

Introduction to ALA and ZoaTrack

OBIS Event Data Workshop on Animal Tagging and Tracking Data

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The ALA is made possible by contributions from its many partners. It receives support through the Australian Government through the National Collaborative Research Infrastructure Strategy (NCRIS) and is hosted by CSIRO.

Mission and Governance



The **Atlas of Living Australia** is a collaborative, national project that aggregates biodiversity data from multiple sources and makes it freely available and usable online.

- Funded by NCRIS (National Collaborative Research Infrastructure Strategy) since 2008
- Hosted by CSIRO (Commonwealth Scientific and Industrial Research Organisation)
- Australian node of Global Biodiversity Information Facility (GBIF)



Core Functionality

ALA attempts to answer 2 basic questions:

Where does a species occur?

Which species occur in an area?

- ALA Hub & BioCache
- Web Services API (api.ala.org.au)
- Open source [github/AtlasOfLivingAustralia](https://github.com/AtlasOfLivingAustralia)

Macropus giganteus Shaw, 1790 JSON

Eastern Grey Kangaroo

species Accepted Name authority: Australian Faunal Directory

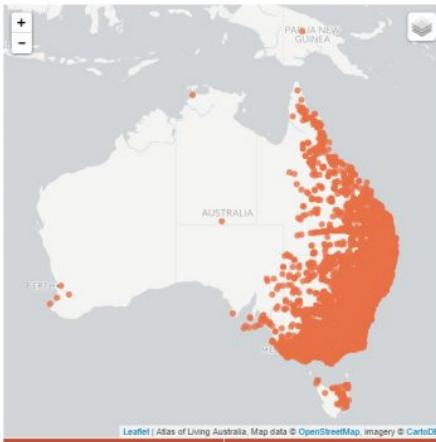
Overview Gallery Names Classification Records Literature Sequences Datasets



Supplied by: Leo



Occurrence records map (70,183 records)



Leaflet | Atlas of Living Australia. Map data © OpenStreetMap, imagery © CartoDB

[View interactive map](#) [View records](#)

Record a sighting Submit a photo Receive alerts when new records are added

38 datasets have provided data to the ALA for this species.

Browse the list of datasets and find organisations you can join if you are interested in participating in a survey for species like *Macropus giganteus* Shaw, 1790

Conservation Status

SA Near Threatened

Sounds

© Australian National Wildlife Collection 2008
Source: Australian National Wildlife Collection
[View more details of this audio](#)

Online Resources

ALA occurrences Google search
GBIF Google scholar
Encyclopaedia of Life
Biodiversity Heritage Library

System Architecture

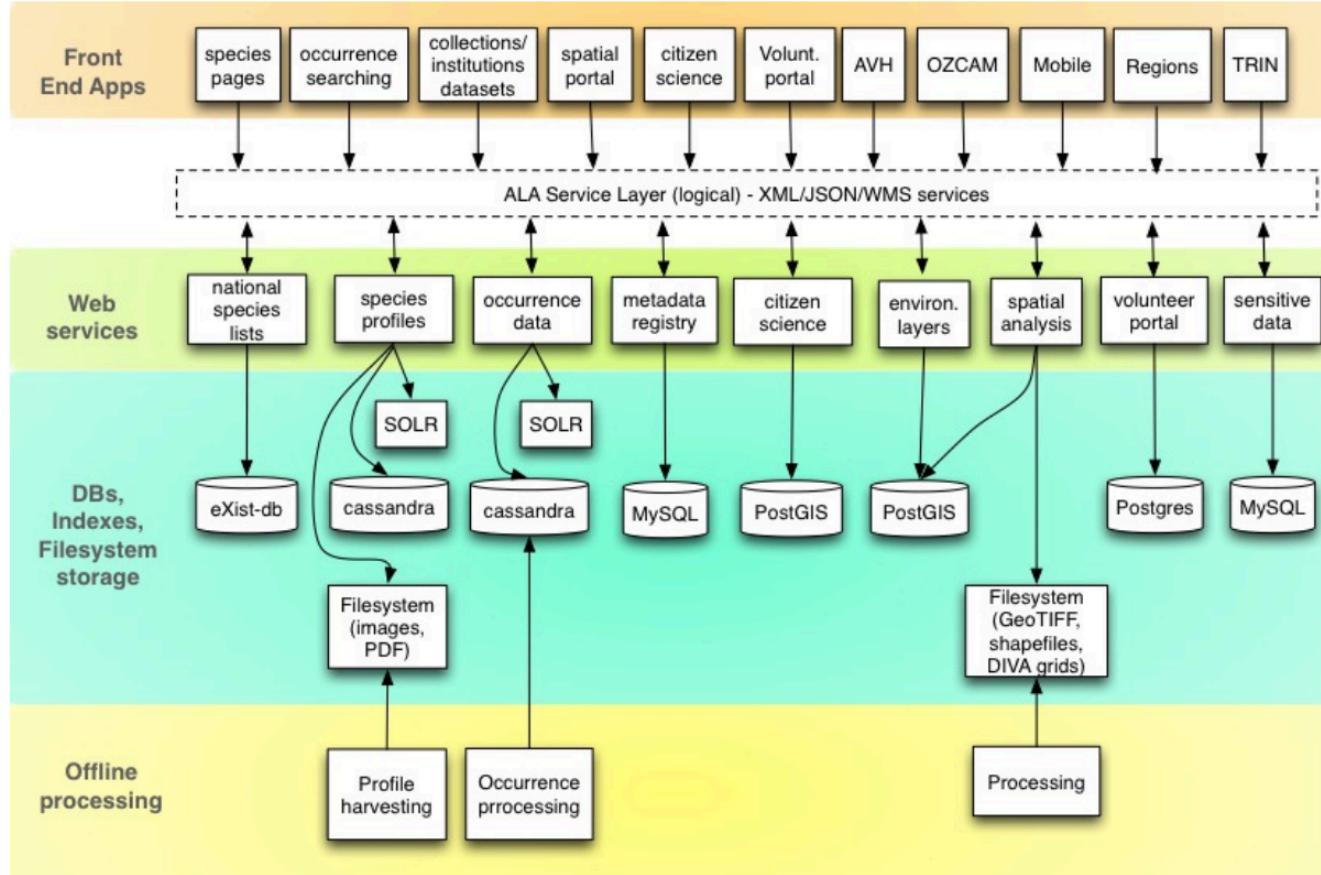
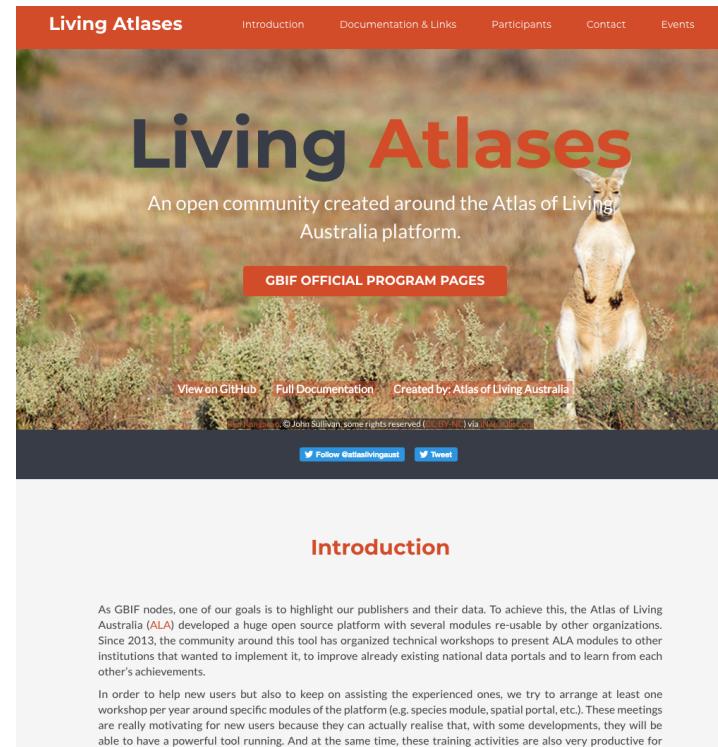
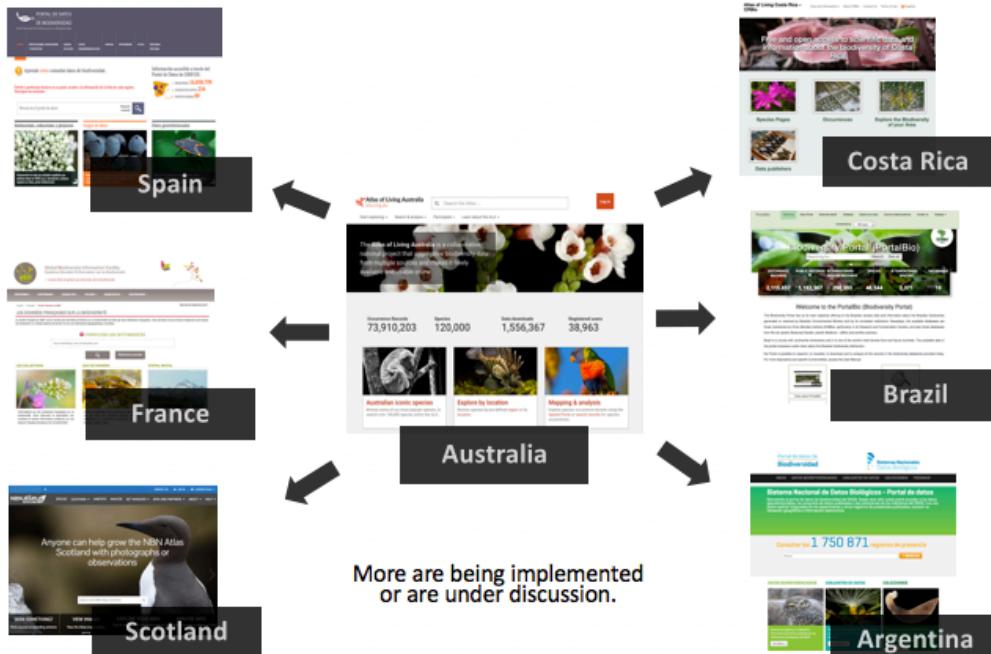


Illustration 2: Modules overview

Living Atlases



The screenshot shows the "Living Atlases" website interface. At the top, there is a navigation bar with links to "Introduction", "Documentation & Links", "Participants", "Contact", and "Events". The main title "Living Atlases" is prominently displayed in large, bold letters. Below the title, a sub-headline reads "An open community created around the Atlas of Living Australia platform." A red button labeled "GBIF OFFICIAL PROGRAM PAGES" is visible. The background features a photograph of a kangaroo in a field. At the bottom of the page, there is a section titled "Introduction" with a paragraph of text and a link to "View on GitHub".

One Infrastructure – Many Systems



ALA Tools

- Spatial Portal
- MERIT
- BioCollect
- ZoaTrack
- DigiVol
- Sensitive Data Service
- FishMap
- Phylolink
- ALA4R

Community Hubs

- [Australia's Virtual Herbarium \(AVH\)](#)
- [Online Zoological Collections of Australian Museums](#)
- [Australian microorganisms information \(AMRiN\)](#)
- [Atlas of Prehistoric Australia \(APA\)](#)
- [Ocean Biogeographic Information System \(OBIS-AU\)](#)
- [Australian Moths Online \(AMO\)](#)
- [Australian Seed Bank Partnership \(ASBP\)](#)
- [Murray-Darling Basin Authority \(MDBA\)](#)

Separate application
supported by ALA specifically
for animal movement data

- Marine and terrestrial
- ~ 9500 tracks
- 200 species
- 4m detections
- Open and Embargo

... more to come ...

The screenshot shows the ZoaTrack application interface. At the top, there is a navigation bar with links for Search, About, Contact Us, Login, and Register. Below the navigation bar is a world map with numerous green circular markers representing tracked projects. Some markers have numbers (e.g., 2, 3, 5, 10, 21, 25, 63, 71, 12, 3) indicating the number of detections. A tooltip says "Click markers to view project details". Below the map is a search bar and a button to "Create a new ZoaTrack Project". A table lists 10 tracked projects:

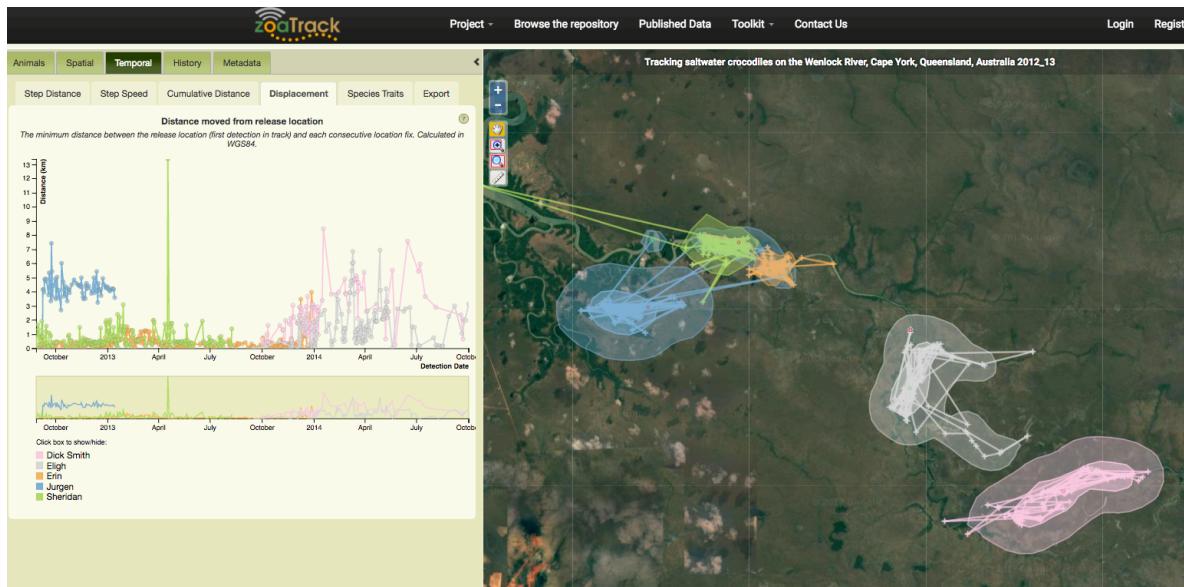
Title	Species	Spatial Coverage	Updated Date	Access Type
Aceh Elephant Project	<i>Elephas Maximus sumatranus</i> Sumatran elephant	Aceh, Indonesia	19/04/2018	Delayed Access Metadata
Dugong movements Kimberley 2016-17	<i>Dugong dugon</i> dugong	Kimberley Western Australia	17/04/2018	Delayed Access Metadata
bnil	<i>Gambelia sila</i> blunt-nosed leopard lizard	SLO, California	04/04/2018	Open Access Tracks
ECOCEAN Whale Shark Race 2016	<i>Rhincodon typus</i> Whale Shark	Ningaloo Marine Park, Western Australia	29/03/2018	Open Access Tracks
ECOCEAN Whale Shark Race Around the World	<i>Rhincodon typus</i> Whale Shark	Ningaloo Marine Park, Western Australia	29/03/2018	Open Access Tracks
ECOCEAN Whale Shark Satellite Tracking	<i>Rhincodon typus</i> Basking Shark, Checkerboard Shark, Tofu Sa, Tofu S... more	Indian Ocean	29/03/2018	Open Access Tracks
Arboreal marsupial ecology (foraging)	<i>Petaurus breviceps ariel</i>	Norther Territory	28/03/2018	Delayed Access Metadata
Thaa Atoll 2017	<i>Rhincodon typus</i> Whale shark	Thaa Atoll, Maldives	27/03/2018	Open Access Tracks
Buffalo Movement Patterns in the Top End of Australia	<i>Bubalus bubalis</i> water buffalo	Kakadu National Park	22/03/2018	Delayed Access Metadata
Arboreal marsupial ecology (dens)	<i>Petaurus breviceps ariel</i>	Northern Territory	21/03/2018	Open Access Tracks

At the bottom, it says "Showing 1 to 10 of 446 entries" and has a page navigation bar with buttons for Previous, 1, 2, 3, 4, 5, ..., 45, Next. The footer includes the "Atlas of Living Australia" logo and the "nectar" logo, along with a note about Creative Commons Attribution license.

ZoaTrack - Overview

... Web platform for animal movement data:

- Analytics & visualisations (e.g., home range estimation)
- Cleansing/filtering
- Data management – DOIs, option to embargo
- Argos data feeds



Spatial Analysis

Features:

- basic stats
- environmental layers
- KML animation download



ZoaTrack

Project ▾ Browse the repository Published Data Toolkit ▾ Contact Us Login Register

Animals Spatial Temporal History Metadata

All Animals Date Range: 2015-07-18 to 2016-04-09 Animals: 12

Detections Layer Trajectory Layer

KML SHP KML SHP

Select all

A-013 Ocean Reef PS/Forest Crescent PS

Download: KML SHP

Trajectory Dates: 2015-07-30 - 2015-10-12 Distance: 1621.157 km Mean step length: 26.576 km Mean step speed: 0.911 km/h

Download: KML SHP

Detections Dates: 2015-07-30 - 2015-10-12 Detections: 64 Mean per day: 0.9 Max per day: 11

Download: KML SHP

Start and End Points Dates: 2015-07-30 - 2015-10-12

A-1019 South Fremantle SHS

zoatrack.org/home

ECOCEAN Whale Shark Race Around the World

Show/hide map layers

Base layer

- Google Satellite
- Google Physical
- Google Streets
- Google Hybrid
- OpenStreetMap
- OpenStreetMap Grayscale
- None

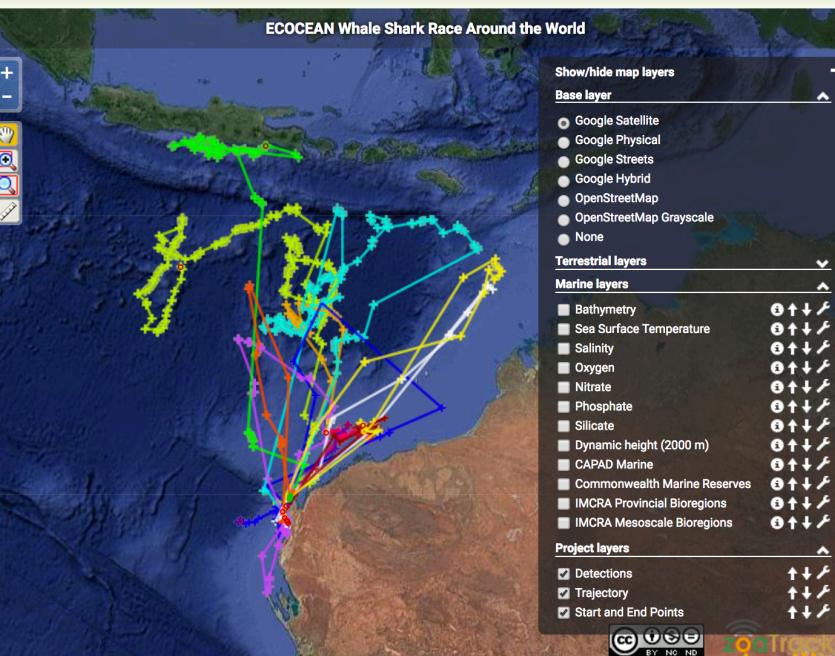
Terrestrial layers

- Bathymetry
- Sea Surface Temperature
- Salinity
- Oxygen
- Nitrate
- Phosphate
- Silicate
- Dynamic height (2000 m)
- CAPAD Marine
- Commonwealth Marine Reserves
- IMCRA Provincial Bioregions
- IMCRA Mesoscale Bioregions

Marine layers

- Project layers
- Detections
- Trajectory
- Start and End Points

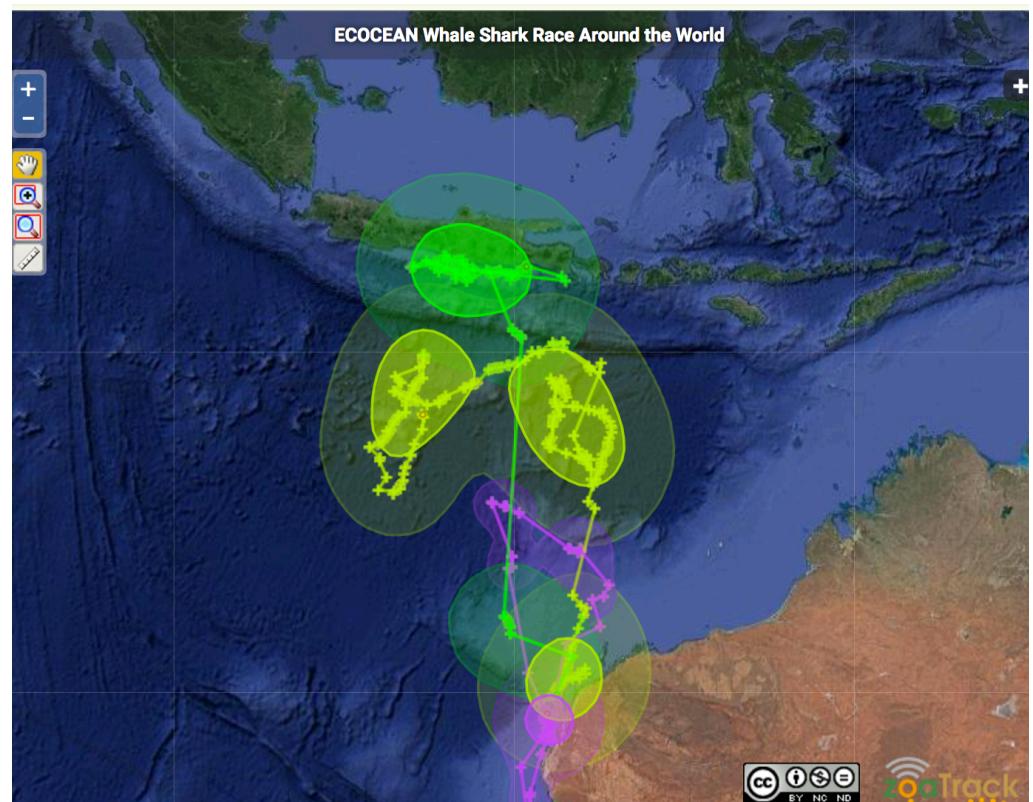
CC BY NC ND ZoaTrack



Spatial Analysis

Point and click R functionality:

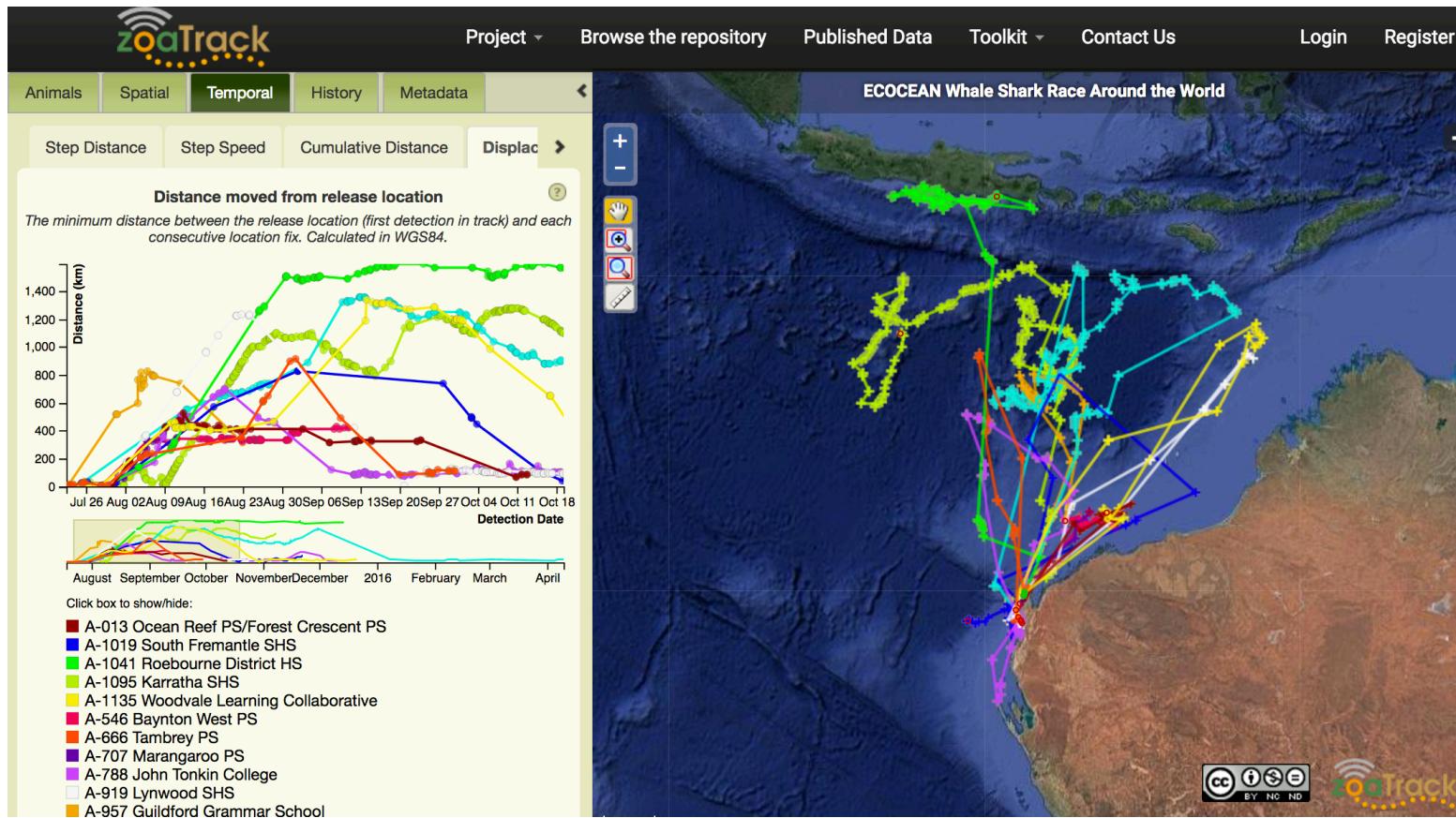
- Home Range : MCP, KUD, Kernel Brownian Bridge, Alpha Hull, Local Convex Hull
- Heat maps, Kalman filter
- Parameterised inputs



Temporal Analysis

Interactive charts:

Step Distance, Step Speed, Cumulative Distance, Displacement



Discoverability via the ALA

- Users can find tracking data by searching on species in ALA

Atlas Of Living Australia

ALA Apps ▾ ALA Info ▾ Search the Atlas Search

ANIMALIA / CHORDATA / VERTEBRATA / GNATHOSTOMATA / PISCES / ACTINOPTERYGII / EUTELEOSTEI / ACANTHOPTERYGII
SCORPIONIFORMES / PLATYCEPHALIDAE / Platyccephalus / Platyccephalus caeruleopunctatus

Platyccephalus caeruleopunctatus McCulloch, 1922

JSON

Bluespotted Flathead

species Accepted Name authority: Australian Faunal Directory

Overview Gallery Names Classification Records Literature Sequences Datasets

Photographer: Australian National Fish Collection, CSIRO

Compiled distribution map

Compiled distribution map provided by Australian National Fish Expert Distributions

Occurrence records map (1,537 records)

Online Resources

- ALA occurrences
- GBIF
- Encyclopedia of Life
- Biodiversity Heritage Library
- Google search
- Google scholar

Datasets

19 datasets have provided data to the for this species.

Browse the list of datasets and find organisations you can join if you are interested in participating in a survey for species like *Platyccephalus caeruleopunctatus* McCulloch, 1922

Animal Movement Data in ZoaTrack.org

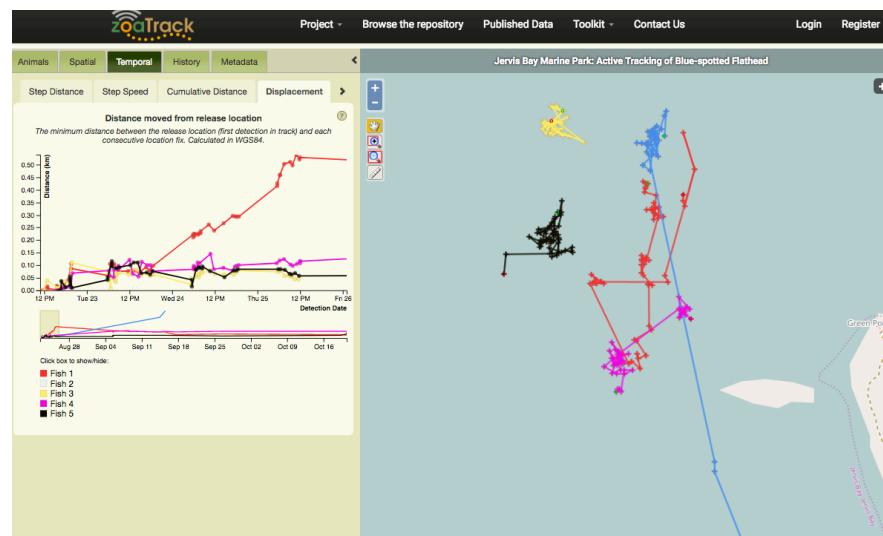
Description Animal movement data for this species is available in ZoaTrack.org

Project Blue Bay Marine Park: Active Tracking of Blue-spotted Flathead
Jervis Bay NSW, Australia, 2011

Data Usage Open Access under a CC-BY licence

Provided by: Animal Movement Data in ZoaTrack.org

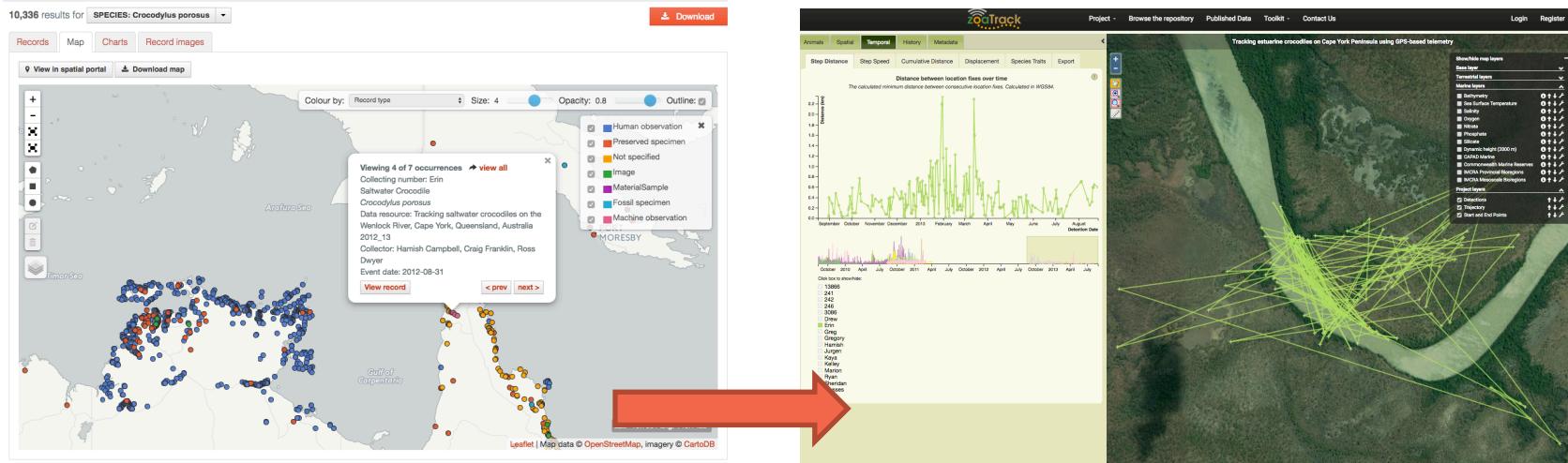
Leaflet | Atlas of Living Australia. Map data © OpenStreetMap, imagery © CartoDB



Discoverability via the ALA

Tracking data can be represented as occurrences in ALA

- Detections if represented as individual occurrences skew the whole dataset, doesn't sit well with user expectation of the Atlas
- Lots of data/metadata repetition for individual records
- Need to be able to search and discover, then link users to the origin system, or at least a system that has tools the analyse it usefully.



Discoverability via the ALA

ALA mostly ingests Simple Darwin Core flat files

Aggregate each track into a single comprehensive record

Darwin Core Term	
basisOfRecord	MachineObservation
eventId	Identifier for the track (ie. sensor deployment on an animal). Foreign key to source system.
eventDate	Date range for first to last detection
eventRemarks	Sensor description
footprintWkt	Polygon representing track (home range, convex hull, alpha hull)
collectionId	URL link back to source system
decimalLatitude	Nominal occurrence (first detection)
decimalLongitude	Nominal occurrence (first detection)
sampling fields	Count of detections

Key Issues

- Discoverability – exposure - consistency
- General repository versus specialized
- Detailed Darwin Core record easily answers the two key questions
 - Where does this species/group occur?
 - What species occur in this area
- The difference between single occurrence records and tracks is made obvious to the users up front (no confounding)
- Ease of implementation

Thank you. Questions?

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