When using political boundaries (e.g., counties or

area codes) we included all of Alamosa, Conejos, Costilla, Saguache, and Rio Grande Counties as part of the SLV (Figure 1).

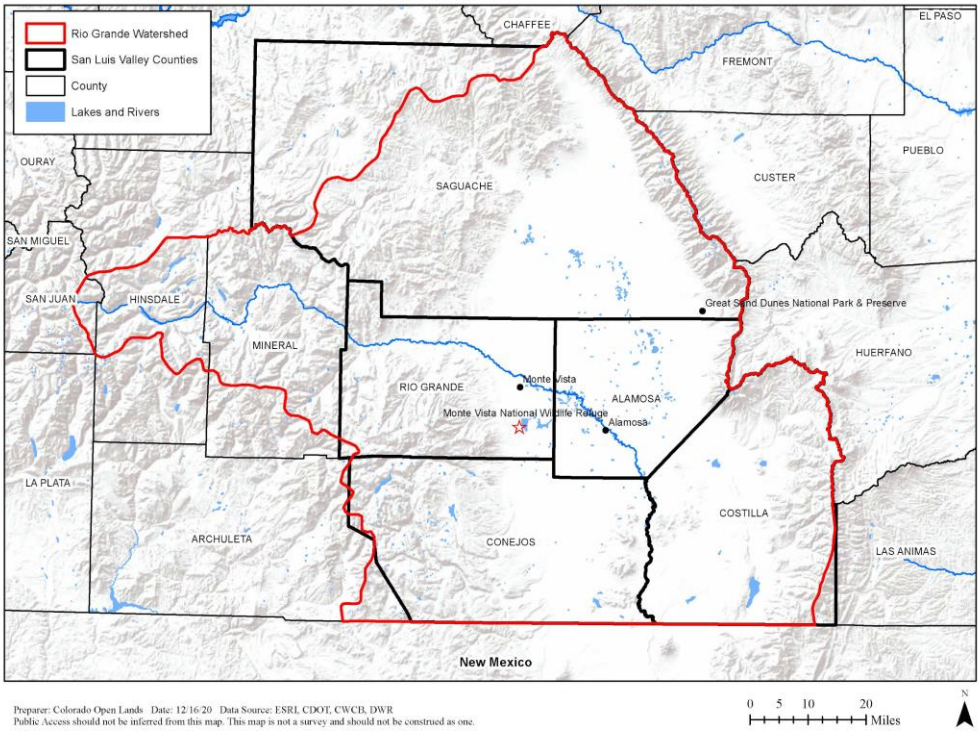

Figure 1. The study area consisted of the Upper Rio Grande Watershed (Red polygon) and Saguache, Rio Grande, Alamosa, Conejos, and Costilla counties (Dark black polygon), Colorado, USA.

Survey— We administered a survey to groups of visitors at crane tourist areas during the 2020 spring migration. Surveyors approached groups of visitors, explained the purpose of the research and, if they consented to participate, provided a clipboard, survey, and a pen or pencil to one member of the group. Respondents were asked a variety of questions about their trip—the survey instrument is included here as Appendix A. Surveys were administered at six main locations: Monte Vista National Wildlife Refuge Visitor Center, Alamosa National Wildlife Refuge Visitor Center, the three main crane viewing pullouts on the Monte Vista National Wildlife Refuge, and the arts and crafts fair that is part of the Monte Vista Crane Festival.

Visitation Estimation—We estimated the total number of crane visitors over a 30-day period from February 27th to March 27th, 2020 when cranes are typically present in large numbers in the SLV and tourist visitation is historically the highest. We placed pneumatic road tube counters (MetroCount, RoadPod VT5900) at five popular crane viewing sites on the Monte Vista and Alamosa National Wildlife Refuges to count the number of vehicles that visited each site per day. To correct for typical visitation to the wildlife refuges unrelated to the cranes we compared total number of cars during the crane migration to the total number of cars after the majority of cranes had left from March 28th through April 26th, 2020.

To estimate the total number of visitors and visitor days from the car counts we used the answers to a number of questions on the survey instrument. First, we categorized survey results by local or non-local visitors using zip codes from Question 2. Question 17 asked guests to estimate the number of times per day they visited each viewing area where a road counter was deployed. We used the average of answers to this question to correct the total number of cars for multi-site visitation. We then used average group size (Question 11) to estimate the total number of visitors. To calculate visitor days, we first corrected the total length of stay for each individual group using Questions 15 and 16 to only capture days spent in the San Luis Valley specifically for the sandhill crane migration, and then estimated the average length of stay. This average was finally used to estimate the total number of visitor days over the entire 30-day period, grouped by local and non-local visitation.

Direct Economic Impact—Questions 5-10 on the survey instrument asked respondents to estimate their typical daily spending per group per day based on nine different spending bins for six categories of activity (Hotel/Lodging, Food and Drinks, Gasoline/Fuel, Shopping, Entertainment, and Other). To evaluate spending when a group chose the ninth bin (More than $176) we used a formula of: (category 8 – category 7) + low point of category 9 = category 9 spending. Due to the categorical nature of the data, we used the mode of the responses and the midpoint of the spending bins to estimate typical daily spending.

Results

Survey Administration—Survey administration was constrained by staff or volunteer availability, and surveys were administered on 3/1, 3/6, 3/7, 3/8, 3/10, 3/11, 3/14, and 3/15. During these times surveyors approached 273 groups for survey responses and received 261 survey responses, a 95.6% response rate. We intended to administer surveys throughout the 30-day period that cranes were present but stopped after 3/15 due to the spread of Covid-19 into Colorado and out of precaution to avoid contact between volunteers and tourists.

Visitation—· We estimate visitors from the SLV made up 11.5% of visitation groups, and visitors from outside the SLV made up 88.5% of visitation groups. We observed an 89.3% decrease in car count visitation from the 30-day period with cranes to the 30-day period after cranes had left the SLV. Adjusting for normal local visitation through car counters, we estimate that 7,457 cars/groups visitors went through the Valley specifically for crane watching. Of these groups, 857 were local and 6,600 were from outside the SLV. Multiplied by the average group size (1.933 people per local group, 2.53 people per non-local group) we estimate that 1,657 local people and 16,685 non-local people visited crane viewing areas over the 30-day period.

Tourists visited from 164 different zip codes, 15 different states (Colorado, Arizona, Connecticut, Iowa, Kansas, Louisiana, Massachusetts, Michigan, Minnesota, New Mexico, New York, South Dakota, Texas, Wisconsin, Wyoming), and one other country (Canada). The majority of visitors (90.1%) were from within Colorado, and the top 5 counties Colorado survey respondent groups came from were: El Paso (29 groups), Denver (27 groups), Arapahoe (19 groups), Boulder (18 groups), and Jefferson (17 groups). Figure 2 displays the locations of residence for all respondents from within Colorado.

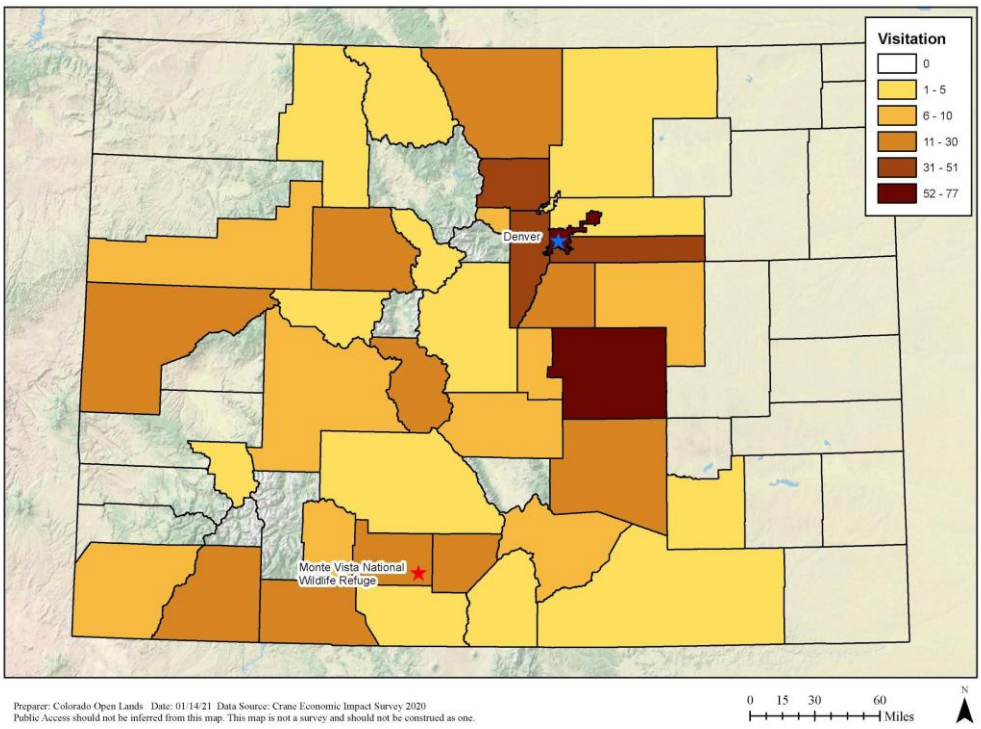

Figure 2. Visitation frequency of Colorado survey respondents by county.

Economic Impact—The average SLV local was likely to spend between $1-25 on gasoline and between $1-25 on shopping. Therefore, the average spending from a local crane watcher was $26 at midpoint. The average non-local visitor was broken down into two groups, 1) those not spending on a hotel (potentially camping) or passing through and 2) those spending on a hotel. The minority of non-local visitors (72; 31.17%) were in category one, and the majority (159; 68.83%) were in category two. The average group in category one spent $25-50 on food and $25-50 on gas per day. The average group in category 2 spent $101-125 on lodging, $51-75 on food, $25-50 on gas, and $25-50 on shopping per day. Using the midpoint of the categorical data we estimate that SLV residents spend $26 per day, nonlocals staying in hotels spend $252 per day and other non-locals spend $76 per day (Table 1).

	SLV Local	Non-local pass through	Non-local hotel
# of respondents	42	72	159
Spending person^{-1} day^{-1}	$26	$76	$252
Direct economic impact	$3,713.67	$473,31.49	$2,872,800.04
Total direct revenue	**$3,349,885.20**		
Total tax revenue	**$118,402.33**		

Table 1. Spending and direct economic spending by visitor categories.

Therefore, discounting for local visitors and calculating the direct impact from non-local visitors, we estimate the economic impact of the crane watching over the 30-day period to be $3,349,885.20. Broken down by categories of visitors, we estimate the economic impact to be $3,713.67 from SLV residents, $2,872,800.04 from non-locals who spent on hotels, and $473,371.49 from other non-locals (Table 1).

To estimate tax revenue from visitor spending, we used the local tax rate of Alamosa county, where the majority of hotels and restaurants are located in the SLV. The local tax rate of 3% is similar to those of the surrounding counties (Conejos, 0%; Costilla, 1%; Rio Grande, 2.6%; Saguache, 2.5%). We excluded gasoline and state tax from this estimate because the majority of visitors are from Colorado. Using the 3% tax rate we calculated the tax revenue from visitor spending at $92,638.33. Further, all local counties except Saguache county collect a 2% tax rate for lodging. Using this tax rate, we calculate an additional tax impact of $25,764. Therefore, the total revenue from these two tax bases is $118,402.33 (Table 1).

Finally, we asked respondents to estimate the total amount of money they would be willing to spend on additional services if they were offered in the SLV (Question 14, Appendix A). The small communities in the SLV have a limited ability to provide an abundance of services for the inconsistent tourists that visit for the crane migration. We asked respondents to identify potential services, such as additional tours or entertainment opportunities in town, that businesses might be able to provide as additional revenue sources. We estimate that on average, if additional services were offered, the local economy could capture an additional $316,778 in revenue, including $34,578 from local residents, $229,571 from nonlocals who spend on hotels, and $52,629 on nonlocal who do not spend on hotels.

Conclusion

We conducted the first comprehensive economic impact study of the sandhill crane migration in the San Luis Valley of Colorado. We found that the sandhill crane migration is a significant economic driver for the region, contributing nearly $3.5 million to the local economy, including $118,000 in local taxes. These findings show that the livelihoods of communities in the SLV are uniquely intertwined with this single species and the habitat that supports them.

Sandhill crane related ecotourism provides businesses in the Valley with significant revenue and allows the local economy to remain diversified. The crane migration attracts a unique group of tourists to the SLV that may not typically travel to this area. Virtually all tourists surveyed were visiting the SLV for the primary reason of viewing the sandhill crane migration, and the majority of these tourists were from outside of the region. The most common visitors to the SLV for other tourist activities are from metropolitan areas in Colorado, and while our data on the crane migration mirrors this trend, this event is attracting tourists during a time of the year when the majority of other tourism is not occurring. Sandhill crane migration ecotourism creates a unique opportunity for businesses to capture tourism dollars that are not typically available outside the region.

While sandhill cranes bring an obvious economic benefit to the SLV, the critical habitat that supports them is currently in decline. Sandhill cranes rely almost entirely on private agricultural lands while they are migrating through the SLV. Nearly 90% of their food requirements are met by waste grain left on barley fields after the harvest, and major crane roosts are located in wetlands on private land (Gammonley and Laubhan, unpublished data). As sustained droughts become the new normal, these private

agricultural operations are struggling to maintain the habitat that has supported the cranes up until now. Declining water supplies threaten to dry up wetlands and have caused the price of water to increase to a point where some farmers can no longer grow barley. If these trends continue without intervention the SLV may begin to see fewer cranes arriving each year, and eventually fewer tourists.

The annual sandhill crane migration through Colorado is a natural marvel. Sandhill cranes, and the habitat that they depend on, provide countless benefits to ecosystems and communities alike. By reporting on this research, we hope to demonstrate just one more reason that the sandhill cranes are intertwined with prosperity in the San Luis Valley.

References

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5. Dority, B. R., Thompson, R., Kaskie, S. & Tschauner, L. The economic impact of the annual crane migration on central Nebraska. *College of Business and Technology, University of Nebraska at Kearney, Kearney, NE* (2017).
6. Lingle, G. R. History and Economic Impact of Crane-watching in Central Nebraska. *North American Crane Workshop Proceedings* **6**, 33–37 (1992).

Appendix A

Sandhill Crane Economic Impact Survey – Spring 2020

Please complete only one survey per group

Your answers to this survey will be an important part of an economic impact study to help us preserve the Sandhill Crane Migration in the San Luis Valley of Colorado. Please make your answers applicable to your current visit to observe the **Sandhill Crane Migration**. **Your answers will be completely CONFIDENTIAL and ANONYMOUS.** Thank you for your time!

1. In which country do you live? ☐ United States ☐ Other:_____

2. If you live in the United States, what is your zip code? ☐☐☐☐☐

3. Have you visited and observed the Sandhill Crane Migration in the San Luis Valley before? ☐ Yes ☐ No

4. How did you learn about the Sandhill Crane Migration? (Check all that apply)

   ☐ Word-of-Mouth ☐ Magazine
   ☐ Website ☐ Visitors Bureau
   ☐ Social Media ☐ Hotel
   ☐ Newspaper ☐ Brochure

Please estimate your group's **typical DAILY** spending in the following categories while viewing Sandhill Cranes in the San Luis Valley. That is, please include **ALL** spending for and by the entire group locally, not just your individual spending.

	N/A	$1-25	$25-50	$51-75	$76-100	$101-125	$126-150	$151-175	$176+
5. Hotel/Lodging	o	o	o	o	o	o	o	o	o
6. Food and Drinks	o	o	o	o	o	o	o	o	o
7. Gasoline/Fuel	o	o	o	o	o	o	o	o	o
8. Shopping (Souveneirs/Gifts)	o	o	o	o	o	o	o	o	o
9. Entertainment (Arts, Museums)	o	o	o	o	o	o	o	o	o
10. Other (list)_____	o	o	o	o	o	o	o	o	o

11. How many people are in your group and included in the above spending? _____ people

12. How many days have you or will you be visiting the San Luis Valley? _____ days ☐ I live Locally

13. If you are spending money on lodging in the San Luis Valley, please write the **name** of your accommodations (i.e. Airbnb, hotel name, campground name) and the **town** in which you are staying.
    Name:_____
    Town:_____

14. If the following additional services/options were available during your trip, which would you spend money on? Please select all that apply and estimate how much **your group** would be willing to spend **over your entire trip.**

Additional Service	**est. $**
☐ Private company crane tours	_____
☐ Access to crane photography blinds on private land	_____
☐ Additional events at businesses in town (e.g. live music, happy hours)	_____
☐ Other (specify)_____	_____

15. How important was the **Sandhill Crane Migration** in your decision to visit the San Luis Valley? Please choose ONLY ONE response.
    ☐ It was the principal reason I came to the area
    ☐ It was one of several reasons I came to the area
    ☐ It was mentioned in local visitors guides and looked interesting
    ☐ It was not important because I would have visited the area anyways.

16. If it is not your principal reason for visiting the San Luis Valley how many **extra** days will you stay because of the **Sandhill Crane Migration**?
    ☐ 0 days (it has no effect on the length of my trip)
    ☐ 1 day
    ☐ 2 days
    ☐ 3 days
    ☐ 4 days
    ☐ 5 or more (please list ____)

17. Please estimate the number of times **per day** that you visited each area on the Monte Vista Refuge.
    ___ Road 8 South Pullout for barley field
    ___ Highway 15 east pullout for loafing wetland
    ___ Auto Tour Loop at Monte Vista Visitor Center

18. What other tourism venues have you or are you planning to visit?
    ☐ Alamosa National Wildlife Refuge
    ☐ Great Sand Dunes National Park
    ☐ Rio Grande Natural Heritage Area
    ☐ Local State Wildlife Areas
    ☐ Bureau of Land Management Areas
    ☐ Forest Service Land
    ☐ Hot Springs (please name):_____
    ☐ Other (please specify) _____

This study made possible by a collaboration of the following partners:

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Code	Date

The Colorado Sun

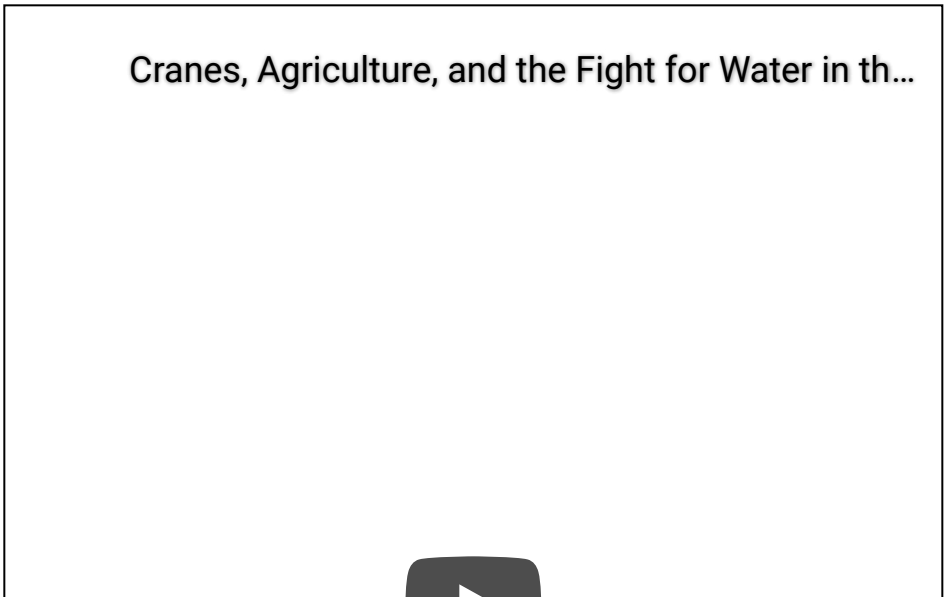
OPINION COLUMNS

Video opinion: Battle over San Luis Valley water draws in sandhill cranes

Max Ciaglo 4:40 AM MDT on Mar 15, 2020

(Michael Ciaglo, Colorado Open Lands)

Sandhill cranes have been migrating through the San Luis Valley of Colorado for thousands of years. The Rio Grande River likely attracted the first cranes to the Valley, providing the ideal habitat and abundant food resources that they required to complete their migration.



Early settlers brought agriculture to the San Luis Valley with them. To irrigate fields to grow hay, farmers diverted water from rivers onto the land, mimicking natural wetlands and effectively expanding habitat for cranes to thrive. When wheat and barley farming began in the valley in the 1900s, it also provided a high-calorie food resource that buoyed crane populations that were dwindling throughout North America.

More than 50% of land in the valley is now publicly owned, but over 90% of existing wetlands are on private farmlands. Although these lands and the water on them are managed as part of private business operations, they provide critical habitat for sandhill cranes.


Max Ciaglo

However, we in Colorado relate all too well to the sentiment that "whiskey's for drinking; water's for fighting."

The battles are fought on many fronts: agricultural versus municipal users; rural towns versus urban centers. Water often flows towards money.

Water in Colorado's rivers and streams is sometimes diverted from one r basin to meet the demands of another. These exports take water from once-

productive agricultural lands and dry them up in the process, and the wildlife that depend on these lands are often left out of the discussion entirely.

MORE: As metro Denver grows, another caller wants to tap the vast aquifer under the San Luis Valley

In the San Luis Valley declining groundwater and extended drought have already left the land thirsty for water. But even now, as Colorado knocks on the door of a third decade of consistent drought conditions, other interests are eyeing water from the valley's underground aquifer to export to growing cities on the Front Range of Colorado.

Farmers and ranchers across the valley have been working together with partners like Colorado Open Lands and other local coalitions for decades to protect and conserve their water. As they come together once again to fight the threat of water export, they are fighting to make sure that there is a future for agriculture in the Rio Grande Basin. And as long as there is a future for agriculture there will be a future for sandhill cranes.

Max Ciaglo is the Grain for Cranes Fellow at Colorado Open Lands, a statewide land and water conservation nonprofit. The Grain for Cranes program aims to support sandhill crane habitat by supporting agriculture in the San Luis Valley. Find out more at ColoradoOpenLands.org