Using iNaturalist to engage the public and learn more about echinoderms

François Michonneau, Gustav Paulay

Florida Museum of Natural History, University of Florida, Gainesville, FL 32611

francois.michonneau@gmail.com, paulay@flmnh.ufl.edu

Introduction

Echinoderms are among the most conspicuous and abundant marine invertebrates. Several species of echinoderms undergo important demographic fluctuations for reasons that are not always well understood (e.g., crown-of-thorns outbreaks, *Diadema antillarum* die-off, starfish-wasting-syndrome), with important ecological consequences. In addition, many species are targeted by unregulated fisheries.

Despite these factors, echinoderms have not received a lot of taxonomic attention, and many large species remain undescribed and/or poorly known. Regularly, field guides illustrate undescribed species, and divers commonly photograph new or poorly known species.

With recent technological advances, it has become increasingly easier to document species encountered in nature. For instance, smartphones can, with the single touch of the screen, take a picture while associating the exact geographical location and time of the observation. Digital cameras have made underwater photography much more accessible, and many divers now document the species they encounter by sharing their pictures on social media websites.

Our knowledge of echinoderms could therefore be improved by aggregating user observations of these organisms, while educating the public at the same time about these fascinating organisms.

What is iNaturalist?

iNaturalist (http://inaturalist.org) is a website that allows users to submit observations about any species, along with images, GPS coordinates and ancillary information about the habitat or natural history. Once submitted the observations can be further identified by the community and validated by "curators". This mechanism allows users to hone their identification skills, learn about the organisms, and communicate with each other. Observations in turn provide a wealth of information about distribution, variation, abundance, and other aspects of natural history.

We started a project on Echinoderms (http://inaturalist.org/projects/echinoderms) to gather observations worldwide, and across taxa. Our goal is to improve our knowledge of species distributions, variation, and biology, and to educate the public about the diversity of Echinoderms. This platform provides a great outreach tool facilitating communication between scientists and naturalists. Because iNaturalist is easy to use and has applications for mobile devices, it can also be used during organized citizen science initiatives such as Bioblitz, or class field trips.

This crowd-sourcing effort has the potential to greatly facilitate the documentation of species diversity, occurrences, variation, changes in distributions and species density (e.g., crown-of-thorns outbreaks, consequences of the starfish wasting syndrome) while educating the public about echinoderms

Over a hundred users have already contributed 700+ observations. We will advertise the project more widely to the SCUBA diving community and through citizen science initiatives. We welcome everyone to submit observations or help curating the observations submitted to the project. Don't hesitate to join us!

Project page

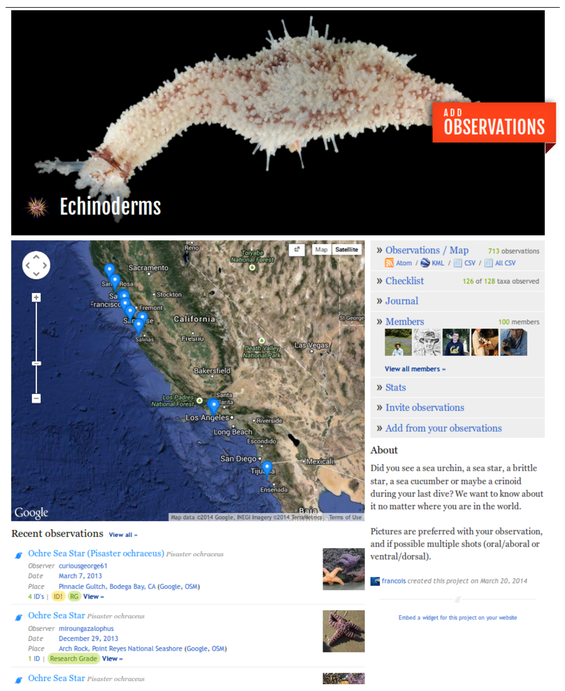

Figure 1: The Echinoderm project on iNaturalist

User observation

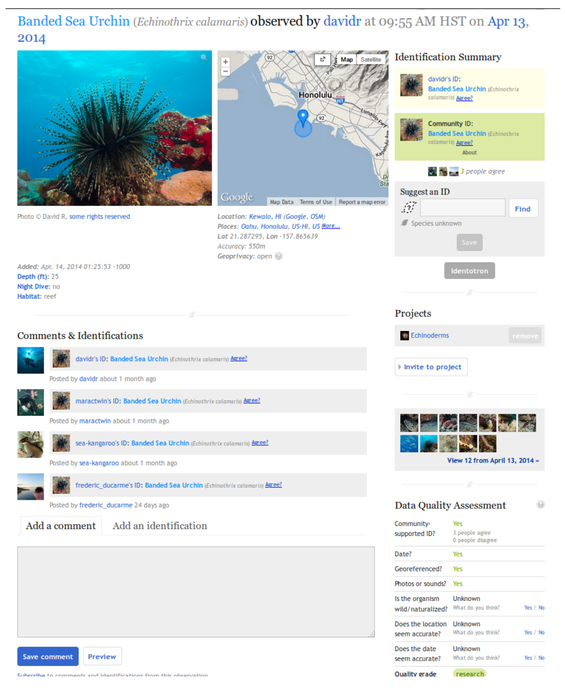

Figure 2: Example of an user-submitted observation

Observations per class

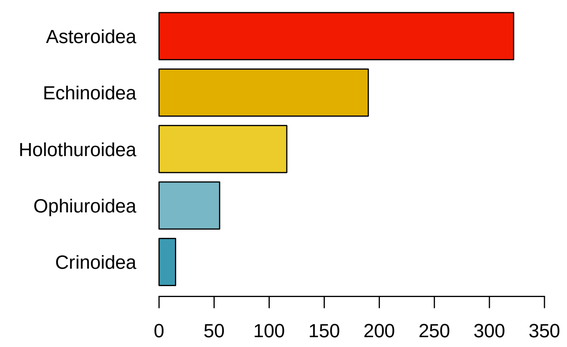

Figure 3: Number of observations per class

Large and abundant species from the intertidal of the Western United States dominate the observations at present, reflecting the development of iNaturalist in California. However, underwater sightings from the Caribbean and the Indo-West Pacific also represent a large proportion of the observations.

Most recorded species

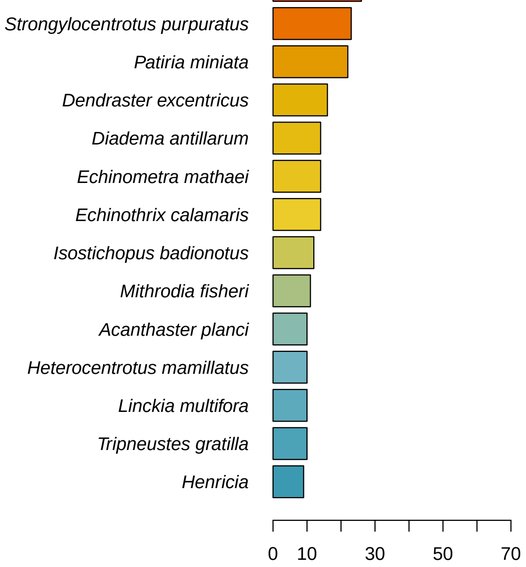

Figure 4: List of the 20 species the most observed on iNaturalist

Map of recorded observations

Figure 5: Global distribution of observations recorded by iNaturalist users

Distribution maps

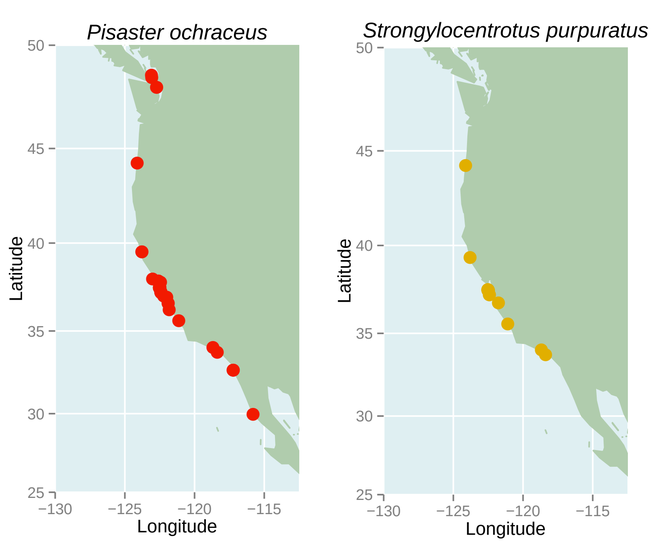

Figure 6: Distribution map for two highly observed species generated from user observations

This poster is open-source (CC-BY), fully reproducible and available on Figshare (DOI: 10.6084/m9.figshare.1040435). The source code can be obtained from: http://github.com/fmichonneau/inat-poster. It was made possible using the LaTeX package tikzposter, and R complemented with the packages ggplot2 (by Hadley Wickham), knitr (by Yihui Xie), taxize (by Scott Chamberlain & Eduard Szocs), and wesanderson (by Karthik Ram).