NOTES FROM THE FIELD
GEOLOGIC RESOURCES INVENTORY
GREAT SAND DUNES NATIONAL MONUMENT, CO

Geology Workshop Report
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SUMMARY

FIELD TRIP

Park resource specialist Andrew Valdez led NRPC staff on an afternoon field trip explaining the park's geology and identifying resource concerns and ongoing research. The sand that makes up the dunes is the primary resource of the park. The sand is constantly recycled as it is caught up in a complex cycle of winds alternately crossing the San Luis Valley to the west and the Sangre de Cristo Range to the east. Maintaining that cycle is essential to the preservation of the dunes. There are three geologic components to the park and dune system; a stable sand sheet surrounding the dunes; the active dune fields, and a sabka system (internally drained evaporative basin) to the west of the park. There are some xxx miles^2 of dunes in the field, of which xx miles^2 are in the park. Additionally, there are metamorphic crystalline rocks exposed in the northeast corner of the park which, while having no impact on the dunes, non the less represent a significant geologic feature. We observed sites where the sand lapped onto the bedrock as well as onto alluvial fans extending from the mountain front.

RESEARCH

Sand traps identify the provenance of the sand and the effect varying levels of vegetation have on dune stabilization and motion. NRPP money funding for study?
Re-establishing abandoned USGS gauging stations at several of the creeks leading down off the mountain.
Early 90s research revealed that the sand sheet west of the park provided a critical element in the sand cycle. Maintaining that sand sheet west of the park was critical to dune preservation.
There is ongoing research in the region related to an anticipated proposal to mine the ground water of the San Luis valley

RESOURCE CONCERNS

In the early 1990s a proposal was put forth to mine the extensive ground water resources of the San Luis Valley. The park was concerned about the effect this would have on the dunes and the sand cycle. The local agriculture community was equally concerned about the impact on their irrigation source. Although that proposal was defeated, a similar one is anticipated in the near future. There will be significant state involvement in any future proposal.

RMP statements

Acquire MF maps from USGS multiple copies for park, I&M, GRD
Talk to NRCS about soils mapping in GRSA (and other CO parks) for status, including digital

FAQ
How old
How thick
How tall
Where do they come from
Are they changing?

Cannot answer age, have a minimum thickness of 710 + 130 well depth, height is 710 max, some changing/motion,

Coop sales data
Geol Map of Colorado Hwy map - 127
So. Rockies Hwy Map 60

Jim McCalpin:
Our Index Map indicates MF 2089, question about mapping extent, maps done in support of SdC wilderness
Two new references: add to list

Digital map use: General public – cobble together existing maps and pull out a compilation
Best situation would be to dedicate a specific map a la ROMO
State mapping projects probably of limited interest – no hazards in large population areas
Hazards – VC on fault scarps, c
ampground location possible on landslide/debris flow, no interest shown by USGS on McCalpin proposal to investigate SdC fault for potential active status

Adams State – senior projects possible for mapping, break out pre Cambrian units

CSM seismic work report available

CGS study by Kirkham (sp) on seismic hazards for area ?
Georef doesn't appear to be capturing phd
I-1594 displays fault lines taken from McCalpin map

Recommended compilation pieces:
Bedrock from two MF 2089, 2168
Surficial from I 1594
Dunes from 575-C
Units would be the three sand units: active dunes, sand sheet, sabka

There is flexibility to allow a GIS theme for the different units,

General belief is that a popular publication, including a map showing informal units, would be popular and worthwhile for interp

ISSUES
1. Date the dunes

USGS lab closed, need funding, samples remain with USGS, cost about $600/sample,

Scientific investigations Water Resource Research Report

2. Surface shaking, earthquake issues, water tanks, pipelines – most facilities within 100 yards of fault lines, tie down to mapping

3. Ground water relation to faulting – 1976 thesis showing faults acting a barrier to ground water passage, another reason to study faults

4. May require another more complete map of faulting

5. Differentiate paleo fluvial channels within park – link to global warming studies, thereis existing climatic history of dunes (also human history, hydrology history)

6. Depth to bedrock – major basin fault located west of major dune field, seismic in 1995? paper on Rio Grande rift, drilling for depth this next fiscal year, to confining layer then just below, maybe to 300 feet

7. Fryeberger issues – preservation of sand sheet critical to dune preservation – grazing of veg on sand sheet and its impacts on dunes

8. Water withdrawl – impacts on sabka

9. main concern is with water QUANTITIES, wind and shape of mountain front cannot be managed, emphasis

10. Research into sands, light colored ripples are coarser grained, different mineralogy, is provenance different? Why don't they mix? Different wind regimes?
11. Infiltration of moisture into soil rates: Meteoric water? Ground water? What is vapor phase coming from?
12. Relationship of vegetation on dunes to soil moisture

INTERPRETIVE NEEDS

Products
Xbedding post card
Geologic publications
Other postcards – xbeds, geol map
Exhibits
Sand peel

Rotating

In house training document geologic piece of the story
Can we get a copy of this

Publish proceedings
Electronic Documents – online
GSA proceedings from 1996 on San Luis Valley area

Talk to Bob on including inland dune parks in coastal processes symposium
Bill Wellman, Jane Beyner? Possible initiators
Including academic community

Report on the park – Andrew would edit/coordinate Possible Mary Mickelsen as author? Using Cooperating org, I&M, GRD project monies

Additional data coming in – deep well

Is there Lexam (Tom Watkins geologist) data available

UNIQUE GEOLOGIC FEATURES

Surge flows

DISTURBED LANDS – Steensen

Some prospect pits and shafts

HAZARDS AND ISSUES

Water – from WRD

Hazards – Jim McCalpin write up from proposal

HISTORY OF GEOLOGIC EXPLORATION IN AREA – human history – Mary
Possible funding by I&M year end money