

James San Jacinto Mountains and Oasis de los Osos Reserves

Report period: July 1, 2017 – June 30, 2018

OVERVIEW

During the 2017-18 fiscal year, there were 544 unique visits to the James Reserve for a total of 1,198 visitor days. Compared to the previous year and the previous 5 years average (Fig.1), the James experienced a small increase in user visits, but also a small decrease in user/days, suggesting that visitors may commute to the James or that there is a trend towards researchers spending shorter periods of time to pursue field work.

The predominant activity type of the Reserve changes from year-to-year, in part because of the goals of the James. This year, we increased public use and research and we experienced a slight decrease in teaching (Fig.2).

In 2017-18 public use was the most common use at the reserve (Fig. 3) with 47.9% of the total time, followed by instruction (32.7%) and research (19.4%). For the Oasis de los Osos reserve, there were 2 unique groups, totaling 2 user days. Both visits were associated with research.

We aim to increase the use of the James Reserve to fulfill our mission to support research, teaching and outreach. During the last fiscal year, more groups visited the reserve compared to the previous years. A decrease in teaching was complemented by a small increase in research use and a significant increase in public use. Several new peer-reviewed publications resulted from the active research programs in the reserve.

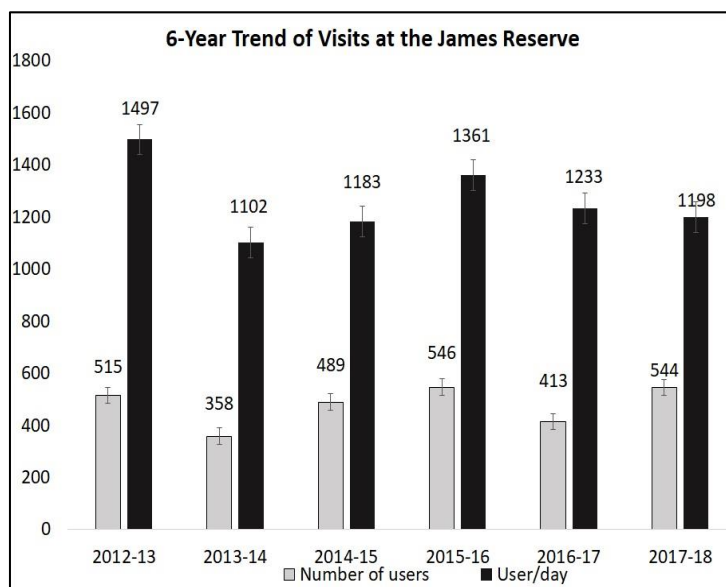


Figure 1. Six years of users' visit at the James Reserve

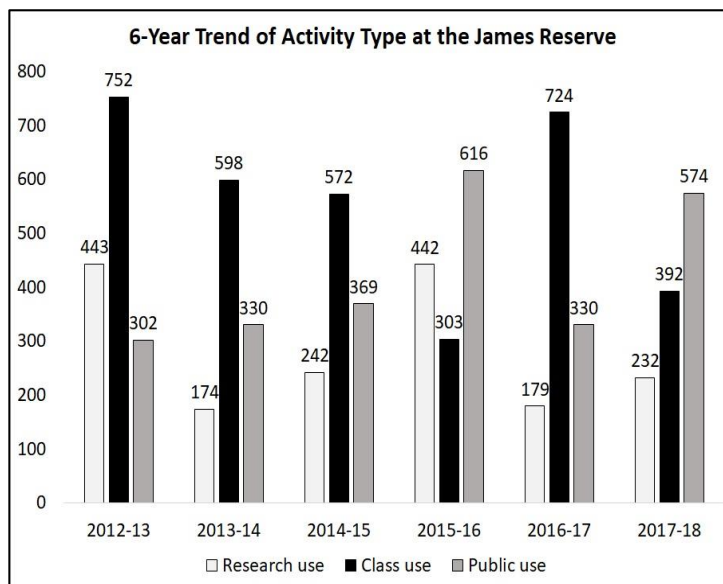


Figure 2. Six years of use by type at the James Reserve

RESEARCH AT THE JAMES

Research directions and projects have diversified during the last year. During 2017-18, 25 research projects were conducted at the James Reserve and two at the Oasis de los Osos (Appendix 1). The research topics spanned a variety of disciplines; projects were conducted from at least 20 different institutions, including five University of California campuses (UCR, UCLA, UCB, UCSD, and UCSC), three campuses from other university systems in California, five out- of-state universities, three international universities, three government agencies and one consulting firm.

Of the 25 research projects, only seven provided some information of grant funding, totaling \$3,967,664, with an average of \$566,809 per project. The following is a list of the projects at the James Reserve with high levels of funding:

- Ecology and systematics of parasitic fungi in the Zoopagomycotina (\$2,000,000)*
- Microclimate dynamics on an elevation gradient (\$998,000),*
- The California Acorn Survey (\$450,000).*
- ISEECI Collaborative Research: Eco physiological Instruments for Measuring Biotic Climate Impacts Across Western Field Stations (\$444,961)*
- Centennial Resurvey of San Jacinto Mountains (\$42,720)*
- Mountain Yellow-Legged Frog Monitoring Project (\$30,000)*

RESEARCH AT OASIS DE LOS OSOS

At Oasis de los Osos, the primary continuing project is “Flora of the San Jacinto Mountains” conducted by staff of the University of California, Riverside and California State University (CSU), Long Beach (Vascular Plants of the Oasis de Los Osos Reserve, San Jacinto Mountains, California. A Fisher, B Betz. Crossosoma 42 (1), 1-36)

At los Osos and the James, University of California, Riverside and the University of Florida started a new project about “Environmental sampling for Zoopagomycotina fungi” in March 2018.

CLASSROOM INSTRUCTION

One of the uses of the James Reserve is as an outdoor laboratory and classroom for university level instruction. The amount of university teaching (32.7%, Fig.3) at the James Reserve decreased compared to the previous year (58.7%). Six classes visited the James in 2017-18. The number of students (161) was similar to the previous year (171). However, the student user days (392) was almost half the number in 2016-17 (724). This suggests that the visiting classes stayed in the reserve on average for shorter periods of time (2.43 days vs 3.83 of the previous year). In addition to one class from our parent institution (UCR), there was one class from UCLA, one class from California State University in Northridge, one from the Irvine Valley College and two from Pepperdine University. Classes included ecology, botany, and mammalogy. No class visited Oasis de los Osos during this fiscal year.

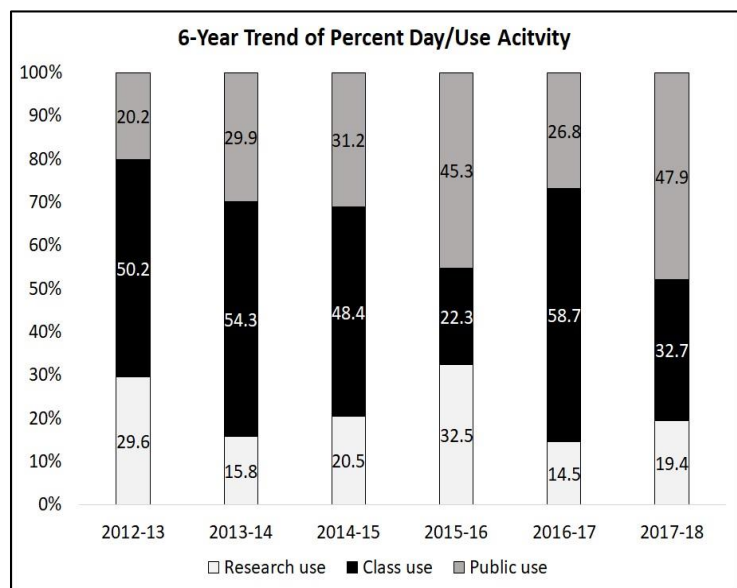


Figure 3. Six years of percent use by type at the James

PUBLIC OUTREACH

One of the main missions of the University of California Natural Reserve System is Public Outreach (<http://nrs.ucop.edu/mission.htm>). We try to accommodate public groups and they are welcome at the Reserve as long as it does not compromise the groups that need the ecological resources that the Reserve provides to researchers and classes. The James Reserve remains available to k-12 institutions, meetings of various organizations, and public groups. Outreach efforts occur both at the Reserve and offsite. Offsite visits and events are aimed at increasing the public's awareness of the activities at the James Reserve as well as the scientific knowledge generated by research efforts at the James.

This last fiscal year the James Reserve hosted several public groups including Idyllwild Arts Academy, The Southern California Chapter of the Wildlife Society, the Smithsonian Environmental Research Center, and the Trailfinders organization established by the founders of the James Reserve, Harry and Grace James. Seventy people, of which 21 were represented by original Trailfinders and family members, attended the Summer Reunion, an open house and the dedication of a cabin to Marvin Blair, a Trailfinder who passed away on March 12, 2013. At the reunion, guests of honor included: Dr. Mike Hamilton, (former director of the James Reserve) and the UC Riverside Dean of Natural Sciences.

PUBLICATIONS

A number of non-peer reviewed and peer-reviewed articles regarding the research conducted in the James Reserve was published during the 2017-18 fiscal year. Only one peer-reviewed publication was published from research at Oasis de los Osos. The list of publication is shown in Appendix 2.

STEWARDSHIP AND FACILITIES

During fiscal year 2017-18 there were few improvements made to the stewardship and facilities of the James. The most significant improvements were the replacement of the old generator with a new RCB 38kWh Kohler propane generator and construction of ramp for the Blair House, increasing accessible of the cabin to visitors who cannot climb the stairway entrance.

No improvement were made at the Oasis de los Osos.

REPORT METHODS:

The data presented in this report was generated by algorithms built in the RAMS 2.0 software.

Data is created from input from the users and then reviewed by the management.

Data is for a specific fiscal year and is only taken from approved reservations.

If the visitors came only for a day visit without spending the night at the reserve the user/day data was calculated by multiplying the number of users by 1. If they spent one night in the reserve the user number would be multiplied by 2 and so forth.

APPENDIX 1: List of Research Projects during the 2017-18 Fiscal Year.

James Reserve:

“Centennial Resurvey of San Jacinto Mountains” University of California, Riverside | San Diego Natural History Museum, \$42,720.00.

“Mountain Yellow-Legged Frog Recovery” San Francisco State University (CSU) | US Geological Survey | USGS | U.S. Geological Survey WERC. U.S. Forest Service (USFS) 09-CS-11051200-024, \$30,000.00

“California Acorn Survey” University of Nebraska | Cornell University NSF, \$450,000.00

“What does a species mean?” University of California, Riverside.

“Effects of climate change on demography and population dynamics of plants” University of California, Riverside.

“Preliminary assessment of bumble bee fauna of the James San Jacinto Mountain Reserve” University of California, Riverside | California State University (CSU), Fullerton | Vector Space Systems.

“Spotted Owl Research for US Forest Service”, US Forest Service.

“Flora of the San Jacinto Mountains”. California State University (CSU), Long Beach.

“Forest Dynamics Plot” University of California, Riverside | Smithsonian Institution | Unaffiliated with any institution | Smithsonian Environmental Research Center.

“Microclimate dynamics on an elevation gradient” University of California, Riverside. National Science Foundation (NSF), \$998,000.00.

“Rural population data collection and banding” University of California, Los Angeles. Santa Monica Bay Audubon Society, \$550.00, Los Angeles Audubon Society, \$1,433.00.

“ISEECI Collaborative Research: Ecophysiological Instruments for Measuring Biotic Climate Impacts Across Western Field Stations” University of California, Berkeley | University of California, Santa Barbara | University of California, Santa Cruz | University of California, Office of the President | Northern Arizona University | UC Berkeley. National Science Foundation (NSF) 1522558, \$444,961.00.

“The Physiological Genomics of Diet Switching in Mammalian Herbivores” (University of Utah).

“Phylogeography of Carpenter ants from the California Channel Islands” University of California, San Diego.

“Identifying Effects of Aspect on Litter Decomposition” University of California, Riverside.

“Changes in ectomycorrhizal formation, diversity, and community composition Comparison with 2011 survey” Tottori University, Japan.

“Ornithology Excursion pre-conference PAG” University of Konstanz, Germany.

“Scouting for Field Mycology class” University of California, Riverside.

“Effects of climate change on nectar microbes” University of California, Riverside / College of the Desert

UCR Extension).

“California Lepidoptera Survey” UC Berkeley/University of Connecticut/California Academy of Science/Denver Museum of Nature and Science.

“Flight initiation distance across latitudinal and elevational gradients” University of California, Los Angeles.

“Environmental sampling of microparasitic fungi in the Zoopagomycotina” University of California, Riverside | University of Florida. National Science Foundation (NSF) 1441715, \$2,000,000.00.

“Observation of Formica Ants” University of California, Riverside.

“Incorporating species-specific dispersal pathways in models predicting aquatic metacommunity responses to climate change” University of California, Riverside | University of California, Santa Barbara.

“The role of group size in the evolution of organizational complexity” University of California, Los Angeles | Cornell University | University of California Los Angeles.

Oasis de los Osos:

“Flora of the San Jacinto Mountains” University of California, Riverside | California State University (CSU), Long Beach

“Environmental sampling for Zoopagomycotina fungi” University of California, Riverside | University of Florida

Appendix 2: List of peer-reviewed articles published during fiscal year 2017-18.

James Reserve:

Ahn J, Park J, Park D, Paek J, Ko J. Convolutional neural network-based classification system design with compressed wireless sensor network images. *PloS one*. 2018 May 8;13(5):e0196251.

Allen, M.F. and Allen, E.B., 2017. Mycorrhizal mediation of soil fertility amidst nitrogen eutrophication and climate change. In *Mycorrhizal Mediation of Soil* (pp. 213-231).

Ashley, M.V., Backs, J.R., Kindsvater, L. and Abraham, S.T., 2018. Genetic Variation and Structure in an Endemic Island Oak, *Quercus tomentella*, and Mainland Canyon Oak, *Quercus chrysolepis*. *International Journal of Plant Sciences*, 179(2), pp.000-000.

Baker, N.R. and Allison, S.D., 2017. Extracellular enzyme kinetics and thermodynamics along a climate gradient in southern California. *Soil Biology and Biochemistry*, 114, pp.82-92.

Baker, N.R., Khalili, B., Martiny, J.B. and Allison, S.D., 2018. Microbial decomposers not constrained by climate history along a Mediterranean climate gradient in southern California. *Ecology*, 99(6), pp.1441-1452.

Chi, H., Pitter, S., Li, N. and Tian, H., 2018. Big Data Solutions to Interpreting Complex Systems in the Environment. In *Guide to Big Data Applications* (pp. 107-124). Springer, Cham.

Collignon, R.M., 2017. *Semiochemistry of Cerambycid Beetles: Interactions Among Pheromones, Host Plant Volatiles, and Density Dependent Effects*. University of California, Riverside.

Collins, S.L. and Brown, R.F., 2018. Getting Started With Sensor Networks in Experimental Ecology: Pitfalls and Pratfalls. *The Bulletin of the Ecological Society of America*, 99(2), pp.277-283.

Fu, C., Wang, G., Bible, K., Goulden, M.L., Saleska, S.R., Scott, R.L. and Cardon, Z.G., 2018. Hydraulic redistribution affects modeled carbon cycling via soil microbial activity and suppressed fire. *Global change biology*.

Fuller, Z.L., Haynes, G.D., Richards, S. and Schaeffer, S.W., 2017. Genomics of natural populations: Evolutionary forces that establish and maintain gene arrangements in *Drosophila pseudoobscura*. *Molecular ecology*, 26(23), pp.6539-6562.

Koenig, W.D., Knops, J.M., Carmen, W.J. and Pesendorfer, M.B., 2017. Testing the terminal investment hypothesis in California oaks. *The American Naturalist*, 189(5), pp.564-569.

Knudsen, K.E.R.R.Y., Lendemer, J.C., Schultz, M.A.T.T.H.I.A.S., Kocourková, J.A.N.A., Sheard, J.W., Pignoli, A. and Wheeler, T., 2017. Lichen biodiversity and ecology in the San Bernardino and San Jacinto Mountains in southern California (USA). *Opuscula Philolichenum*, 16, pp.15-138.

Illangasekare, T.H., Han, Q. and Jayasumana, A.P., 2017. Environmental Underground Sensing and Monitoring. In *Underground Sensing* (pp. 203-246).

Singla, T. and Manshahia, M.S., 2017. Wireless Sensor Networks for Pollution Monitoring and Control.

Song, Y., Shin, H. and Paek, J., 2018. Lightweight Server-Assisted HK Compression for Image-Based Embedded Wireless Sensor Network. *IEEE Systems Journal*, (99), pp.1-11.

Sreekantha, D.K. and Kavya, A.M., 2017, January. Agricultural crop monitoring using IOT-a study. In *Intelligent Systems and Control (ISCO), 2017 11th International Conference on* (pp. 134-139). IEEE.

Willyard, A., Gernandt, D.S., Potter, K., Hipkins, V., Marquardt, P., Mahalovich, M.F., Langer, S.K., Telewski, F.W., Cooper, B., Douglas, C. and Finch, K., 2017. *Pinus ponderosa*: A checkered past obscured four species. *American journal of botany*, 104(1), pp.161-181.

Oasis de los Osos:

Fisher A. and Betz, B. Vascular Plants of the Oasis de Los Osos Reserve, San Jacinto Mountains, California *Crossosoma* 42 (1), 1-36.