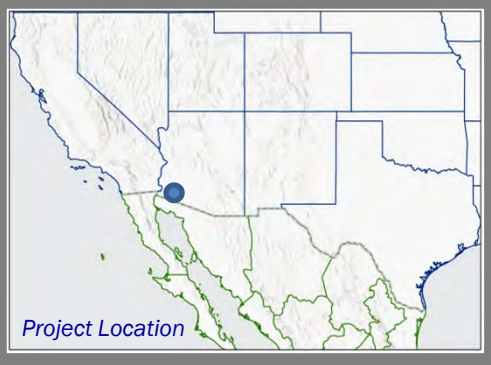
ACTIONABLE SCIENCE

Using a Mobile App and Remote Sensing to Map, Monitor, and Control Invasive Plants

Non-native plants have invaded much of the Sonoran Desert, threatening native plants and wildlife. At the Barry M. Goldwater Range-West (BMGR-W), on lands managed by the Marine Corps Air Station Yuma (MCASY), managers are working with partners to detect, map, monitor, and treat invasive Sahara mustard (*Brassica tournefortii*) and buffelgrass (*Pennisetum ciliare*). To improve efficiency and effectiveness, MCASY has adopted a process that uses a weather-monitoring network, a web-based program called DroughtView, and a cloud-based mapping app called GIS Cloud. These tools are helping the team prioritize and document their activities in-the-field.



Native Plants on the Mohawk Dunes in Southwest Arizona

KEY ISSUES ADDRESSED

Sahara mustard and buffelgrass are drought-tolerant plants from Africa and Eurasia that spread easily in the Sonoran Desert, outcompeting native plants for resources. Buffelgrass and, to a lesser degree, Sahara mustard increase fire frequency and size. These fires can kill native vegetation at BMGR-W, including cacti, shrubs and species that are relatively rare or limited in distribution, such as elephant tree (*Bursera microphylla*), sand food (*Pholisma sonorae*), and blue sand lily (*Triteleiopsis palmeri*). Fires supported by non-native species also threaten military infrastructure.

BMGR-W covers nearly 700,000 acres in southwestern Arizona. This makes it difficult to effectively monitor and treat plant populations that are constantly moving, changing, and spreading. To address these challenges, MCASY uses new tools and a collaborative approach that leverage the expertise of its partners, University of Arizona (UA) and the National Park Service's Lake Mead Exotic Plant Management Team (NPS).

PROJECT GOALS

- Increase efficiency and effectiveness of field operations to monitor and control buffelgrass and Sahara mustard over a large area

Sahara Mustard-Dominated Dunes

THE SKY'S THE LIMIT

The useful simplicity of GIS Cloud allowed the team to collect a very high number (1,750) of data points during the winter of 2016-2017.

PROJECT HIGHLIGHTS

Weather-Monitoring Network: MCASY hosts five weather stations at BMGR-W that are integrated into a regional weather-monitoring network that includes stations hosted by neighboring federal agencies. The team uses the network to track rainfall patterns across the landscape and identify areas where the subsequent germination and growth of non-native plants are likely.

DroughtView: DroughtView, a web-based remote sensing tool, displays conditions in the field. The team uses it to identify areas where non-native species may be growing.

GIS Cloud: Using GIS Cloud, a Cloud-based mapping app, the team collects field data on iPhones using dropdown menus. With standard phone service, data can be uploaded onto the GIS Cloud website and then viewed by all partners. Each data point can include photos, audio, or notes. UA manages the cell phone technology, and manages and interprets data.

Control of Invasives: NPS implements control treatments, which may include manual removal or herbicide. With input from the team, NPS plans and implements control using the data in GIS Cloud. UA monitors effectiveness and their research helps inform adaptive management.

Collaborators

- Marine Corps Air Station Yuma
- University of Arizona
- National Park Service

Funding Partners

- Marine Corps Air Station Yuma

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Photos courtesy of Jim Malusa/University of Arizona

LESSONS LEARNED

Using DroughtView saves the team time, money, and effort by allowing them to plan and prioritize control efforts before sending anyone into the field.

Conservation Law Enforcement Officers (CLEO's) patrol BMGR-W 7 days a week. Using GIS Cloud, CLEO's can collect and transmit data on infestations in a few seconds while they are working on their primary duties. CLEO's have contributed large amounts of data to the project.

The large dataset from GIS Cloud provides NPS with the information they need to implement a focused and timely control effort.

The success the team has had using GIS Cloud has inspired agencies nearby to adopt it. This should reduce the spread of these species onto BMGR-W from neighboring lands, and maximize the effectiveness of control efforts.

NEXT STEPS

- Continue monitoring, mapping, and control efforts on BMGR-W lands
- Update communication abilities of weather station network to allow for better monitoring and tracking of precipitation events
- Work with neighboring land managers to coordinate more effective weed management region-wide

PROJECT RESOURCES

For more information on this project, contact Randy English: randy.english@usmc.mil

For additional project resources and case studies, visit the Collaborative Conservation and Adaptation Strategy Toolbox: WWW.DESERTLCC.ORG/RESOURCE/CCAST

Native Ajo Lily and Sand Verbena on Dunes near Yuma, Arizona