



Flying With Swallows – a Model for Undergraduate Research-Based Learning

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CCURI
COMMUNITY COLLEGE UNDERGRADUATE
RESEARCH INITIATIVE

Ecosystem Survey

- The observations of the cliff swallow population and MVC Fauna (co-habitants of swallows) are conducted by biology major and non-major students and volunteers from college faculty and staff.
- The locations and status of nests, and MVC fauna are monitored using Esri mapping technology.
- The project is ongoing, and the data will be used for long-term population studies in relation to environmental changes and the fragmentation of natural habitats due to human developments.



Maps showing the position of nesting swallows on MVC campus throughout the years 2015 (top right), 2016 (top left), 2017 (bottom left), and 2018 (bottom right). Adopt A Window Initiative



Bobcat and deer captured by motion-trigger wildlife cameras



MVC Fauna ArcGIS map 2015-2018.

Ecosystem Investigation

- DNA Barcoding technique with cytochrome oxidase subunit 1 gene has been employed to analyze insects on the campus and insects found in stomachs of the birds found deceased on campus.
- Biology major students and students conducting individual research identified insect pest species consumed by cliff swallows (flying fire ants, western dry wood flying termites and scentless weed bugs), supporting the swallows' role as insectivores that regulate populations of insects considered pests to humans and to agriculture.



Description	Max score	Total score	Query cover	E value	Ident	Accession
Solenopsis aurea isolate Solauro1 cytochrome oxidase subunit 1 (CO1) gene, partial cds; mitochondrial	1098	1098	96%	0.0	99%	KJ929512.1
Solenopsis xyloni voucher UCDC PSW15020 CASENTO106041 cytochrome oxidase subunit 1 (CO1) gene, partial cds;	1074	1074	97%	0.0	98%	JQ742649.1

- General Chemistry students tested metal ion concentrations in soil extract samples from local soils and soil found in fallen swallow nests. A new Laboratory Manual for the four chemistry courses involved in the FWS project have been implemented.

More on FWS on college website:

<http://www.mvc.edu/academicprograms/swallows/>

2019 STEM For All Video Showcase Facilitator's Choice Recognition:

<https://stemforall2019.videohall.com/presentations/1427>



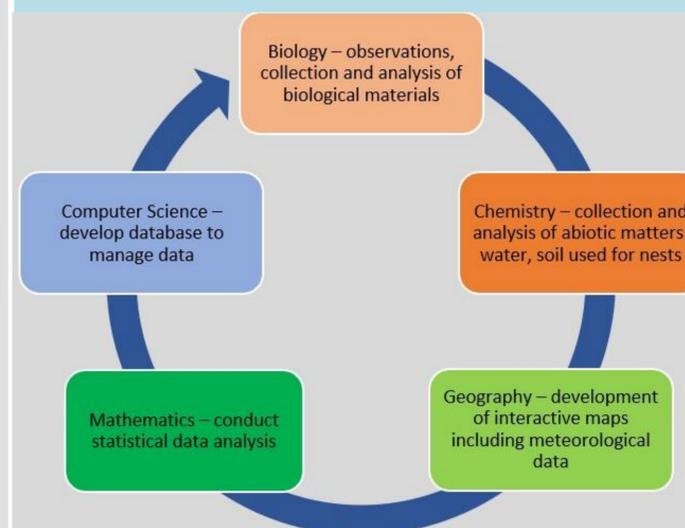
Swallow Day at MVC

Lessons Learned and Future Plans

The FWS project identify essential elements of the undergraduate research-based program:

1. Engaging and inclusive research topic
2. Enthusiastic faculty
3. Clear goals and objectives
4. Intra- and inter-curriculum activities
5. Student-driven projects
6. Constant information flow
7. Adequate assessment methods
8. Administrative support
9. External collaboration with experts
10. Dissemination of results on all levels

The goal of the FWS is to expand to more disciplines, so the project becomes an unifying umbrella for MVC students and an identification beacon to other institutions.



The surroundings of MVC have presented unique undergraduate research opportunities and experiences for STEM students

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Abstract

Every year, Moreno Valley College (MVC) in Southern California is host to the seasonal residence of the American cliff swallows, *Petrochelidon pyrrhonota*. The swallows present an opportunity for research within the community college. Students have monitored nesting habits of swallows on campus since 2014 using Esri software. The five-year observations indicate fluctuations in population size of swallows at MVC and time of their arrival. DNA barcoding technique for the CO1 gene has been used to analyze the stomach contents of the birds found deceased on campus. Cliff swallows are insectivores consuming flying fire ants, western dry wood termites and scentless weed bugs. The college's ongoing research with these birds contributes to our understanding of the cliff swallow as a migratory bird and a model organism for biomonitoring.

Introduction

- The geographical location of Moreno Valley College (MVC) is nestled within hills of chaparral ecosystem in California.
- Every spring MVC students experience the arrival of migratory cliff swallows that fly from Central and/or South America to breed.

