



Title	DISCOVERY: A Photo-Identification Data Management System
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DISCOVERY: A Photo-Identification Data Management System



South African
NATIONAL PARKS

14th Savanna
Science Network
Meeting

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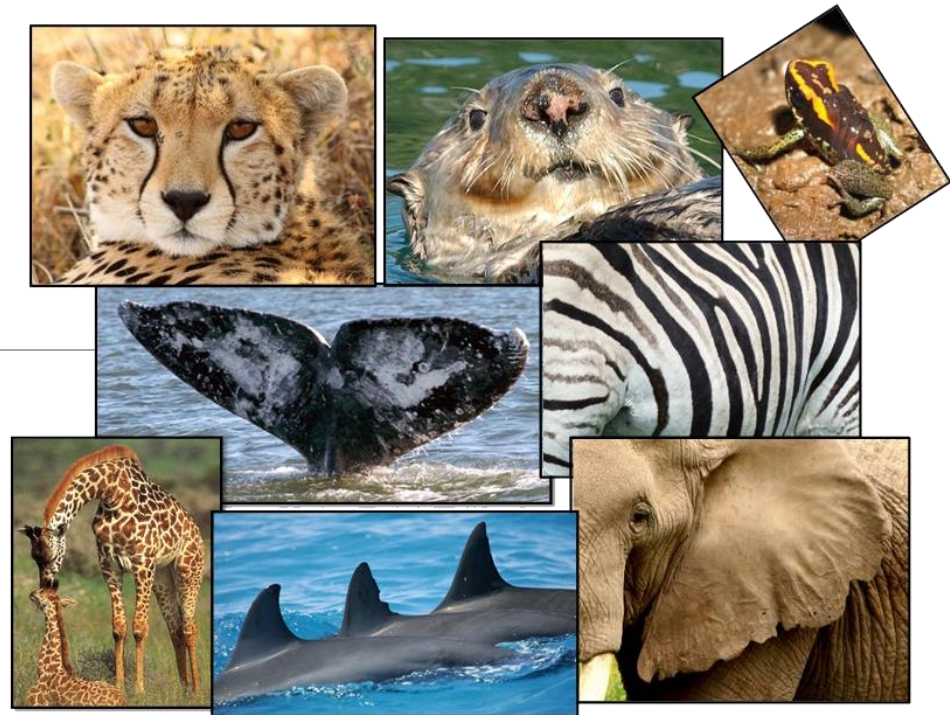
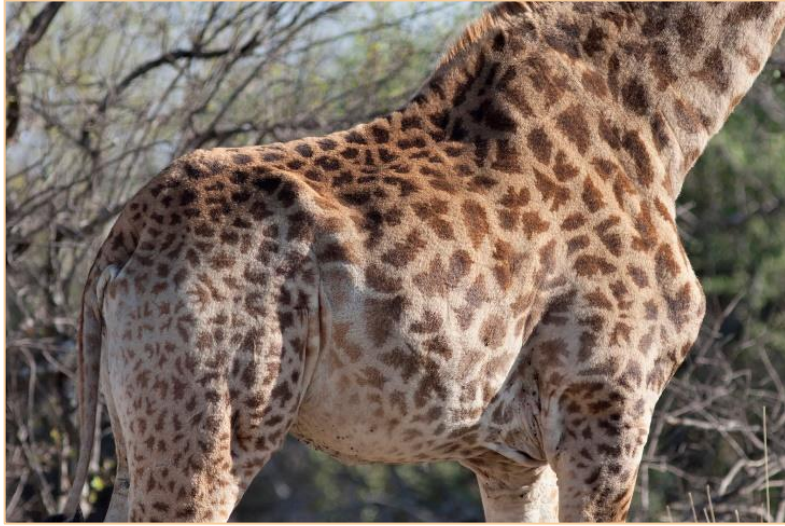


Photo-Identification



???

=



- Time consuming
- Visually fatiguing
- Cross comparisons between databases



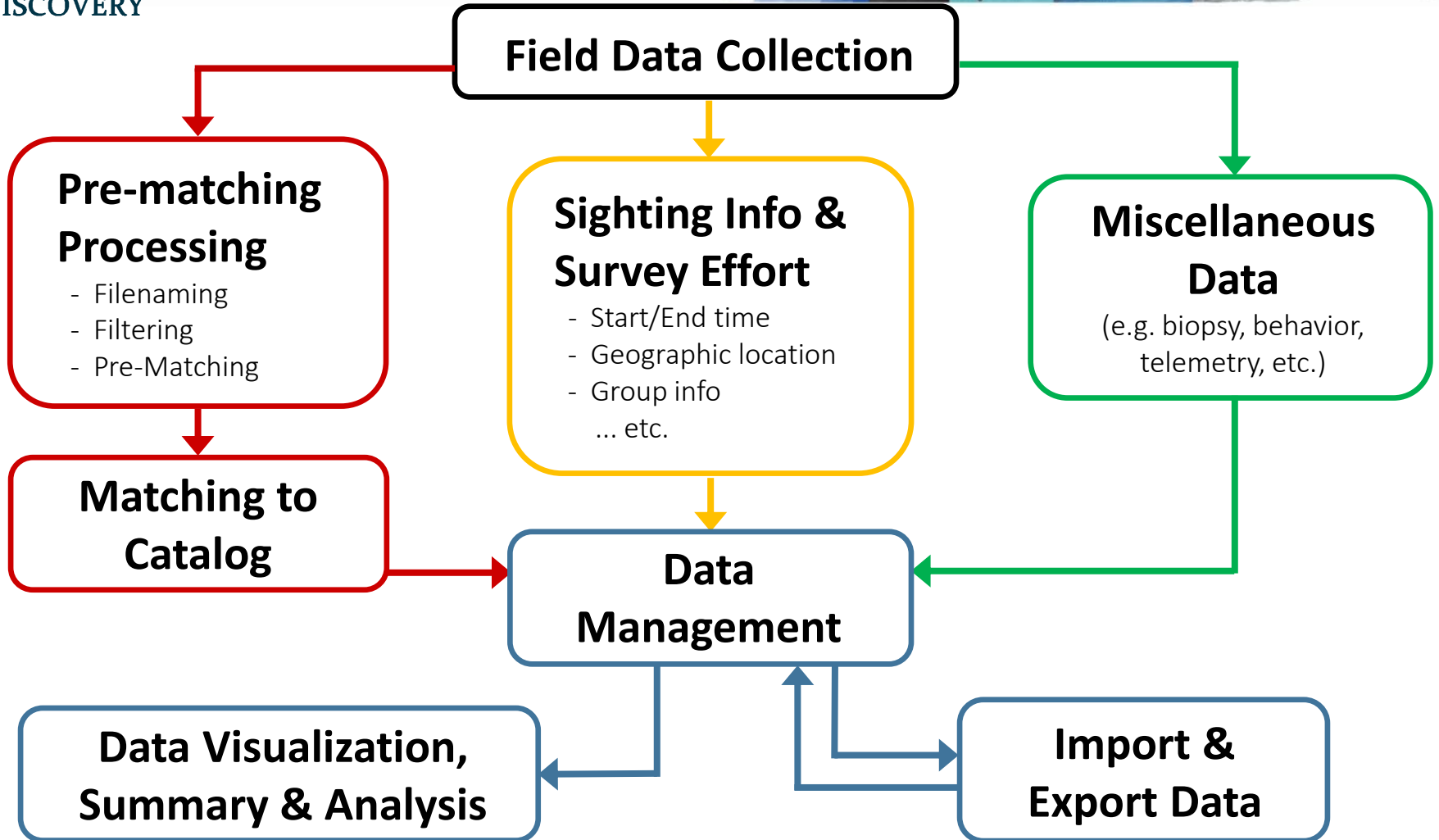
Approach



- **Integrative system**
 - Store, visualize, manage and analyze photo-ID/associated data
- **Dynamic setting**
 - Meet various needs of research projects and user preferences
- **Inclusive** of other tools (*e.g. program R*)
- **Compatible** with other software (*e.g. MARK, SocProg, ArcGIS*)
- Efficient to maintain **long-term, multi-team** datasets



Approach



Pre-Matching Procedures

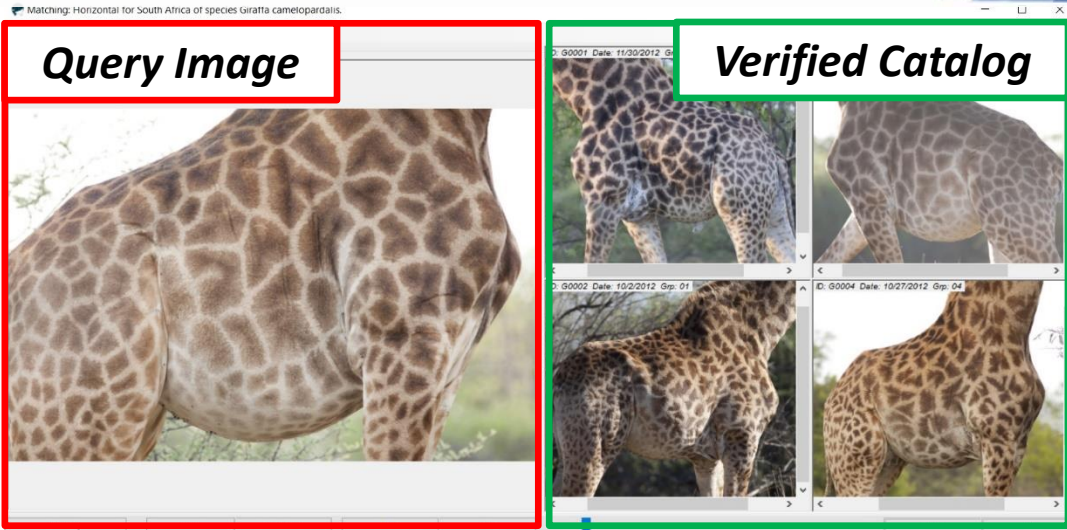


- Image processing
- Image filtering

***User-defined
folders from
dynamic setup***

A screenshot of an image processing software interface. The interface includes a file explorer on the left showing a directory structure with folders like 'Miscellaneous (2)', 'Quality1 (11)', 'Quality2 (4)', 'Quality3 (1)', and 'Trash (2)'. A red box highlights these folders with the text 'User-defined folders from dynamic setup'. The main window displays an image of an elephant with a green selection box around it. A toolbar at the top right contains buttons for 'Quality1', 'Quality2', 'Quality3', 'Trash', 'Unmark', 'Mother and Calf', and 'Miscellaneous'. A bottom toolbar contains buttons for 'Zoom', 'Select Area', 'Pan', 'Crop', and 'Save Image', along with sliders for 'Contrast', 'Brightness', and 'Sharpen'. A red arrow points from the text box to the 'Quality1' button in the top toolbar.

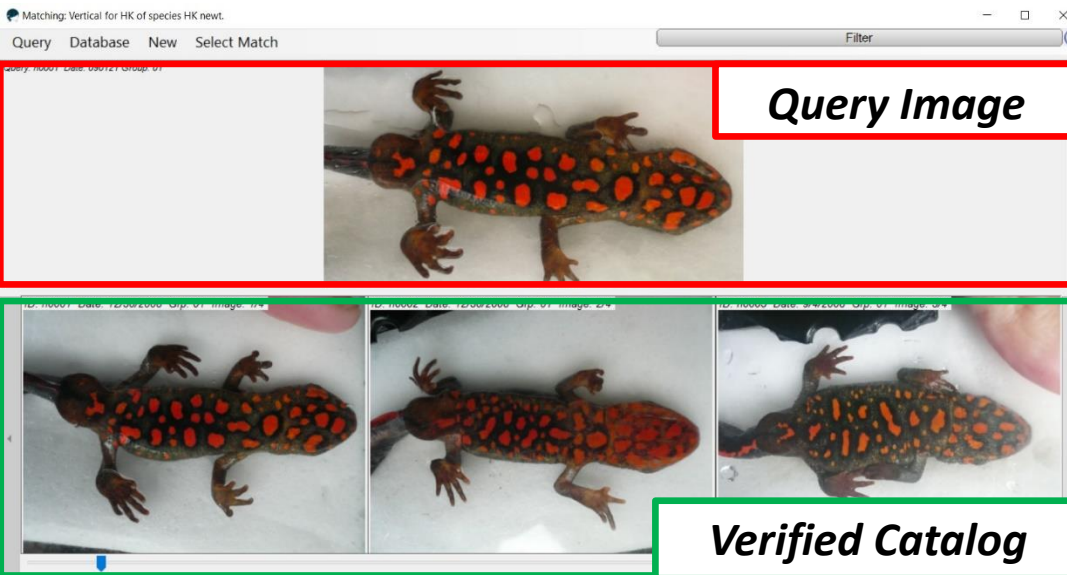
Photo-ID Matching



Horizontal View Mode

✓ Enhanced searching of IDs by **categorizing database**

✓ **User-defined settings** to optimize efficiency



Vertical View Mode

Survey Associated Info.



Sighting Information

Sighting ID: [Study Area] Study: **WGW**

Date: 02-Feb-2013

Start Time: 13:33

End Time: 13:55

Survey: PhotolD

Species: **Gray Whale**

Group ID: 2

Behavior: Foraging

Grp Size: 5

Time: 13:55

This is my second comment

Add

#	Date	Time	Comment
1	02-Feb-2013	13:33:00	This is my comment
2	02-Feb-2013	13:55:00	This is my second comment

Depth: 10, 13

Edit Sighting

Data Management

- Individual Catalog



Individuals

ID	# Images	# Sightings	First Year	Last Year	Sex
a0001	4	3	2005	2014	C
a0002	14	8	2005	2014	C
a0003	8	4	2004	2014	C
a0004	5	5	2003	2014	C
a0005	9	5	2005	2014	C
a0006	6	4	2006	2014	C
a0007	11	5	2004	2014	C
a0008	7	5	2005	2014	C
a0009	6	4	2006	2014	C
a0010	11	5	2004	2014	B
a0011	9	5	2004	2014	B
a0012	8	4	2006	2014	B
a0013	11	5	2005	2014	B
a0014	1	1	2014	2014	B
a0015	1	1	2014	2014	B
a0016	1	1	2016	2016	B

*Catalog of
Individuals*



Left

Right

Front

Images of a0016

Image	GROUP_IMG	Date	Aspect
a0016_2016031...	01	10-Mar-16	Right

Individual Images

Data Management

- Sighting Records



Sightings

HongKong
Zhuhai

Study Site

Sousa chinensis
Neophocaena phocaenoides

Species

2010
2011
2012
2013
2014
1/1/2014
1/2/2014
1/3/2014
1/17/2014
1/20/2014
1/26/2014
2/7/2014
2/26/2014
2/27/2014
3/1/2014

Add Sighting

	Study Area	Date	Group	Start	Stop	Species	Survey	Behavior	Group Size	Ind	Environment	Comments	Geo	Photo
1	HongKong	26-Jan-2014	01	11:02:00	11:22:00	Sousa chinensis	PhotoID	Foraging	8	Ind	Env Data	Comments	Geo	Photo
2	HongKong	26-Jan-2014	02	11:35:00	11:45:00	Sousa chinensis	PhotoID	Travelling	2	Ind	Env Data	Comments	Geo	Photo
3	HongKong	26-Jan-2014	03	11:47:00	12:00:00	Sousa chinensis	PhotoID	Travelling	3	Ind	Env Data	Comments	Geo	Photo
4	HongKong	26-Jan-2014	04	12:48:00	13:10:00	Sousa chinensis	PhotoID	Foraging	2	Ind	Env Data	Comments	Geo	Photo

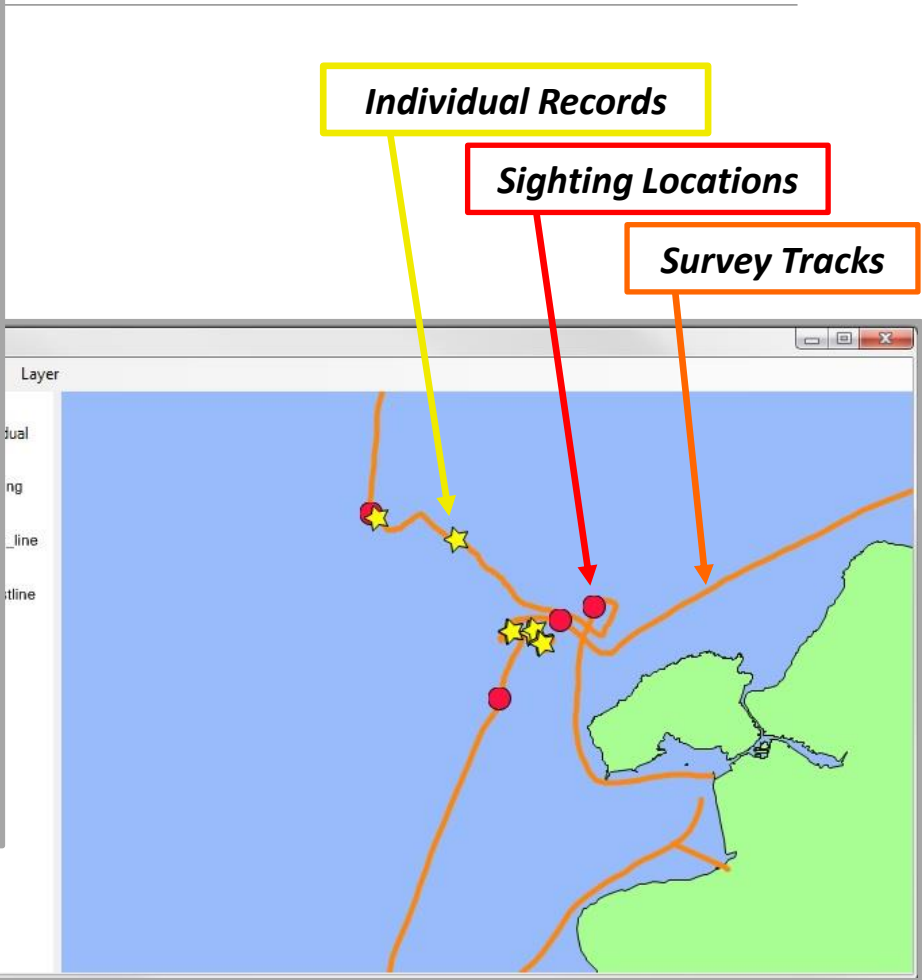
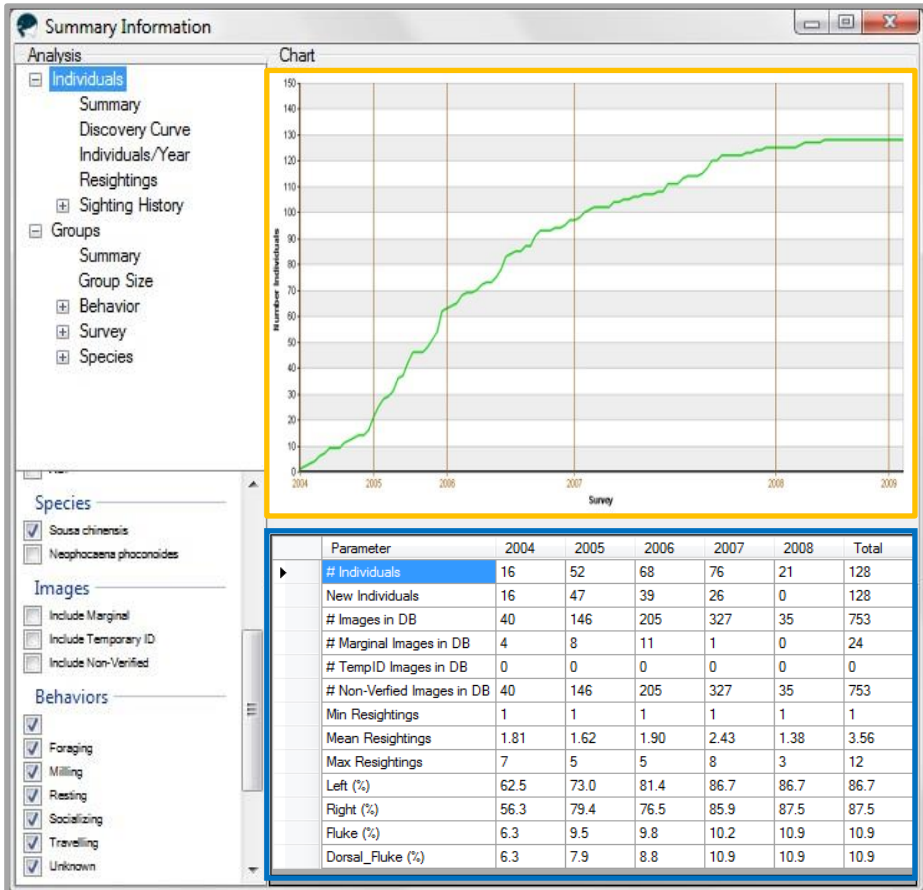
Environment

	#	Time	Depth	SST	Offshore	Tide	Seastate	Habitat
1	1	11:02:00	6.1	20	3000	Ebb	1	open sea
2	2	11:12:00	5.7	19	5000	Ebb	1	
3	3	11:22:00	5.9	19	5000	Ebb	1	open sea
4	4	11:22:00	5.9	19	6000	Ebb	1	

Geographic

	#	Time	Latitude	Longitude
1	1	11:31:46	22.35864	113.87870
2	2	11:47:24	22.36547	113.87570

Data Visualization, Summary & Analysis



Discovery R



- Wide range of analytical and display functions (open source)
- Built-in interface for users not familiar with R

Database

File Send
Dataframe
Images
Sightings
Vessel
Group_or_Agg
NN
Foraging_Tactics
Gen_Comments

Variables

PKey
STUDY_SITE
INDIVIDUAL
DIR_LOCATION
FILENAME
DATE
TIME
GROUP_IMG
LATITUDE
LONGITUDE
TYPE_SPECIMEN
SPECIES
VERIFIED
TEMPORARYID
QUALITY
Plot

X
Y
Fill

Plot

User-defined Plot

R Functions

Behavior_PieChart
Discover_Curve
GoogleMap
Histo_Distinct
ID_YEAR
Individuals_Year
Individuals_Per_Variable
KdeAllFirst
Resightings
Sighting_History
TEST_ME

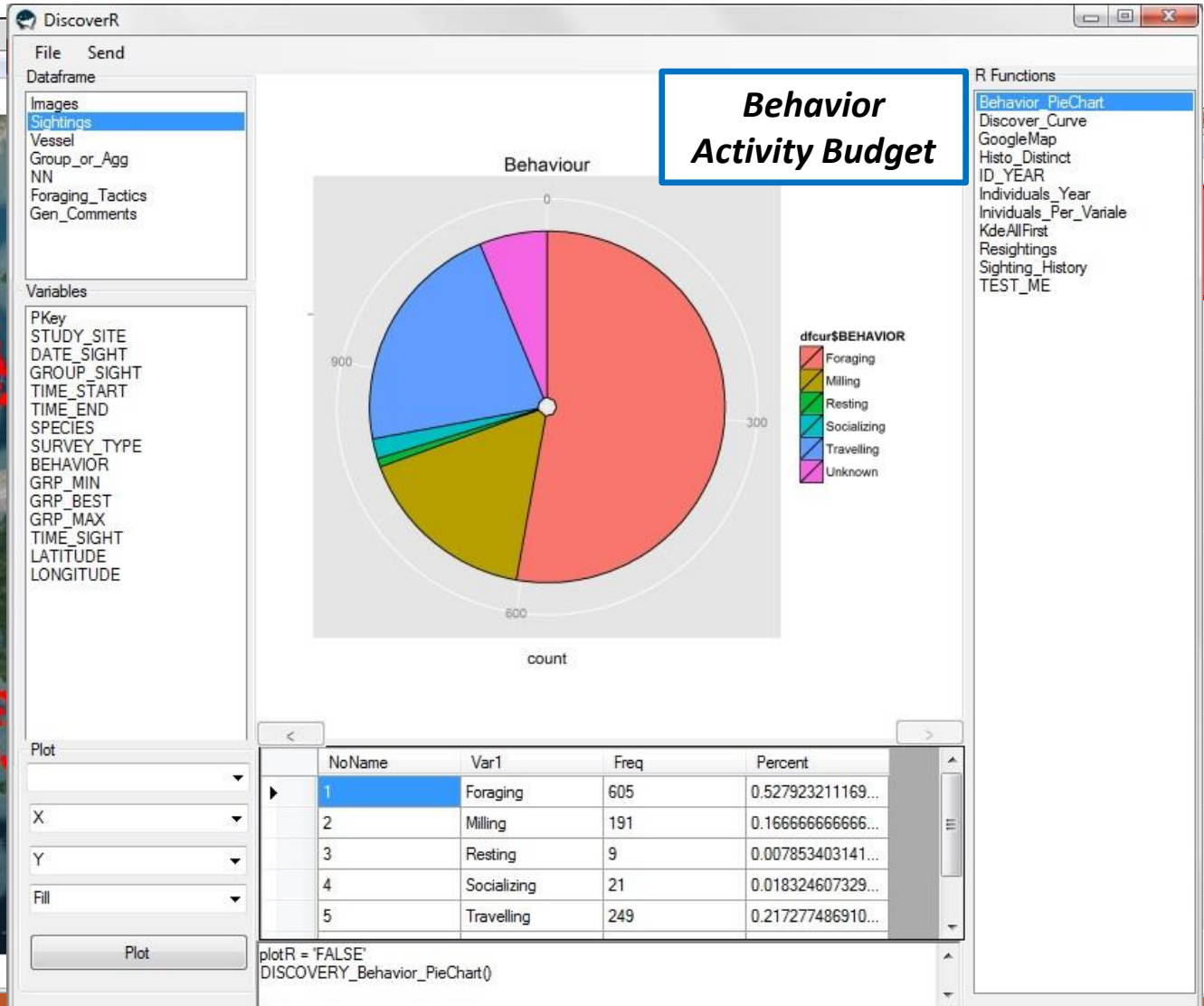
R Functions

Graphic & Table Output

The screenshot shows the Discovery R interface. On the left, there is a 'Database' panel with a list of variables. Below it is a 'User-defined Plot' panel with dropdown menus for X, Y, and Fill, and a 'Plot' button. In the center, a bar chart displays the 'Number of Individuals' for the years 2010 through 2014. Below the chart is a data table with columns for 'Year', 'NoName', and 'Individuals'. The table shows data for 2010, 2011, 2012, 2013, and 2014. On the right, there is an 'R Functions' panel with a list of functions, including 'Individuals_Year' which is highlighted. Below the functions panel is another 'R Functions' label. At the bottom right, there is a 'Graphic & Table Output' label. The plotR = FALSE and DISCOVERY_Individuals_Year() are visible at the bottom of the interface.

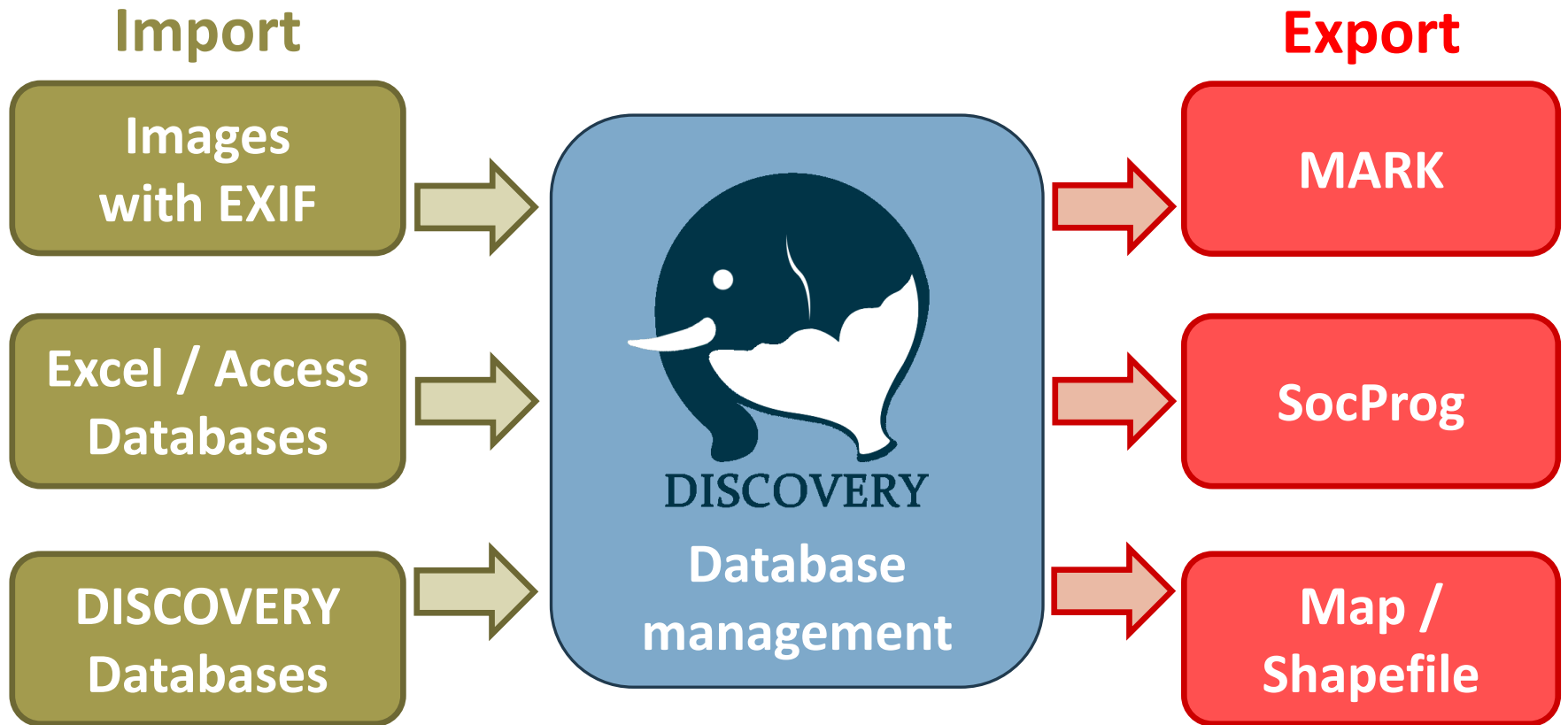
Year	NoName	Individuals
2010	189	1
2011	226	0
2012		0
2013		0
2014		0

Discovery R



Data Management

- Import & Export



Website (program download and manual):

<http://www.biosch.hku.hk/ecology/staffhp/lk/Discovery/>

(New version out soon! Stay tuned!)

OR

Skukuza Unit 225 (14th – 17th March)



DISCOVERY: Photo-Identification Data-Management System for Individually Recognizable Animals

About the Software

- DISCOVERY Development Team
- Download DISCOVERY
- DISCOVERY Manual
- FAQ
- Related Links
- Forum

About the Software

Individual photographic identification (photo-ID) represents a powerful technique to study behavioural and population ecology of free-ranging animals. This approach has been applied across species and habitats, both aquatic and terrestrial, gathering a large variety of data.

All photo-ID studies require many hours of intensive field surveys and even longer hours of subsequent, labour-intensive processing of photographic material. Thanks to the recent advances in digital photography, high quality digital images can be obtained in a short space of time and the photo-ID data can be processed immediately upon the completion of a field day, even in remote locations where processing of traditional photographic material would not have been possible. However, such fast accumulation of data can pose an obvious and often considerable obstacle to data management. This is where DISCOVERY comes handy; it provides a dynamic, user-friendly platform to assist researchers not only with the matching of individual photo-ID data, but also at the multitude of steps of field data collection and the complex data management and analyses that follow after individual matching is completed.



The DISCOVERY system assists with filtering of raw data and all levels of individual-ID matching; it assists with processing, storing and managing digital images; it provides file naming routines and links sighting information with environmental, geographic, and numerous user-defined parameters; it provides graphic displays of data and basic analytical tools. DISCOVERY can be used to centralize a database for multiple species and multiple study areas; it is particularly useful for maintaining a single database for research projects collecting data at large geographical scales and between multiple research teams working on different databases. DISCOVERY also provides a means of linking the new system with traditional datasets based on film photography, to form continuous complete datasets. The DISCOVERY system has been designed so that it can easily facilitate integration of all collected and stored data to and from other tools; with a multitude of dynamic functions it was designed to meet project-specific requirements and user-specific needs.

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- Glenn Gailey
- Leszek Karczmarski

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