Project Title:
UC NRS Reserve Application Management System 2.5 (RAMS 2.5)

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Project Summary:

The Reserve Application Management System (RAMS) (http://rams.ucnrs.org) provides a central online mechanism to manage UC Natural Reserve System (NRS) use. RAMS allows reserve managers to review and approve reserve visits and activities, track types and numbers of users, search previous users and research, and maintain reserve use calendars. RAMS aggregates this information into metric data cited in reports, grant proposals, and communications materials to demonstrate how the NRS contributes to the UC mission. RAMS also tracks the metadata associated with research being done on the reserves, increasing the visibility of NRS science. RAMS can also manage the invoicing for use of NRS facilities and is used by campus administration for accounting reconciliation.

Project Narrative:

The University of California's Natural Reserve System is a system of more than 40 wildlands and field stations around the state. Each reserve is managed by one of the nine general UC campuses. Reserves operate as outdoor laboratories and classrooms without walls. As the largest university-administered network of protected lands in the world, the NRS needed a central, web-based system to manage and track reserve use. RAMS provides a single mechanism to do this, while collecting use metrics, reporting these metrics to campus and systemwide administration, along with invoicing for that use. RAMS also acts as one of the unifying forces within the NRS, as it is used by all reserve visitors, managers and administrators across all campuses.

RAMS replaces a system that required users to submit a paper application that would be reviewed by the site manager. Once an application was approved, a visit to the site was scheduled. Responsibility for collecting user information, such as intended activities, affiliation, the size of their group,,etc., was at the discretion of the reserve manager. The inconsistency of the data content, quality, and reliability became apparent in the annual reports received by the NRS office at UCOP.

The paper-based reporting system was replaced by RAMS 1.0. In 1999, staff at one reserve began programming a web application to capture information from field station users. The application also collected information on every approved research project and the ecological metadata of the research. RAMS 1.0 metadata followed a standardized format (EML) developed by the Knowledge Network for Biocomplexity (www.ecoinformatics.org). The metadata information was made available online and included location, temporal span, abstract of research, author, contact information, and funding sources

and amounts. RAMS 1.0 also requested a user's research permit information and provided a liability waiver form online.

The standardized set of data collected by RAMS 1.0 made it easier for reserve managers to handle ongoing requests to use the reserve. In addition, RAMS 1.0 automatically compiled the information in an annual report for each reserve. Prior to RAMS 1.0, managers needed to retype project and research descriptions, compile lists of their affiliated institutions, and rely on paper records to calculate the number of users. Early in the reporting process, the NRS Systemwide Office at UCOP saw the value of collecting reserve use metric data.

RAMS 1.0 was adopted by increasing numbers of NRS reserves over the next decade. When the size of the FileMaker Pro database grew too large to be functional, the application was completely redesigned between 2010-14. RAMS 2.0 was upgraded to a MySQL normalized relational database and a Lasso-based user interface. RAMS 2.0 and the NRS were cited in "Enhancing the Value and Sustainability of Field Stations and Marine Laboratories in the 21st Century" (2104), a National Academy of Sciences report, as examples of best practices for managing field station use and tracking metrics data.

By the time RAMS 2.0 was completed, however, the server it was housed on needed to be replaced and moving the system to a new server would require completely rewriting the user interface. The NRS then began adapting RAMS to run on new hardware with modern program architecture

With version 2.5 (released February 2019) RAMS evolved into a more user-friendly system in a programming language that would continue to be supported in the future and has a larger community of use. 2.5 was written in Ruby on Rails, a server-side web application framework written in the Ruby language. Its model–view–controller (MVC) framework provides a structured programming environment for the RAMS database, web service, and web pages. The object-oriented programming interface of RAMS 2.5 has not only made user interactions with the database speedier but also improved programming efficiency. RAMS 2.5 has now been adopted by all reserves across the NRS.

Use Metrics

Total annual user base	~60,000 people
UC annual user base	~18,000 people
Total RAMS Applications ('99 – '19)	26,288 projects
Total RAMS Reservations per year ('99 – '19)	45,400 visits
New RAMS Application per year	2,000+ projects
New RAMS Reservations per year	4,900+ visits

RAMS 2.5 has also become a valuable metadata database through which users can describe the research they are conducting at the NRS. The RAMS team has worked closely with NCEAS (National Center for Ecological Analysis and Synthesis, UC Santa Barbara) and DataOne to address the complexities of automatically managing the metadata for research projects based across the reserve system. By collaborating with these entities, and aligning RAMS metadata collection to accepted standards, we are contributing to an international repository for research data. This in turn ensuring NRS science reaches a broader audience. RAMS 2.5 also makes it easier for NRS researchers to comply with required data management standards. In fact, the data collected by RAMS 2.5 now fulfills the requirements of Ecological Metadata Language (EML) Meta Data standards.

RAMS 2.5 provides those who wish to use NRS reserves with a fast, easy-to-use, online interface to manage their visit requests. The program offers an efficient way to request return visits and obtain rapid

approvals from reserve managers . For reserve managers and UC administrators, RAMS 2.5 has dramatically improved the ease of handling use requests as well as myriad other aspects of reserve use management, from allocating accommodations to requesting the use of vehicles. The new system also automatically compiles these requests into informative reports for campus and UC administration.

The NRS has long made RAMS available to other field stations and marine labs. Non-NRS sites that have adopted the system include Gump South Pacific Research Station (UC Berkeley), Eagle Lake and Butte Creek Ecological Preserve (CSU Chico), La Kretz Field Station (UC Los Angeles), and Hopland Research and Extension Center (UC Agriculture and Natural Resources). Still more entities have consulted with the RAMS team while developing their own use tracking systems, including Pepperwood Preserve, Rocky Mountain Biological Field Station, University of Wyoming, Organization of Biological Field Stations, California State Parks, and the National Park Service (for field stations at Yosemite, Sequoia, Kings Canyon, and Lassen Volcanic national parks, and Point Reyes National Seashore).

Examples of the RAMS 2.5

Management interface for reservations:

Management interface for invoicing:

RAMS | Manager @ Santa Cruz Island Reserve | University of California, Santa Barbara
Calendar   Application   Reservation   Billing   Report   Reserve management   Search   Help   Kevin Browne

Purpose: Observations of wetland and riparian restoration.   All Approved

Reservation # 62447 | Earliest Arrival: April 28, 2019 - Latest Departure: April 29, 2019 | 2 days   1 participants
Reservation of Application # 42924 | Research | Coastal Wetland Restoration

Reservation Status   Edit

This page displays the relevant information about a specific reservation, approval status for people and assets, and allows you to create invoices.
If the **Status** box above is red then this indicates an incomplete reservation. To complete the reservation, click on the yellow section title and proceed through the rest of the reservation.

Annual Reporting of Reservation	Enabled
Update Status Log	Submitted on 2019-04-26 Silent performed on April 27, 2019 09:59 by Lynn McLaren-Dewey - no comments
Calendar Link	Google Calendar Apple ICal

Edit Reservation Status

Reservation Information   Edit

Statement of Purpose:
Observations of wetland and riparian restoration.

Reservation Applicant:
Paula Power - UC ANR Santa Barbara County

Special Needs:
none

Edit Reservation Info

Visits   Edit

Summary of visits:
April 28, 2019 @ 12:00 – April 29, 2019 @ 12:00   Total Days: 2

Paula Power	UC ANR Santa Barbara County - (Volunteer)	Approved

Edit Participants

Reserve Resources   Edit

Summary of reserve resources requested:
April 28, 2019 @ 12:00 – April 29, 2019 @ 12:00   Total Days: 2

Regular Bunkroom estimated cost: 1 person @ $18.78 per night for 1 night = $18.78	Create Invoice	Approved

Estimated Total: $18.78

Edit Assets

RAMS | Manager @ Santa Cruz Island Reserve | University of California, Santa Barbara
Calendar   Application   Reservation   Billing   Report   Reserve management   Search   Help   Kevin Browne

Uninvoiced Reservations   Invoices

Invoice log:

INVOICE # 17867-0 created on 2019-04-22 by Lynn McLaren-Dewey
INVOICE # 17867-0 emailed to: Samiri@ucsb.edu and laura.susin@ucsb.edu on 2019-04-22 by Lynn McLaren-Dewey
INVOICE # 17867-1 updated on 2019-04-24 by Lynn McLaren-Dewey
INVOICE # 17867-1 emailed to: Samiri@ucsb.edu and laura.susin@ucsb.edu on 2019-04-24 by Lynn McLaren-Dewey
INVOICE # 17867-2 updated on 2019-04-24 by Alexa Johnson

INVOICE

Invoice date: April 22, 2019
Invoice #: 17867-2
Application #: 41569
Description: HABS in the SBC
Reservation #: 61800
Purpose: 1) Water Quality 2) Phytoplankton Samples

Bill To

Sarah Amiri NOAA (all units)	Samiri@ucsb.edu
Laura Susin University of California, Santa Barbara	laura.susin@ucsb.edu

Reserve Resource	Begin	End	Units	Count	Rate	Subtotal
Christy Ranch Facilities Use (Per person per night)	April 06, 2019	April 07, 2019	5 people	1 night	$7.00	$35.00
Vehicle Use - By Day (Per unit per day)	April 06, 2019	April 07, 2019	1 unit	2.0 days	$45.00	$90.00
Vehicle Mileage (Per unit per each)	April 06, 2019	April 07, 2019	48 units	1.0 each	$1.00	$48.00
Christy Ranch Set-Up (subsequent visits) (Per unit per each)	April 06, 2019	April 07, 2019	1 unit	1.0 each	$25.00	$25.00
Steward Assistance (Per use per hour)	April 06, 2019	April 06, 2019	1 use	2.0 hours	$63.00	$126.00

Total reserve resources provided: $324.00

Management monthly calendar of use:

Management annual reporting interface:

Management annual reporting interface:

Management annual reporting interface:

Public application interface:

Public reservation interface: