



Making Research Happen: a guide for British and Irish zoos and aquariums

The purpose of this document is to provide guidance on research policy and application within a zoo or aquarium in the British Isles. It provides guidance on the legal requirements for ex-situ research in zoos, and how to prioritize resources, promote, publish and evaluate research in your collection. This was a result of the 2009 11th BIAZA research symposium workshop on “Applying the EAZA Research Strategy to British and Irish zoos and aquariums “to help implement the strategy within BIAZA collections.”

EAZA have written an extensive Research Strategy (available at <http://www.eaza.net/activities/Pages/Research.aspx>) based on the research requirements outlined in the World Zoo and Aquarium Strategy (2005). The EAZA Research Strategy sets out a clear and purposeful research vision and mission, establishes primary goals and a detailed action plan with objectives that are specific, measurable, realistic and time-bound. BIAZA recommends this Strategy to its members and has written this document to give guidance on how this Strategy can be implemented in a British and Irish setting. Throughout this document, the term ‘zoos and aquariums’ is sometimes shortened to ‘zoos’, for simplicity’s sake.

The main EAZA Research Strategy goals

Each zoo/aquarium will:

1. Identify and pursue its own research policies and priorities.
2. Participate in research.
3. Develop an infrastructure, equipment and allocate sufficient staff time for research, taking into account the policies and priorities of other conservation and research agencies.
4. Link research priorities and policies to the regional and institutional animal collection planning process and the relevant activities of others.
5. Increase the dissemination of research plans, news and results.

6. Identify research priorities and projects in which they can cooperate collectively.
7. Ensure that all staff and departments understand the value of and need for research in zoos.
8. Integrate research as a component of management decisions into all disciplines within the institution.
9. Maximize the use of ZIMS and other zoo-based databases as research tools.
10. Measure and evaluate research processes, progress and output.

(http://www.eaza.net/about/Documents/EAZA_Research_Strategy_2008.pdf)

In addition to this document, BIAZA has produced a series of research guidelines – all of which can be found on the BIAZA website (<http://www.biaza.org.uk/public/pages/publications/index.asp?catUid=170>) – which provide detailed information on how to carry out certain types of research in a zoo setting:

- Project Planning and Behaviour
- Surveys and Questionnaires
- Nutrition and Diet Evaluation
- Behavioural Profiling
- Visitor Effects
- Evaluating Enrichment
- Using Zoo Records for Research
- Monitoring Stress
- Multi-zoo Research (due in 2010)
- Aquarium-based Research (due in 2010)
- Statistics
- Publishing Zoo Research
- Ethics and Legislation (due in 2011)

(1) Research Policy and Prioritising Research

Institutions should have a written research policy that should identify research priorities based on the collection and current resources present within the particular institution. A policy is typically described as a deliberate plan of action to guide decisions and achieve rational outcome.

Policy development relies on organizational involvement, including:

Staff willingness and expertise

- Animal keeping staff - effective communication and understanding between keepers and researchers is essential for productive research
- Managers / vets – pro-research managers and vets are necessary to establish a culture of research within the institution and
- Research expertise – ideally this should be present within the institution, but can also be accessed through partners, e.g. at academic institutions.

Links with universities and colleges

- Partnerships with academic institutions allow access to specialist expertise and facilities that most zoos cannot provide

Facilities

- All research requires some basic facilities which are outlined in section (2) below

Having considered available resources, an institution should target specific areas of need or specialist interest within the collection or other areas of operation, e.g. husbandry issues, visitor dwell time, etc.. A formal system of identifying these target areas and communicating them to the person responsible for research needs to be established to create a constructive flow of realistic proposals that can be put into practice. A research policy should ideally work to integrate science and research into the management of the zoo.

A research policy and priority research list can be used to designate the project to an appropriately skilled student or staff from collaborating universities. Such a project list gives the institution more control over the types of research it supports or initiates and can also help encourage research on under-represented species / areas. Maintaining links with the BIAZA Taxon Working Groups will also help zoos to identify key areas and target relevant research. Communication with the TWGs and the BIAZA Research Group may also allow for standardisation of research across several institutions which would lead to more robust results and conclusions.

Legal and ethical issues

Zoos and aquariums involved in research should ensure they have an understanding of relevant legal requirements. In the UK the main legislation is

the ASPA (Animal Scientific Procedures Act) which was introduced to safeguard the welfare of animals used in research and may have very important implications to zoo research, depending upon the nature and circumstances of the zoo research being considered. In Ireland the 1876 Cruelty to Animals Act is still being used. Researchers may also be affected by other legislation such as CITES and it is essential that someone in the organisation is aware of all these. An internal ethics procedure is also essential to ensure that all research meets the organisation's own ethical standards. This need not be complex or time-consuming. A good set of ethical guidelines for the treatment of animals in behavioural research and teaching can be found here <http://asab.nottingham.ac.uk/downloads/guidelines2006.pdf> by the Association for the Study of Animal Behaviour (ASAB)

For further guidance see *Zoo Research Guidelines: Sampling* and the forthcoming *Zoo Research Guidelines: Ethics and Legislation* (due in 2011).

(2) Resourcing research – how to participate

The main reasons that many BIAZA zoos are not participating in research are cited as cost and lack of expertise within the institution. However, even with very limited budgets, research can be achieved within zoos.

As an absolute minimum requirement zoos and aquariums should make research a part of at least one person's job specification. Research can be written into the roles of keepers, records officers, vets and education officers, for example. Ideally however there should be at least one dedicated research officer, even if only part-time, although this may be a difficult financial commitment for smaller collections. A dedicated research officer will have the right expertise and the time to focus on research, however they may be too detached from the husbandry etc to efficiently identify research needs. Giving research responsibility to e.g. a keeper as part of their job will overcome this but they may not have sufficient time or expertise to commit to research. It would also be best for zoos to allocate a specific person to be responsible for forging and maintaining internal and external research links, and to improve communication between keepers and researchers. Smaller collections may find it useful to collaborate either with larger collections or combining with several other smaller collections, to unite their research resources and efforts. This

effectively would solve many of the resource issues, however expertise on the research involved may still need to be sourced.

Staffing models

Within the British Isles there are several staffing models that zoos and aquariums have used to develop a research programme depending on the financial resources available.

Example models of how to provide staff time for research In approximate order of cost

Model	Pros	Cons	Examples
Include in remit of existing jobs eg keepers, educators, vets etc	Direct knowledge of collection, husbandry etc so good ability to decide priorities Good training for keepers and other staff	May lack necessary research skills May not have time to give research a high enough priority compared with other tasks	Jersey – excellent research culture in that it is normal for everyone to do it
Use university staff/students to do research	Effectively free or very cheap. Good access to lab facilities and other resources. Can work well if relationship well managed.	Poor communication between zoo and university can cause big difficulties University staff may not be aware or not interested in zoo's priorities	Dublin until recently - persuaded university to allocate a staff member by funding PhD students. Equally Sparsholt students' final year projects are often zoo-based and are a good source for resourceful students
Give one person overall responsibility as part of job	Person more likely to have appropriate research skills to carry out ex-situ research projects Can also act as contact person for universities etc	May have less direct knowledge of collection to determine priorities May not be able to give research enough time	Shaldon Newquay Harewood
Full time sandwich placement as research	Low cost or free Can focus on research	No advanced research training Temporary post so lack of	Blackpool until recently

co-ordinator	Has basic skills and expertise	consistency year to year and no opportunity to develop the role	
Full time internship (recent graduate)	Low cost Can focus on administrating research Basic skills and expertise	No advanced research training (unless was part of their degree) Temporary post so lack of consistency year to year and no opportunity to develop role	Chester (but with full time research officer as well)
Part-time dedicated research officer	Can focus on research Good co-ordination of students Likely to have good skills and expertise	Likely to be low paid so possibly not attractive to best researchers or high staff turnover rate	
Part-time research officer + PhD opportunity	Can focus on research Good co-ordination of students Own PhD research project of high standard and relevant to zoo	Very difficult for the person – low pay, big commitment to do job and PhD together for up to 7 years	Paignton Blackpool Marwell
RA seconded from university	Can focus on research Good co-ordination of students Own PhD research project of high standard and relevant to zoo Person gets better paid than the above	May be difficult to organise – might have been a lucky one off	Paignton – works very well
Joint zoo/university staff member	Highly trained research officer, good quality research Good links to determine research priorities Access to resources at university	Fairly costly University terms and conditions very different to zoos so hard to reconcile with other staff Not enough time allocated to zoo work	Paignton – not very successful overall Chester – honorary lectureships, giving access to university resources and expertise – not a costly commitment, and has useful rewards
Full-time dedicated research officer	Can focus on research and has appropriate skills and expertise Good co-ordination of students Own research of high standard and relevant to zoo	Costly especially for small collections	Chester Paignton Bristol Twycross
Several dedicated researchers in various fields of expertise	Excellent standard of research Improved husbandry and operations Reduced costs eg good nutrition research can cut cost of feed bill Valuable expertise can generate income from	Expensive – only feasible for large collections	Chester Paignton

Basic resources needed by zoos and aquariums to do research

In addition to people to do the work the basic infrastructure essential for research is-

1. Space to work, computer and internet access, probably including some specialist software e.g. for statistical analysis.
2. Access to scientific journals and bibliographic searching tools. Some zoos have their own libraries but a full range of up to date scientific literature is usually only affordable through gaining official status at an academic institution e.g. Associate Researcher status with a local university.
3. Wide buy-in to research in general across the organisation (keepers, curators, vets and directors).

Using universities and colleges

One of the biggest resources for research is the universities and colleges. Zoos should make links with their local academic institutions and/or with individual academics with interests / specialities that are similar to the zoo's own priorities. Universities can provide research expertise, research manpower (usually through students), library services, software and specialist facilities and equipment that most zoos would not otherwise have access to. Higher Education Institutions (within the local area of a collection), that run suitable and relevant courses will have final year students that need to conduct research-based dissertations as part of their honours programme. It is suggested that a zoo research officer (or similar) contacts final year tutors with a list of suggested projects that the collection wants doing (titles, brief synopsis of the research idea) which could be circulated to any interested students. It should still be up to the collection to decide if they wanted that particular student to complete the project. This way, collections can get useful research done that is beneficial in the long term. For this to work, project ideas would need to sent out to second year students so that they can collect data over the summer for write-up in their third year. Caution must be taken here however, as sometimes the time and effort to draw up this list, does not outweigh the benefits of having

particular students carrying out research. Always take this into consideration when collaborating with your local university.

In particular it may be useful to send a list of potential research projects to Sparsholt College for keepers taking the ANCMZA course (which has produced published papers in the past).

Collaboration with academic institutes is strongly encouraged, however it needs to be carefully managed to ensure all partners understand their contributions, responsibilities and limitations, e.g. ethics approvals, institutional representation in resulting papers, ownership of data, and issues around unavoidable husbandry changes which may affect research projects. In addition some research projects are not always suitable for students e.g. some multi-zoo or long term projects with proscribed methods that do not give the student the necessary opportunity to show they can plan research projects (nb Sparsholt have in the past supervised some multi zoo and longitudinal studies, so it is feasible).

ZIMS as a research resource

Zoo records are potentially a very valuable resource for research. Ideally records managers could have part of their time committed to research and use this data source to produce good research. This would be a very cost effective way to achieve research compared with other types that need equipment, consumables etc. However there may be issues of data ownership and who should be able to access the data.

For further guidance on what research can be achieved using zoo records see *Zoo Research Guidelines: Using Zoo Records*.

(3) Research funding

Grants for research are available from a number of sources to fund project research expenses (often easier) and sometimes research staff (more difficult). Major government research funding such as through the BBSRC is usually only available to academic institutions so must be applied for with an appropriate partner. Fundraising can also be achieved in the usual ways through visitors or sponsors.

In some cases zoo research staff can generate income to cover research activities by teaching on local University courses, either in the zoo, e.g. student field trips, or in the University itself. This can be through hourly teaching rates and accessing per-student payments for supervision of projects (student training money). It is sometimes difficult for Universities to provide sufficient quantity and/or quality research projects to all students, so they are often keen to work with external project supervisors. There may be ways to reach agreements with Universities in splitting the responsibilities/costs/time of providing student projects. There is inherent value in animals collections held by zoos and this should be considered when agreeing collaborations with universities.

Part-time PhD students i.e. students working as a researcher in the zoo whilst completing their own studies are an excellent way to achieve good research in zoos. These can be funded through grants but often living expenses are self-funded by the student from their part-time salary and research costs are funded by the zoo.

(4) BIAZA resources for research

BIAZA Research Group (BRG)

The BRG has compiled a range of excellent resources on the BIAZA website for supporting zoo- and aquarium-based research including advice for potential researchers, a series of guidelines for specific methods and techniques and a quarterly newsletter. In addition the BRG host an annual zoo research symposium each July and offer a system of letters of support to researchers hoping to carry out multi-zoo research. Before the BRG gives a letter of support for a project the proposal is fully evaluated and often many improvements suggested. Zoos should therefore be assured that supported research is likely to be well executed and of use to zoos generally. The BRG works with the Taxon Working Groups to highlight areas of research need and provide a link between zoo staff and academic researchers with relevant interests.

Taxon Working Groups (TWGs)

Taxon Working Group meetings could provide a forum to initiate multi-collection projects and identify specific research opportunities and gaps in knowledge. In this respect it is important that research representatives from zoos and aquariums attend TWG meetings whenever feasible. Non-BIAZA members will find it harder to be involved in TWG initiated research but are still encouraged to maintain links with TWGs and contribute to multi-institution research when possible.

Multi-zoo studies

Zoo research is often criticised for having small sample sizes. One way to combat this is to conduct a multi-zoo/-aquarium study. This can either be one researcher replicating work at several collections or each collection carrying out data collection and possibly analysis to an agreed methodology. This kind of research often needs someone vocal to champion the project but can be accomplished through the BRG or TWGs with their support. They can also advise on appropriate methodology, including inter-observer reliability.

Field-based research

Field research is not always about exotic animals in faraway places but can also be done very close to home. Research on native species may be carried out within zoo grounds, most often outside the animal enclosures but not always, as well as in more traditional sites around Britain and Ireland. The Native Species Working Group includes many zoo-based and non-zoo-based organisations, for example, the Wildlife Trusts and English Nature and can advise on research opportunities on native species.

Advertising research proposals

Research proposals or areas of interest can be posted on the BIAZA Research Group Yahoo group and other network sites run by the TWGs. Caution must be exercised as most of these forums are relatively open access and some users may misinterpret the reasons as to why the research is needed.

(5) Dissemination and publishing of research

It is a very important part of research that results are published and disseminated to appropriate audiences through academic and/or technical

journals, newsletters, conferences and meetings. Institutional research policies should include details on how and where results will be disseminated. At the very least a report of any research project should be sent to all zoos involved and the relevant TWG. Abstracts should be submitted for inclusion in the BIAZA Research Newsletter, particularly those that have been given BIAZA support. The project should be recorded in the BIAZA research database although BIAZA cannot hold copies of the projects.

There is currently an apparent difficulty in getting zoo-based research into peer reviewed scientific literature or in some cases any literature. This could be due to many factors including finding the time to write up papers and where to actually start when looking to get published. Equally there is little pressure for keepers/zoo staff to publish their work, even though they are in the best position to do so. Zoos and aquariums should encourage staff to publish results whenever possible.

For further guidance see *Zoo Research Guidelines: Publishing Zoo Research*

(6) – Internal promotion of research

It is important that all staff and departments understand the value of and need for research in zoos. This creates a momentum of research within the collection, and encourages future research.

Suggested ways to encourage a research culture:

- Produce a magazine for keepers and other staff which can be used for the communication of research findings, particularly when they are controversial, for example when evidence shows welfare implications – even better, to report findings that show an improvement to welfare or in the conservation education of the visitors, thus demonstrating the very applied value of research.
- Hold regular meetings between keepers and researchers so that keepers can suggest project ideas. Often keepers are already aware of many of the results that projects divulge, however research yields proof that can be used as evidence to management.
- Give keepers lists of projects which are going on so they can give ideas and opinions.

- Discuss projects early on with keepers rather than when the project is finished.
- Summarise large reports as no one will read most full project reports
- Make sure at least some research can be used to help other Departments e.g. Antwerp: Marketing Dept want Research Team to look at visitor numbers. Research can be helpful to Education Departments, commercial departments, gardens as well as animal keeping departments.
- Research talks to the public are likely to increase the interest of internal staff as they show that the research is generating interest. It also gives an opportunity to publicly thank staff who have been involved.
- Research results can be communicated via the institution's intranet, newsletter, posters in communal areas such as staff canteens, talks for staff (although it can be hard to find a time when everyone is available and willing to attend – Chester Zoo holds occasional lunchtime talks for its staff, where staff can bring their lunches and eat during the talk)

All internal communication about research must be accessible and easy to understand. Verbal and written reports need to take into consideration who the audience is. Many non-research staff will be unfamiliar with statistical tests for example. Simplified but informative results will lead to constructive communication and dialogue.

It is important for everyone involved in research to feel valued.

(7) Evaluation of research output

Evaluation of research output is an important part of a research programme. Looking at whether the research results have potential for the benefit of the collection and in a wider field, can help fuel enthusiasm and respect for zoo research. How research is evaluated can depend on the institution and whether internal or external funding is used etc. Some external funding bodies will have their own evaluation methods which all recipients of funding will have to follow.

Internal evaluations should include the usual academic methods of reporting research output, such as numbers of research projects completed at each academic level, conference presentations, proceedings and peer-reviewed

journal publications. However, they may also include evidence of improvements in zoo operations as a direct consequence of research results.

Finally, BIAZA zoos and aquariums should be aware that the BIAZA Research Group is available to help and support them, and will happily give advice to any member collection on how to initiate or improve their research.

Useful references:

1. EAZA Research Strategy
<http://www.eaza.net/activities/Pages/Research.aspx>
2. BIAZA research guidelines
<http://www.biaza.org.uk/public/pages/publications/index.asp?catUid=170>
3. Ethical guidelines
<http://asab.nottingham.ac.uk/downloads/guidelines2006.pdf>