Building and maintaining citizen science community

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Outline

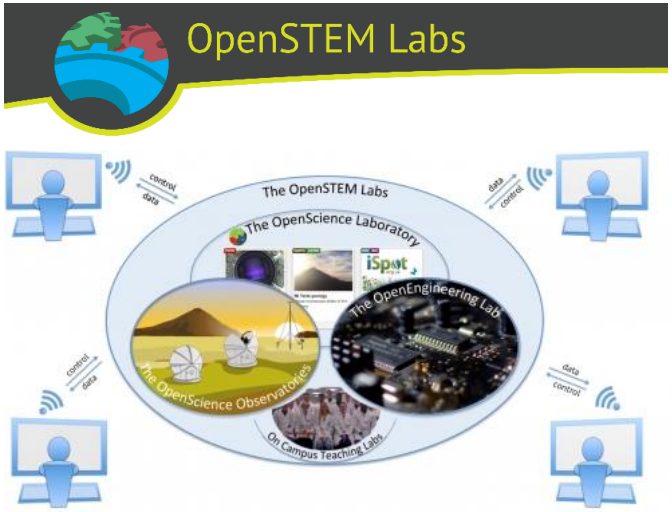
- Why citizen science
- Creating a social network for biodiversity
- The importance of experts
- A community for teaching & learning
- Community scale and reach
- iSpot for the future: help us build and maintain iSpot

Citizen Science @ the OU

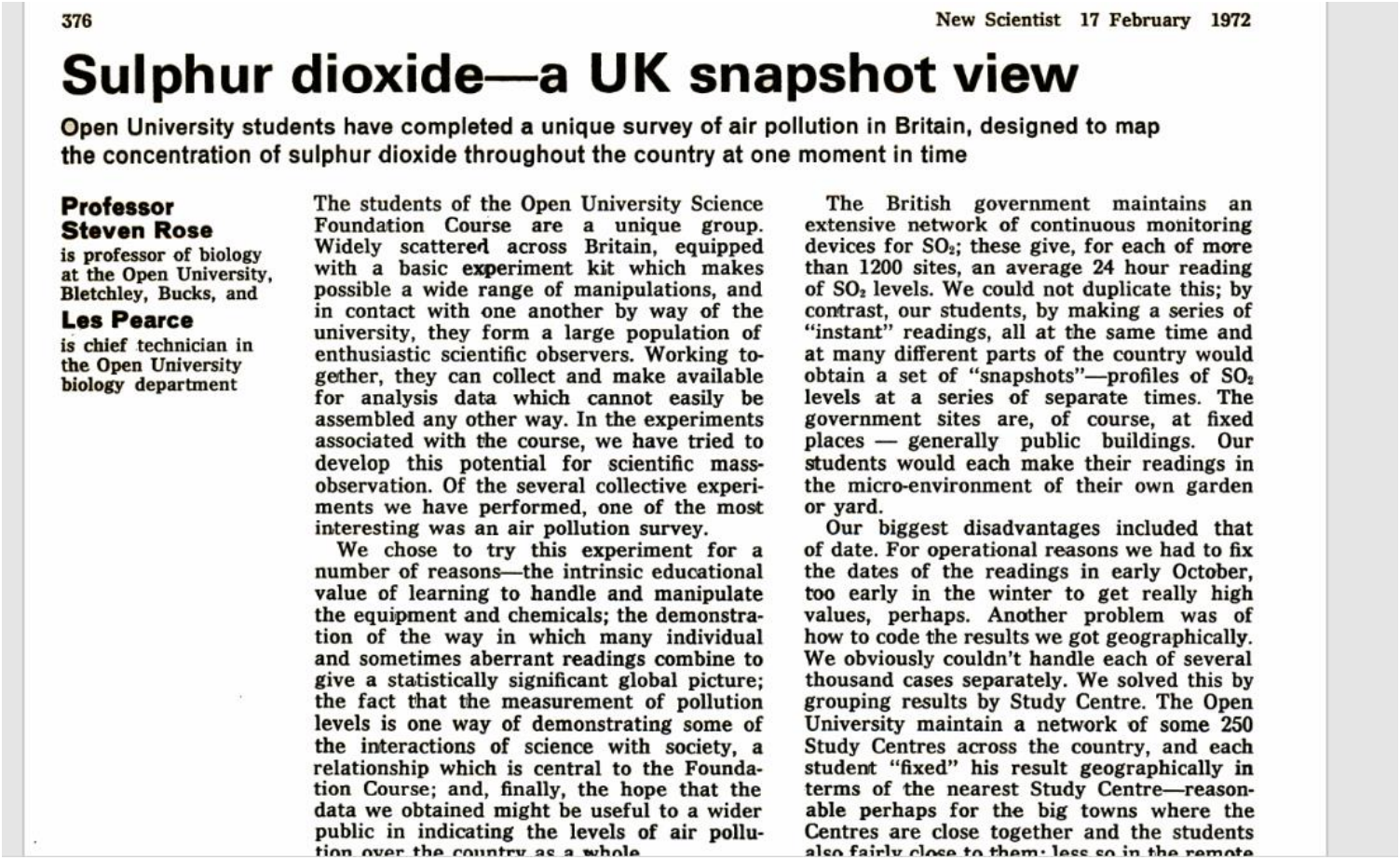
- Britain's main e-learning institution and leader in distance learning
- Develops innovative educational technology
- Integrates citizen science, open / practical science (online) within STEM education

Citizen Science themes & features

- Monitoring at geographic scales: big data
- Collaborative formal and informal learning opportunities
- Infrastructure for collecting and analysing data
- Outreach and public engagement
- Public participation in scientific research / biological recording



Why citizen science?
OU: *The early days…*



376 New Scientist 17 February 1972

Sulphur dioxide—a UK snapshot view

Open University students have completed a unique survey of air pollution in Britain, designed to map the concentration of sulphur dioxide throughout the country at one moment in time

Professor Steven Rose
is professor of biology at the Open University, Bletchley, Bucks, and
Les Pearce
is chief technician in the Open University biology department

The students of the Open University Science Foundation Course are a unique group. Widely scattered across Britain, equipped with a basic experiment kit which makes possible a wide range of manipulations, and in contact with one another by way of the university, they form a large population of enthusiastic scientific observers. Working together, they can collect and make available for analysis data which cannot easily be assembled any other way. In the experiments associated with the course, we have tried to develop this potential for scientific mass-observation. Of the several collective experiments we have performed, one of the most interesting was an air pollution survey.

We chose to try this experiment for a number of reasons—the intrinsic educational value of learning to handle and manipulate the equipment and chemicals; the demonstration of the way in which many individual and sometimes aberrant readings combine to give a statistically significant global picture; the fact that the measurement of pollution levels is one way of demonstrating some of the interactions of science with society, a relationship which is central to the Foundation Course; and, finally, the hope that the data we obtained might be useful to a wider public in indicating the levels of air pollution over the country as a whole.

The British government maintains an extensive network of continuous monitoring devices for SO_2; these give, for each of more than 1200 sites, an average 24 hour reading of SO_2 levels. We could not duplicate this; by contrast, our students, by making a series of "instant" readings, all at the same time and at many different parts of the country would obtain a set of "snapshots"—profiles of SO_2 levels at a series of separate times. The government sites are, of course, at fixed places — generally public buildings. Our students would each make their readings in the micro-environment of their own garden or yard.

Our biggest disadvantages included that of date. For operational reasons we had to fix the dates of the readings in early October, too early in the winter to get really high values, perhaps. Another problem was of how to code the results we got geographically. We obviously couldn't handle each of several thousand cases separately. We solved this by grouping results by Study Centre. The Open University maintain a network of some 250 Study Centres across the country, and each student "fixed" his result geographically in terms of the nearest Study Centre—reasonable perhaps for the big towns where the Centres are close together and the students also fairly close to them; less so in the remote

(noun)

the collection and analysis of data relating to the natural world by members of the general public, typically as part of a collaborative project with professional scientists.

Recent History of CS at the OU

Evolution MegaLab	Species evolution trends: snails
iSpot ispotnature.org	Your place to share nature: species ID skills
The OpenScience Laboratory	Practical science, online experiments etc.
nQuire-it Missions	Create scientific investigations: store and share information
SITU8 Experience your world	Share geo-located data
treezilla the monster map of trees	The monster map of trees: ecosystem services, tree health
Asterics	Astronomy research observatories: linking astronomy, astrophysics and particle astrophysics communities

2009

2012

2013

2016

www.iSpotnature.org

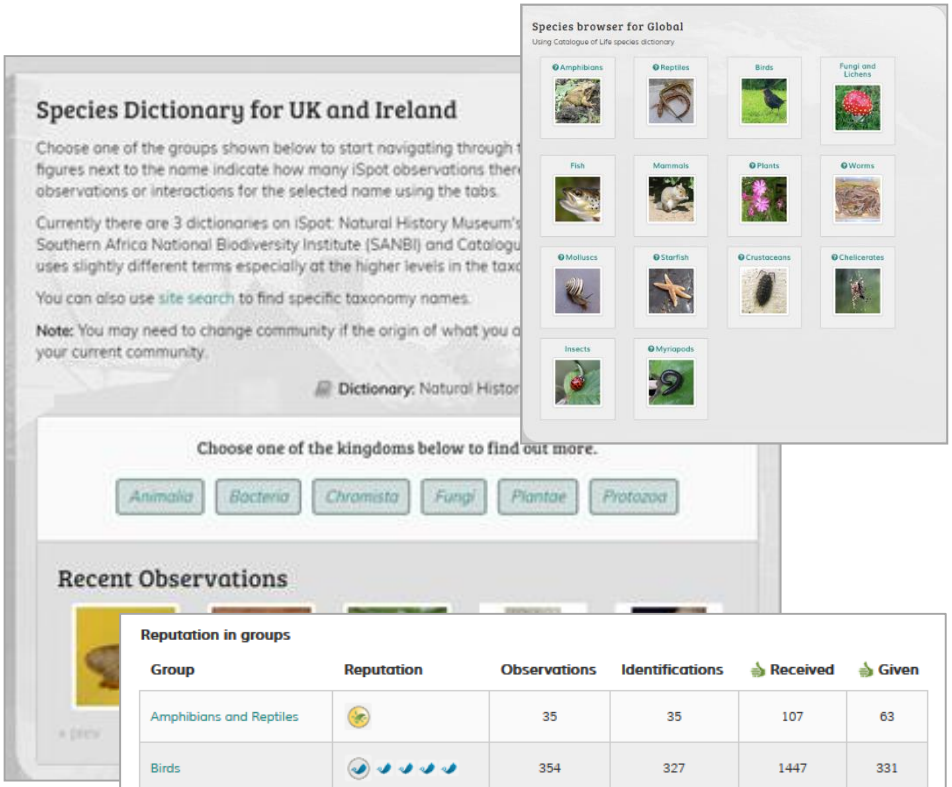
a **citizen science social networking** platform for biodiversity

Explore : view observations (List, Gallery or Map view)

Identify : Search observations, browse species, species dictionary, keys, interactions

Contribute : Likely IDs, agreements, comments, forums, gain reputation points

Personalise: create filters with Projects; collate observation how you want to



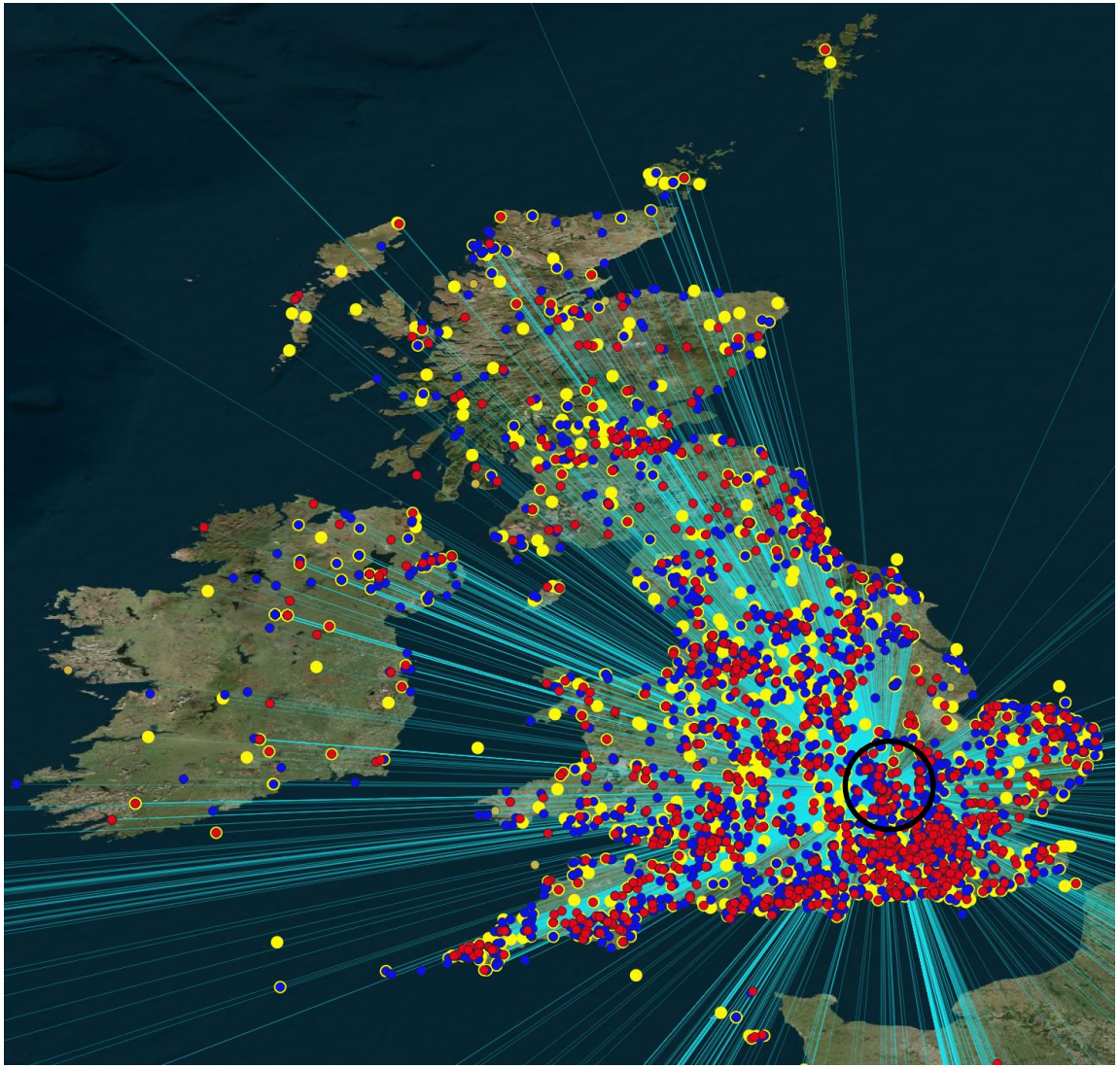
Reputation in groups

Group	Reputation	Observations	Identifications	Received	Given
Amphibians and Reptiles		35	35	107	63
Birds		354	327	1447	331
Fish		10	4	22	0
Fungi and Lichens		957	1424	1726	1542
Invertebrates		1044	552	884	205
Mammals		73	75	203	59
Other organisms		18	10	38	15
Plants		1811	1610	3597	749
	totals	**4302**	**4037**	**8024**	**2964**

iSpot: a social network

Comments, Identifications and Agreements

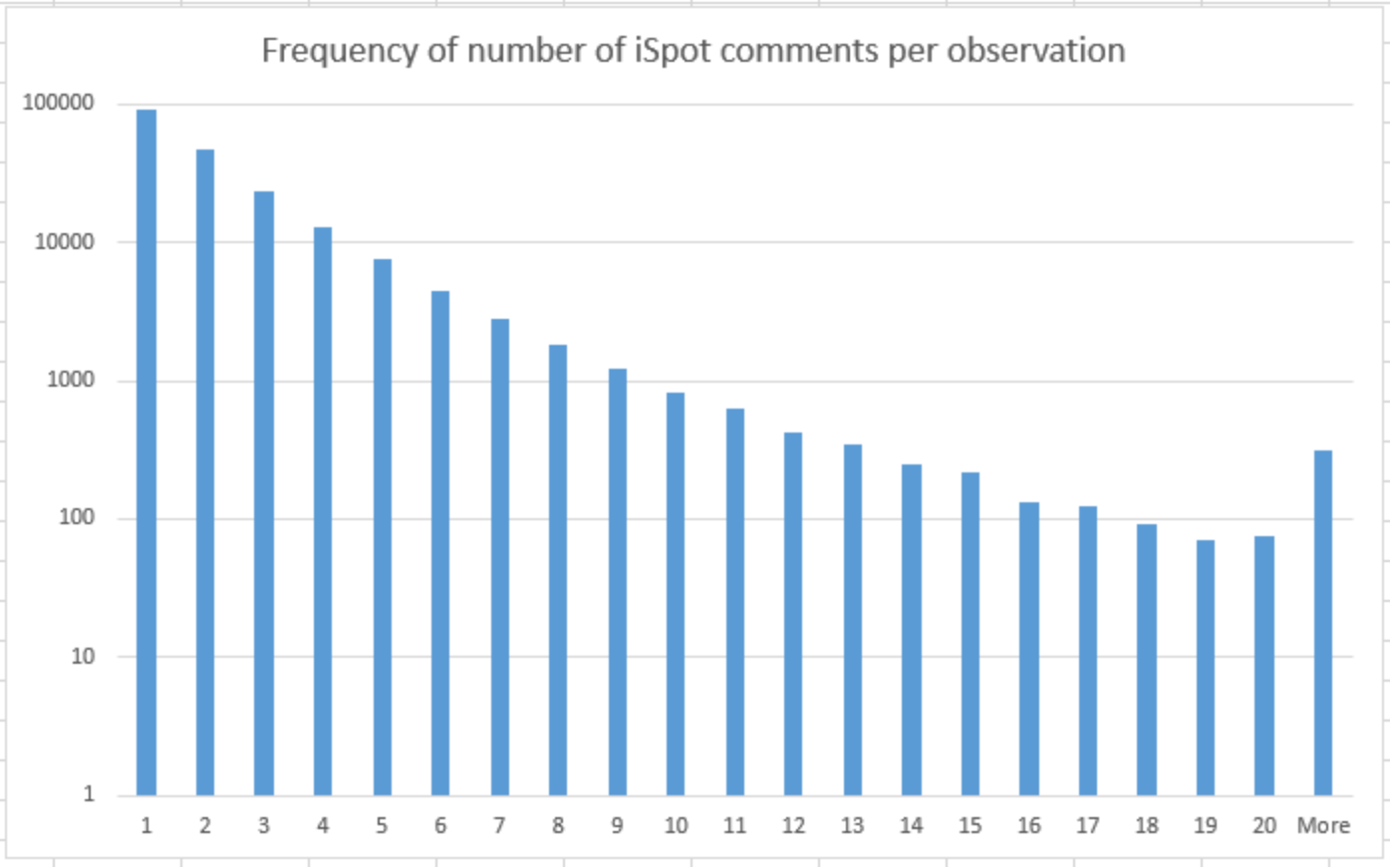
- A social network for biodiversity: one UK participant
- Connections between the locations of the hundreds of comments, agreements and likely IDs given
- Demonstrates how iSpot works: making connections, sharing knowledge and expertise to identify species



Key:
Comments (yellow)
Agreements (blue)
Likely IDs (red)

*Excludes the user's own observations

A networked community: comments on observations



Number of comments (bottom axis) posted to observations (side axis) i.e. 100,000 observations have received at least one comment.

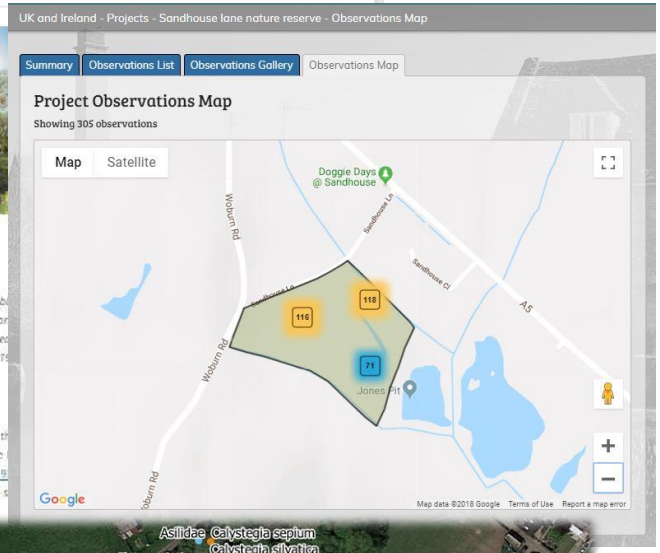
A networked community: Species ID

Sandhouse Lane Nature Reserve

- Old quarry of 10 acres managed as a nature reserve since 1999
- Known as an important breeding place for dragonflies and damselflies
- iSpot project show a rich diversity
- 305 observation recorded on iSpot
- Identified to species level (some to genus or family)
- Likely IDs / Agreements from wide range of experts across the UK

Sandhouse Lane Nature Reserve

How To Get There



iSpot
ispotnature.org

Expertise:

Expert support from Recording schemes, societies and other organisations

- Amateur Entomologists' Society
- Amphibian and Reptile Groups of the UK
- Bedfordshire Moth Group
- Bees, Wasps and Ants Recording Society
- Belfast Hills Partnership
- Berks, Bucks and Oxon Wildlife Trust
- Berkshire Moth Group
- Biological Recording In Scotland
- Biological Records Centre
- Black Country Biodiversity Group
- Botanical Society of the British Isles
- Bristol Regional Environmental Records Centre
- British Bryological Society
- British Dragonfly Society
- British Dragonfly Society - Sussex Group
- British Entomological and Natural History Society
- The British Herpetological Society
- British Lichen Society
- British Mycological Society
- British Plant Gall Society
- British Pteridological Society
- British Trust for Ornithology
- BTO Garden BirdWatch
- Lincolnshire Naturalists' Union
- London Natural History Society
- The Mammal Society
- The Marine Biological Association
- Merseyside BioBank
- National Museum Wales
- Natural History Museum
- Natural Shropshire - Shropshire Biodiversity Partnership
- New Flora of the Isle of Man
- Norfolk and Norwich Naturalists' Socie
- Opiliones Recording Scheme
- Orthoptera Recording Scheme
- Oxford University Museum of Natural History
- Pembrokeshire Coast National Park
- People's Trust for Endangered Species
- Porcupine Marine Natural History Socie
- rECOrd - the Biological Records Centre for the Cheshire region
- Royal Botanic Gardens, Kew
- Royal Society for the Protection of Bir
- Scottish Fungi
- Selborne Society
- Shark Trust

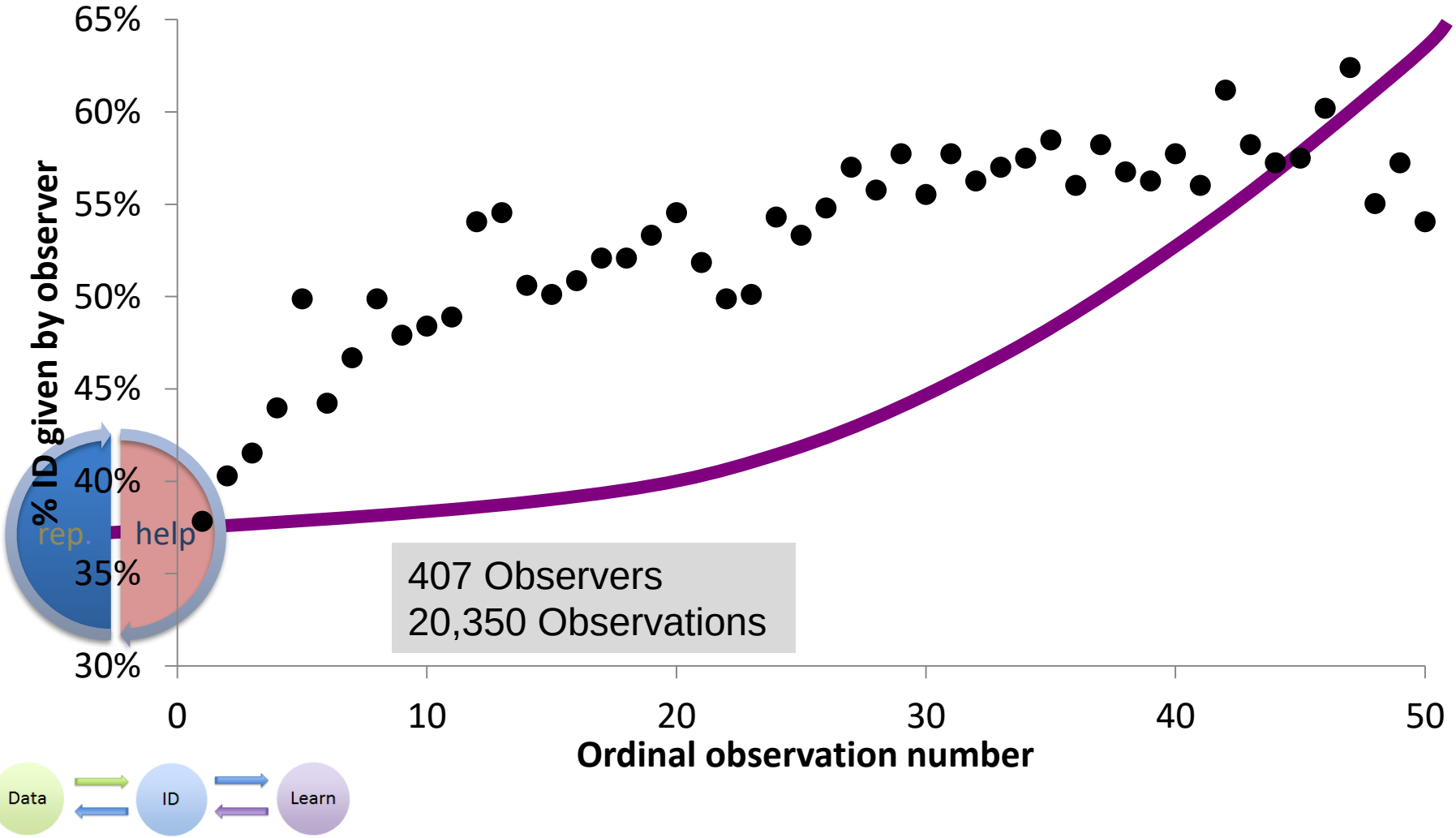
A community for teaching and learning

Concept of learning derived from a random sample of 100 user comments

"By focussing on learning, iSpot not only helps participants generate valid scientific observations, but it also trains them to become the biological recorders on whom future data collection will depend."

Silvertown, J., Harvey, M., Greenwood, R., Dodd, M., Rosewell, J., Rebelo, T., Ansine, J., McConway, K. (2015). ***Crowdsourcing the identification of organisms: A case-study of iSpot***. ZooKeys, (480), 125.

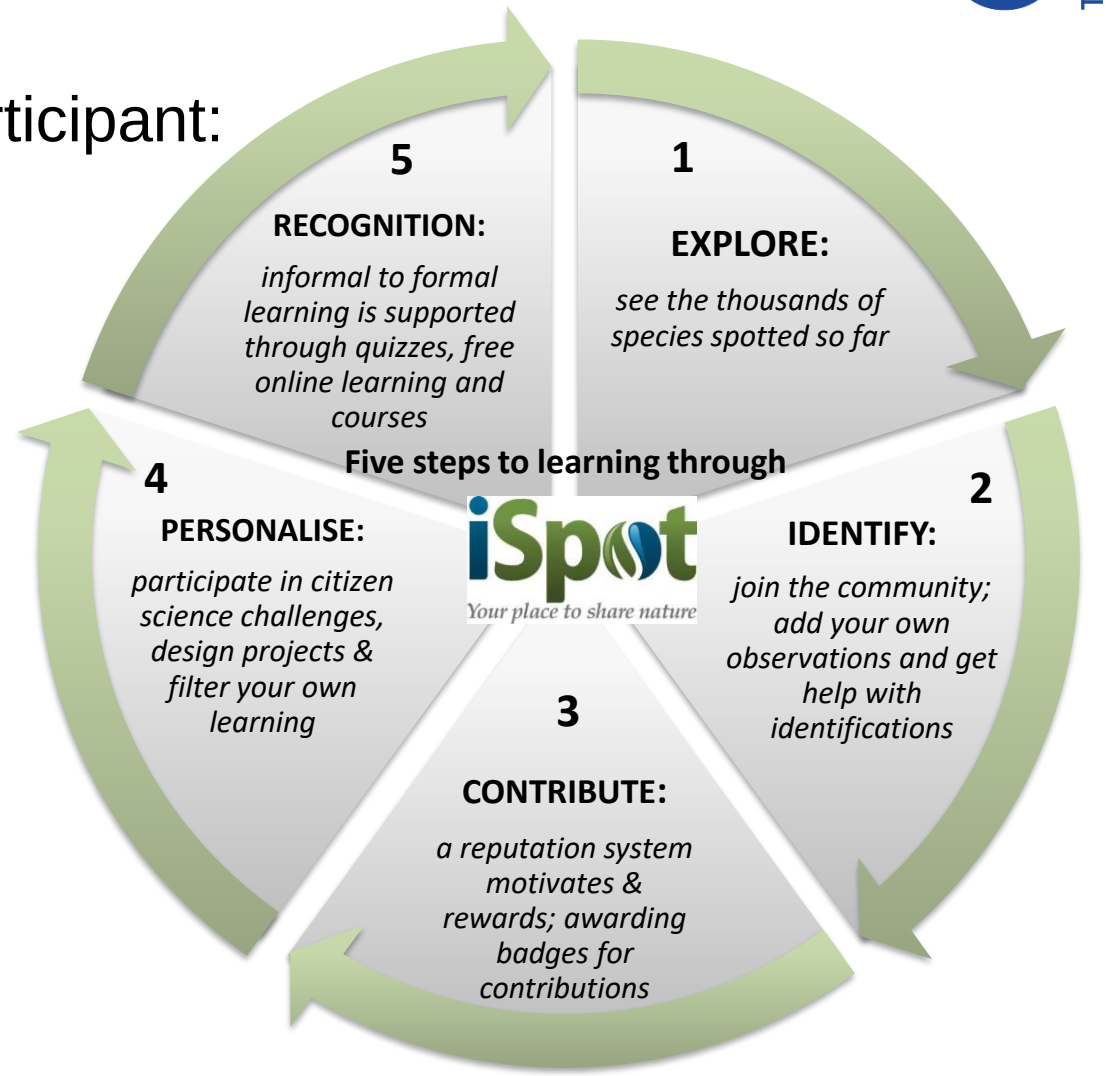
iSpot helps people *learn*



iSpot's learning model

Learning as an active participant:

"Many begin by simply exploring the site; searching, browsing and viewing observations; learning through interaction …can be a valuable experience. "



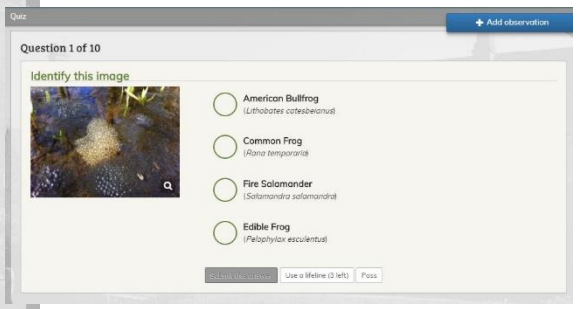
Ansine, J., Dodd, M., Robinson, D., McAndrew, P., (2017) ***Exploring citizen science and inquiry learning through iSpotnature.org.*** Chapter 6 in Herodotou, C., Sharples, M., Scanlon, E. (eds) *Citizen Inquiry: Synthesising citizen science and inquiry learning*. Routledge.

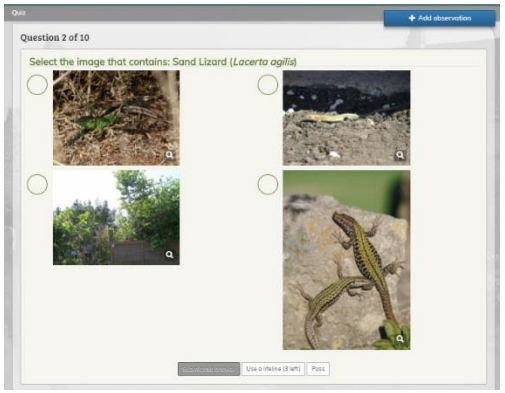
iSpot Quiz:
self assessment & learning

Number of quizzes taken and unique quizzes created in each group of organisms at each level of difficulty

Group of organisms	Difficulty level											
	Easy		Intermediate						Expert			
	Level 1		Level 2		Level 3		Level 4		Level 5			
	Quizzes taken	Unique Quizzes created	Quizzes taken	Unique Quizzes created	Quizzes taken	Unique Quizzes created	Quizzes taken	Unique Quizzes created	Quizzes taken	Unique Quizzes created	Total Quizzes taken	Total Unique Quizzes created
Amphibians and reptiles	1,100	34	411	20	326	30	129	15	344	24	2,310	123
Birds	2,818	100	1,946	61	1,814	54	1,275	47	3,123	206	10,976	468
Fish	639	19	254	13	204	18	85	11	187	17	1,369	78
Fungi and lichens	803	30	381	71	325	74	167	37	188	36	1,864	248
Invertebrates	2,108	78	1,045	98	1,140	211	425	89	1,137	569	5,855	1045
Mammals	1,728	36	950	23	845	31	521	27	1,092	75	5,136	192
Plants	2,996	150	1,816	61	1,555	77	665	63	1,290	133	8,322	484
Grand Total	**12,192**	**447**	**6,803**	**347**	**6,209**	**495**	**3,267**	**289**	**7,361**	**1060**	**35,832**	**2638**

Analysis of the 35,832 quizzes taken between August 1, 2013 up to September 1, 2016 by both registered and unregistered participants (Ansine et al 2017)





iSpot as a teaching tool

OU Courses / Modules / activities:

(between 2–30 iSpot study hours)

- S159 *Neighbourhood Nature*
- U316 *Environmental Web*
- S295 *Biology of Survival*
- SXHL288 *Practical science: biology and health*
- H800 *Technology-Enhanced Learning: practices & debates*
- E209 *Developing subject knowledge for the primary years*
- MOOC *Introduction to Ecosystems*
- BOC *Citizen Science and Global Biodiversity 2018*
- OpenLearn: www.open.edu/openlearn/
- OpenScience Lab practical citizen science activities: www.opensciencelab.ac.uk

+ Courses by other universities, colleges and schools

iSpot in teaching
Community supported teaching and learning

Biology of Survival (S295): OU 2nd level undergraduate module

Students do two main activities using iSpot:

- Bioblitz activity (October)
- Pollination study (March – April)

Summary of use / results:

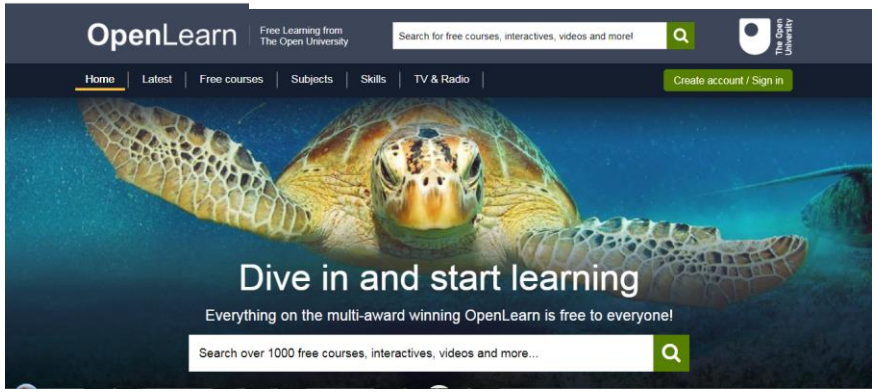
- **bioblitz-S295-20XX** tag used
- Student observations filtered into a project
- 2017/18: 488 observations posted

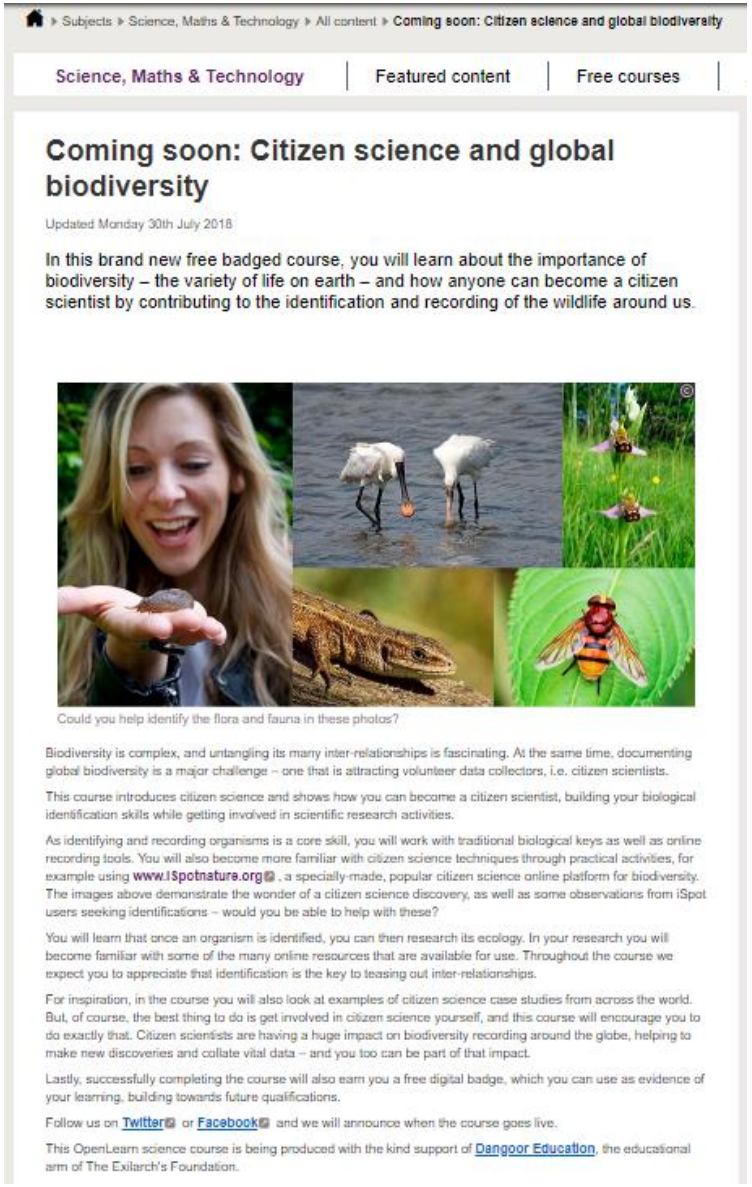
"There are some areas that are worthy of commendation. The iSpot activity is an innovative part of the curriculum enabling students to have interaction with experts. Thus early in the course the wider internet community of biologists is identified and drawn upon."

S295 External Examiner 2016

Citizen science & Global Biodiversity

Free 8 week Badged Open Course (BOC) www.open.edu/openlearn/




Subjects ▸ Science, Maths & Technology ▸ All content ▸ Coming soon: Citizen science and global biodiversity

Science, Maths & Technology | Featured content | Free courses

Coming soon: Citizen science and global biodiversity

Updated Monday 30th July 2018

In this brand new free badged course, you will learn about the importance of biodiversity – the variety of life on earth – and how anyone can become a citizen scientist by contributing to the identification and recording of the wildlife around us.

Could you help identify the flora and fauna in these photos?

Biodiversity is complex, and untangling its many inter-relationships is fascinating. At the same time, documenting global biodiversity is a major challenge – one that is attracting volunteer data collectors, i.e. citizen scientists.

This course introduces citizen science and shows how you can become a citizen scientist, building your biological identification skills while getting involved in scientific research activities.

As identifying and recording organisms is a core skill, you will work with traditional biological keys as well as online recording tools. You will also become more familiar with citizen science techniques through practical activities, for example using www.iSpotnature.org, a specially-made, popular citizen science online platform for biodiversity. The images above demonstrate the wonder of a citizen science discovery, as well as some observations from iSpot users seeking identifications – would you be able to help with these?

You will learn that once an organism is identified, you can then research its ecology. In your research you will become familiar with some of the many online resources that are available for use. Throughout the course we expect you to appreciate that identification is the key to teasing out inter-relationships.

For inspiration, in the course you will also look at examples of citizen science case studies from across the world. But, of course, the best thing to do is get involved in citizen science yourself, and this course will encourage you to do exactly that. Citizen scientists are having a huge impact on biodiversity recording around the globe, helping to make new discoveries and collate vital data – and you too can be part of that impact.

Lastly, successfully completing the course will also earn you a free digital badge, which you can use as evidence of your learning, building towards future qualifications.

Follow us on Twitter or Facebook and we will announce when the course goes live.

This OpenLearn science course is being produced with the kind support of Dangoor Education, the educational arm of The Exilarch's Foundation.

Title: Citizen Science and Global Biodiversity

Highlights the importance of biodiversity and how anyone can contribute, identify and record wildlife, as a citizen scientist:

- What is citizen science its growth and link to biological recording
- Scientific research activities as you learn and build individual skills.
- Traditional biological keys and online recording using citizen science techniques
- Practical activities using www.iSpotnature.org
- Using web resources to research species ecology
- The impact of citizen science on biodiversity around the globe.

www.open.edu/openlearn/science-maths-technology/coming-soon-citizen-science-and-global-biodiversity

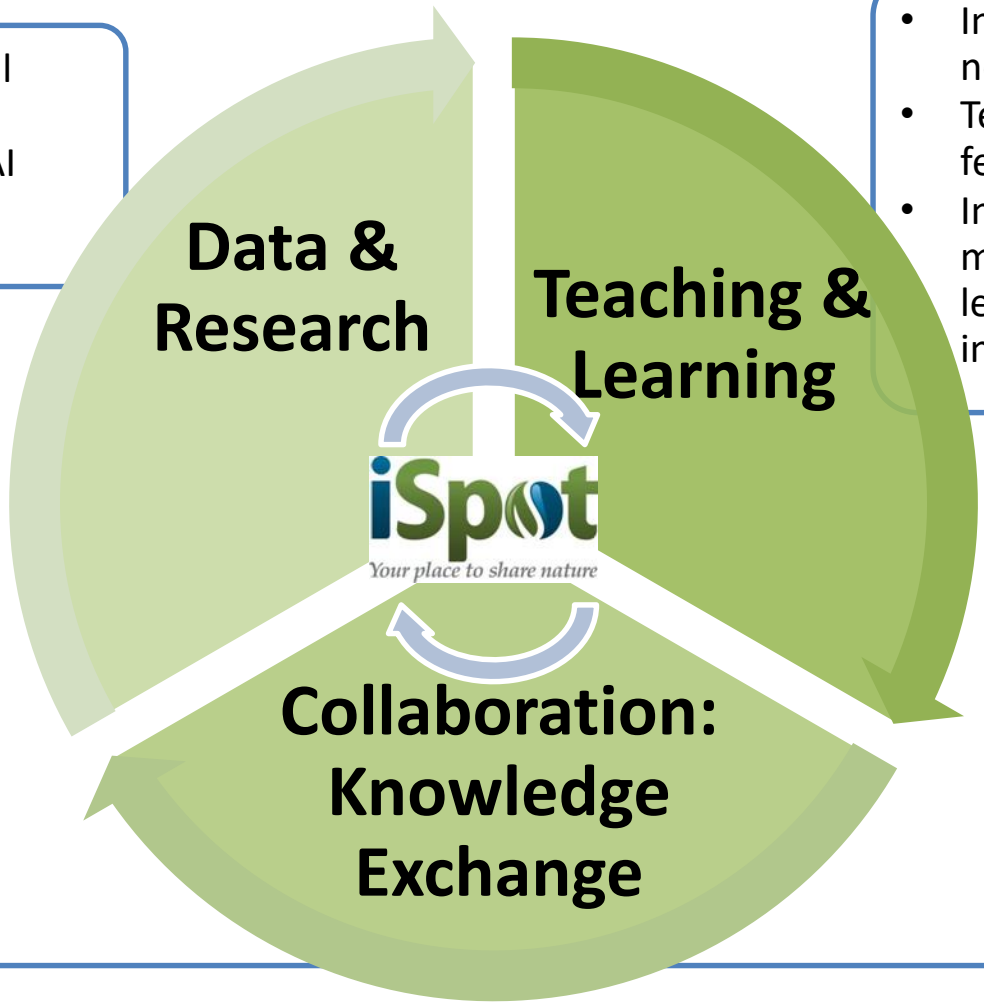
Community scale & reach

- **Media:** radio and TV (OU and BBC) and social media
  - News stories:e.g. Katie and the moth
  - Saving Species - BBC Radio 4 / Great British Year - BBC 1
- **Public engagement & outreach:** events and activities (iSpot Biodiversity Mentors)
- **Collaborations, partnerships, funding:**
  - NBN, OPAL**,** RSPB, etc -UK State of Nature Reports), EoL, Europe - ECSA
  - Funding: Big Lottery Fund, Garfield Weston Foundation, Wolfson Foundation, Ernest Cook Trust, British Ecological Society, British Council

iSpot for the future

- Species ID / Biological recording
- New innovation i.e. AI
- Data classification, collection & analysis

- Interactive social network
- Technology: tools & features
- Integrating iSpot into more teaching and learning (formal & informal)



- iSpot's model for citizen science, teaching and learning
- National / International policy & reports e.g. UK State of Nature
- Collaborations, partnerships(e.g NBN) & new funding options
- Public engagement and media opportunities

Building & maintaining iSpot's community

We need… YOU!

iSpot as it is now - existing technology

- How could you use it now?
- Barriers?

How to make iSpot more suitable for you / new ideas

- What functionality would you need?
- How can iSpot's primary data and collaborative opportunities support biological recording?

Other ideas – use of the iSpot citizen science platform

- iSpot's citizen science is about *biodiversity* – how could this be further applied?

iSpot for the future

- June 2009 – June 2019: acknowledging 10 years of iSpot

Thankyou!

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www.iSpotnature.org

Help us build and maintain iSpot:

- >68,000 registered users (participants)
- >769,000 observations posted
- >922,000 determinations
- >2 million agreements
- 4.3m user sessions / 3.4m page views
- >1.5 million images
- >43,000 species observed
- 180 countries
- >120,000 engagement
- 200 expert organisations