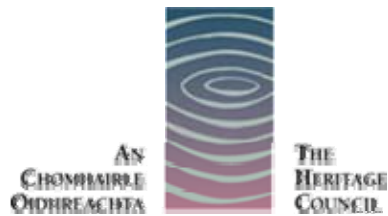


AUDIT OF BIOLOGICAL DATASETS COUNTY WESTMEATH



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Executive summary

As a requirement of international legislation, Ireland has produced a National Biodiversity Plan that sets out actions and methods of implementation for the conservation of Ireland's biodiversity. As part of this plan local authorities are required to prepare Local Biodiversity Plans in consultation with the relevant stakeholders. In order to prepare such plans information pertaining to the natural heritage of the county is essential. This study has collated natural heritage datasets relating to Co. Westmeath from a wide variety of sources contained in published and unpublished sources, including books, reports and scientific papers containing information relating to the ecology and biodiversity of the county. Further to the collation of these data, gap analysis was carried out to establish areas within the county where data was lacking or otherwise on various habitats and species. The report provides conclusions and recommendations for future work within the county to address any gaps in the knowledge identified.

A database of biological records relating to County Westmeath forms the main part of this project. This database currently contains approximately 195 records. Each record provides information on the type of research carried out, the reasons for the study, a brief description of the study, the habitats and species investigated and information relating to the accessibility and ownership of the dataset. The records held in this database were also entered into the Heritage Councils Metadata template.

Subsequent gap analysis of the dataset is provided in the form of summary statistics on both the habitats and species studies. General conclusion and recommendations for future work to address gaps highlighted are presented.

The main findings of this report include the following strengths and weaknesses in relation to habitat information for Co. Westmeath:

- Habitat class G: Grassland and marsh, with the exception of wet grassland is poorly represented.
- Habitat class FW: Watercourses are poorly represented.
- Habitat class FL lakes and ponds and FS: swamps are particularly well represented.
- Within the habitat class PB: Bogs, PB1: Raised bogs and PF: Fens and flushes are very well represented.
- Within the habitat class WL: Linear woodland and scrub the subclass WL1: Hedgerows is particularly well represented.

The main findings of this report include the following strengths and weaknesses in relation to species information for Co. Westmeath:

- Freshwater macroinvertebrates and non-marine molluscs are very poorly represented.
- There is very limited data for mammals, most of which is derived from Environmental Impact Statements and very limited information pertaining to mammals of conservation importance, especially otters, bats and the Irish hare.
- There is limited information on freshwater fish of conservation importance.
- Information on alien and non-native species is very weak.
- Information on Vascular plants, especially those occurring in peatlands is high.
- Information pertaining to birds, including wetland birds is high.

The following general conclusions are made:

- Biological datasets for the county follow a similar pattern to that for Ireland as a whole.
- The relatively high number of datasets for Westmeath primarily relates to the high number of designated areas within the county (Special Conservation Areas, Natural Heritage Areas and Special Protection Areas).
- In common with the rest of Ireland, the level of detail included in Environmental Impact Assessments is often weak.
- The main strengths include very competent, skilled researchers in a variety of institutions, good information on some habitats and species (peatlands, woodlands and vascular plants).
- The main weaknesses stem from limited funding for biodiversity research and study, a lack of basic information on the ecology of important habitats and a limited number of skilled taxonomists in some areas.
- Much biological data pertains to designated species or habitats of either national or EU importance.

The following general recommendations are made:

- Request that when Environmental Impact Assessments are carried out that the full species inventory is included with the EIS.
- Request that when Environmental Impact Assessments are carried out that the habitats described are based on the Fossitt (2000) habitat classification system.
- Encourage universities to carry out research in areas that are poorly studied by providing some level of financial support (travel and subsistence) for such studies to undergraduate students embarking on their final year projects.
- Seek to become partners in large-scale biodiversity studies.
- Encourage on-going research into habitats and species of national and EU importance, while also encouraging studies and inventories of other habitat and species that are poorly known.
- Address the lack of information in relation to FW: Watercourses and G: Grassland and marsh and the species of conservation importance (otters, bats and the Irish hare) for which there is a low level of knowledge.

1. Introduction

The Convention on Biological Diversity (CBD) was negotiated under the auspices of the United Nations Environment Programme (UNEP) at the 1992 Earth Summit in Rio de Janeiro. The CBD was signed by Ireland in 1992 and ratified in 1996.

The CBD reaffirmed that the responsibility for achieving its goals rests primarily with the individual countries that ratified the agreement. The CBD also reaffirmed that states are responsible for conserving their own biological diversity and for using their biological resources in a sustainable manner. The main provisions of the CBD are goals and policies rather than specific tasks, and each contracting party has the right to formulate its own national policy within the guidelines of the CBD. Within the CBD a programme known as Agenda 21 sets out the actions to be taken globally, nationally and locally by organisations and governments in every area in which humans impact on the environment and its sustainable development. In this respect Ireland was bound to develop a national strategy on biodiversity conservation, as outlined in article 6a of the CBD. Ireland's National Biodiversity Plan launched in April 2002 provides for this requirement.

The preparation of Local Biodiversity Action Plans is part of the overall process that the government has initiated to fulfil its international obligations under the CBD. Generally Local Biodiversity Action Plans are a complementary component of Local Heritage Plans prepared by each local authority.

Without the relevant information relating to the current status of the natural heritage within the local authority area, the preparation of Local Biodiversity Plans is extremely difficult, if not impossible. The collation and accessibility of such data has been the subject of recent attempts by a number of government departments and agencies; including the Heritage Council and the National Platform for Biodiversity Research - under the auspices of the Environmental Protection Agency and the National Parks and Wildlife Service. The current Framework for a Biodiversity Research Programme for Ireland¹ reiterates the need for a central database of all biodiversity research in Ireland. The need for a database for all biodiversity research carried out within Ireland stems from the need to perform gap analysis on the current research so that informed policy decisions can be made. The process of setting up a Biological Records Centre has already been initiated. However, it will be some time before this facility is fully functional and in the interim it has proved essential that local authorities access and collate information on local biodiversity record sets so that the process of preparing Local Biodiversity Plans can be completed.

The aims of this project included:

- The creation of a bibliography of all natural heritage datasets included in published information including books, reports and papers containing information pertaining to the ecology of Co. Westmeath.
- Identification and inclusion of datasets included in unpublished information including that contained in Environmental Impact Statements, under-graduate and post-graduate theses, reports and datasets held by Government organisations, non-governmental organisations, educational institutes, environmental consultancies and individual recorders, both within and outside Ireland, as relevant.

¹ Framework for a Biodiversity Research Programme for Ireland (2005). A report by the Irish National Platform for Biodiversity Research.

- Consultation with all holders of national datasets, to ensure that all relevant information for the county was included. An estimation of the relevance of the datasets to the county was required.
- Analysis of the dataset for the county, identification of strengths and gaps in area, habitat and species knowledge, and recommendations for priorities in future work.

This project has achieved the aims outlined above by the production of a database containing metadata pertaining to biological datasets available for Co. Westmeath and the subsequent gap analysis of this data. Recommendations for priorities for future work were made following examination of the gap analysis.

2. Methods

2.1 Information gathering

A full list of all sources consulted is given in Appendix 1. The approach taken and certain caveats to information gathering are listed under each of the categories below.

2.1.1 Approach to data sourcing

In general relevant organisations were contacted by letter explaining the aims, objectives and reasons for this audit or by telephone. In some cases a data capture spreadsheet designed by the National Platform for Biodiversity Research was used to gather information. In many other cases information was gathered by site visits to repositories of data (e.g. University libraries, ENFO, Local Authorities etc). Web based searches of suitable on-line catalogues and web sites were consulted. In addition much of the information was obtained through telephone conversations with the organisation in question that subsequently provided data by telephone, email or forwarding relevant documentation by post.

2.1.2 Caveats to information gathering

Non-Government Organisations

All relevant NGO's (listed in Appendix 1) in Ireland were contacted by telephone, branches where possible were contacted by e-mail. The aims of the project were discussed with the NGO and any relevant data was provided by telephone if possible. In many cases NGO's provided documentation containing information on datasets.

ENFO

Local Authorities are required to provide copies of all Environmental Impact Statements (EIS's) to ENFO. ENFO enter basic information relating to each EIS into a database that is available to download as a PDF file at

http://www.enfo.ie/Library_Database_Files/EIS%20Inventory.pdf. The full content of all EIS's are also scanned by ENFO into a database. This database is available to view fully at the ENFO offices in Dublin. It should be noted that although the requirement to provide EIS's to ENFO lies with the local authority it has been found that in some cases the information is either not provided in a timely manner or has been omitted. While ENFO makes every effort to obtain information from the local authority the ultimate responsibility lies with the local authority and omitted EIS files can lead to gaps in the ENFO database.

The biological information contained within an EIS is often limited, especially in urban areas and areas where the EIS is being carried out for residential developments, industrial development, and sewage treatment plants etc. In these cases the EIS may contain information on environmental parameters other than biological data (e.g. dust or noise pollution). All EIS's for the county were examined and where possible species and habitat inventories were listed in the database. Where an EIS alluded to habitats or species but did not contain inventories of species or habitats the EIS was entered into the database with a note in the description section outlining that there was limited biological information contained. EIS's that contained no biological information were omitted.

Theses

Contact was made with the secretary of the relevant departments in each third level institute. However, few departments had lists of the theses that they produced. The main source of information was library catalogues accessed through websites. These catalogues do not list undergraduate theses and so institutes were visited to access this information. Using the library catalogue and a keyword search, relevant theses were located. However most catalogues (with the exception of University College Cork) only provide a theses title, therefore theses that did not have the location of the work included in the title will have been missed.

Local contacts

Individuals and organisations involved in collecting biological data at a county level were contacted by phone and e-mail.

Additional (non datasets)

Additional sources of information not strictly considered as datasets, were included in the search. For example all of the site synopsis for designated areas (Special Areas of Conservation, Natural Heritage Areas and Special Protection Areas) were included in the database. It was considered the inclusion of such information would be necessary to fully ascertain the biodiversity of the Co. Westmeath and would provide a useful source of information for users of the database.

All Ireland data

Certain datasets contain information on more than one county. In such cases the dataset was searched and provided records relating to Co. Westmeath were contained within it the dataset was entered into the database. In some cases it was necessary to estimate the number of records pertaining to the county, particularly for very large datasets that were not stored in a searchable format. In such cases discussion with the data managers of such datasets allowed a relatively accurate estimate to be made.

Entry of data into the Heritage Councils Metadata database

The data collected throughout the course of this project was entered into the Heritage Councils metadata database, if following a search of the database it was not already contained, with the following exceptions:

- National Parks and Wildlife Site Synopsis were not entered into the Heritage Council metadata database, as these are not strictly datasets but rather a description of designated sites within the local authority area. However, it was felt that it would be useful to include these descriptions within the county database to provide a more complete assessment of the natural heritage within the county and to facilitate gap analysis.
- IWEBS data was entered as one complete dataset and not broken down into individual site-specific datasets as was entered into the individual county dataset.
- As this project was part of a larger survey of data relating to four local authority areas any national datasets which pertained to one or more local authorities was entered only once into the Heritage Councils database to avoid duplication.

2.2 Creation of a database

A database, to hold all data collected during the information gathering stage of the project, was created in Microsoft Access 2000®. This database was designed in a very simple format to provide a user-friendly front end that would allow the database to be updated as required with minimal effort or knowledge of databases. The database contains only one form, from which data can be entered. A series of simple query options are provided on the main switchboard of the database to allow records to be found by searching for either a project title name, species, habitat, data owner name, data holder name, project start date or site location. This query option could be expanded upon at any stage in the future to allow a search based on any fields or combination of fields contained within it.

The fields provided in the database (see Appendix 2) mirror those fields contained with the Heritage Councils metadata database. However, it also contains many more additional fields that were felt necessary in order to fully query the dataset and provide a useful format for gap analysis. All entry fields are non-compulsory, with the exception of the project title field. This allows only a subset of the fields to be completed if required, as many fields will not relate to all datasets.

2.3 Data entry

Data was entered into the database following examination of the relevant datasets. The fields indicated (see section 2.2 above) were completed as fully as possible. However, all fields were not relevant to each dataset and in some cases the required data was not available to complete the data entry form fully.

Habitats

Throughout this project the habitat classification scheme of Fossitt (2000) was used. If a dataset did not provide a habitat code according to Fossitt, the relevant code was provided following examination of the dataset. The full Fossitt Habitat Classification System is provided in Appendix 3. Where a particular habitat rather than a species, was the main focus of the dataset, only the habitat was entered.

Species

In the case of species, a broad species term was generally used to describe the data. The terms used were similar to that provided by the Heritage Councils metadata database, for example if a dataset contained an inventory of bird species the term “birds” would have been used, as to list all species would not have been practical. However, if a dataset contained less than 5 species, a full species listing was generally entered. If a dataset included notable species (such as those protected under national or EU law) the species was listed. Trees were entered as a separate class, distinguished from vascular plants, to allow a more detailed breakdown of the full species dataset. The broad species groups used are provided in Table 1.

Table 1: Broad species groups

Broad species group	Notes on inclusion
Vascular plants (except trees)	All vascular plants except trees
Lower plants	Includes Bryophytes, Lichens, Liverworts, Hornworts and Ferns
Trees	All tree species
Insects	All insect orders
Molluscs (non-marine)	Includes notable species such as Freshwater Pearl Mussel
Crustaceans (non-marine)	Includes notable species such as Freshwater Crayfish
Amphibians and Reptiles	All amphibians and reptiles
Birds	All birds including water birds
Fish	All fish (freshwater and marine)
Mammals (terrestrial)	All terrestrial mammals
Macroinvertebrates (freshwater)	Distinguished from other freshwater invertebrates where species was not provided

2.4 Gap Analysis

Following complete population of the database a series of queries were carried out to provide an estimate of the number of records for each habitat or species group included. Within individual species groups further data mining was carried out to provide more detailed information. For example, within the species group “mammals (terrestrial)” the data was further analysed to assess the level of information pertaining to any protected species. The results of this analysis are provided in Figure 1 (habitats) and Figure 2 (species). The Fossitt habitat classification, which is based on a hierarchical model, was further amalgamated for the purposes of presenting the results of the gap analysis. Initially each of the primary, secondary and tertiary habitat levels were analysed. However, for clarity the secondary level analysis is presented in figure 1.

3 Results

3.1 Habitats studied

Figure 1. Number of records recorded within each habitat type.

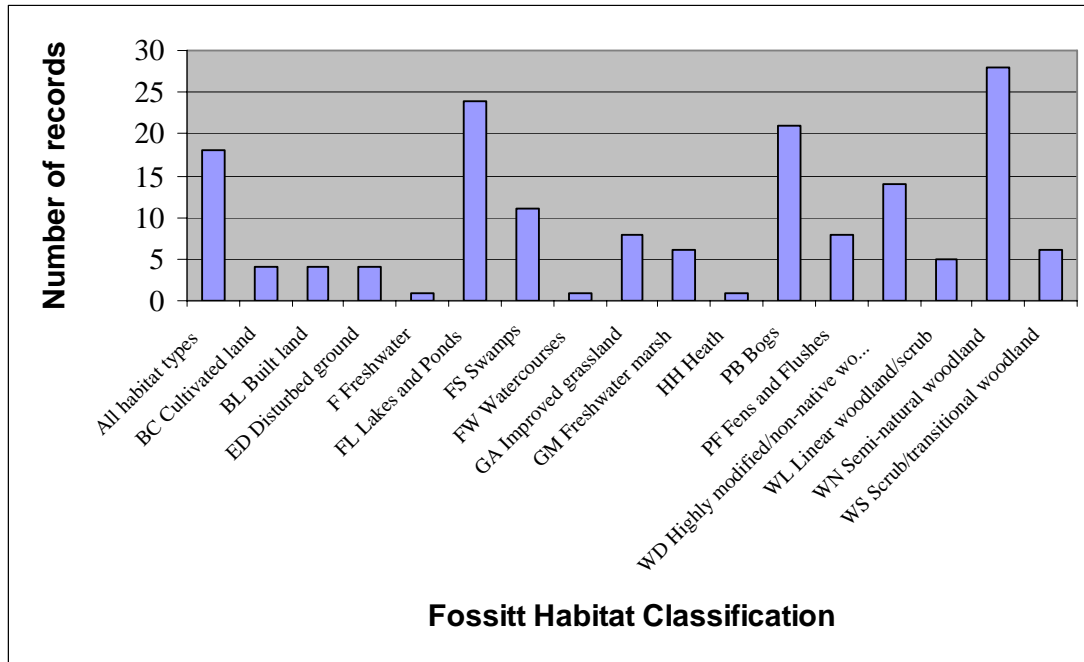


Figure 1 indicates the number of datasets contained within the database for each habitat listed. It should be noted that a dataset may contain more than one record for an individual habitat and this analysis was carried out on datasets rather than individual records. Table 2 provides a more detailed list of all “class 3” Fossitt habitat categories for which no data was available. In cases where the dataset did not provide an obvious habitat classification the broader Fossitt habitat category was used. For example, if a dataset related to P: Peatlands, but the peatland type was not indicated that habitat was listed as P: Peatland.

Figure 1 indicates that habitat classes FL: Lakes and ponds, PB Bogs and WN: Semi-natural woodland are best represented in the Co. Westmeath dataset. This result is very similar to the results obtained by the National Platform for Biodiversity Research when a similar exercise was carried out on a national basis with the exception of habitat class FL: Lakes and ponds being better represented in the Westmeath dataset and habitat class G: Grassland and marsh being slightly more poorly represented. More detailed analysis within the individual habitat groupings indicated the following:

- Habitat class G: Grassland and marsh, with the exception of wet grassland is poorly represented.
- Habitat class FW: Watercourses are poorly represented.
- Habitat class FL lakes and ponds and FS: swamps are particularly well represented.
- Within the habitat class PB: Bogs, PB1: Raised bogs and PF: Fens and flushes are very well represented.
- Within the habitat class WL: Linear woodland and scrub the subclass WL1: Hedgerows is particularly well represented.

Table 2: Number of datasets for each Fossitt Habitat Category where no information was available.

Habitat
FP Springs
GA Improved grassland
HD Dense bracken

3.2 Species studied

Figure 2. Number of records recorded within each broad species group

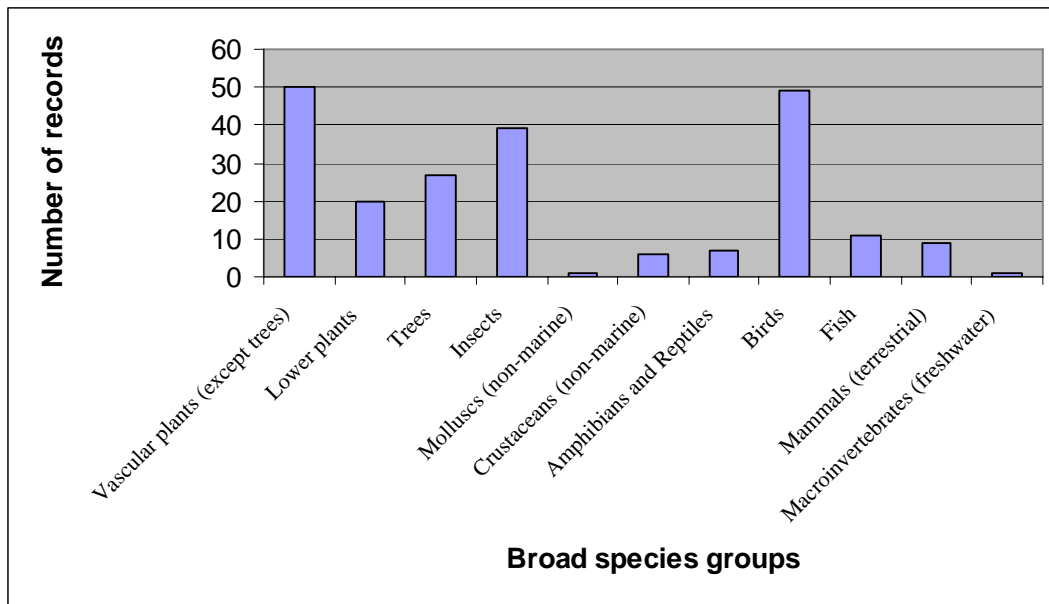


Figure 2 indicates the number of records contained within the database for each broad species group listed. Figure 2 indicates that the species groups, Vascular plants (except trees) and Birds are particularly well represented in the dataset. This result is very similar to the results obtained by the National Platform for Biodiversity Research when a similar exercise was carried out on a national basis with Birds records in Co. Westmeath appearing to be above the national average. More detailed analysis within the individual species groupings indicated the following:

- Freshwater macroinvertebrates and non-marine molluscs are very poorly represented.
- There is very limited data for mammals, most of which is derived from Environmental Impact Statements and very limited information pertaining to mammals of conservation importance, especially otters, bats and the Irish hare.
- There is limited information on freshwater fish of conservation importance.
- Information on alien and non-native species is very weak.
- Information on Vascular plants, especially those occurring in peatlands is high.
- Information pertaining to birds, including wetland birds is high.

4. Conclusions

The audit of biological datasets for Co. Westmeath indicates that biological datasets for the county follow a similar pattern to that for Ireland as a whole. However, as has been indicated in other reports the national level of biodiversity knowledge regarding both habitats and species for Ireland is relatively low. The relatively high number of datasets for Westmeath primarily relates to the high number of designated areas within the county (Special Conservation Areas, Natural Heritage Areas and Special Protection Areas).

In common with the rest of Ireland, the level of detail included in Environmental Impact Assessments is often weak. Frequently species inventories (even when carried out) are not included and habitat classifications are not based on the Fossitt (2000) habitat classification system. Valuable species and habitat information is lost when these inventories are not included. In addition, it would save considerable time and resources on behalf of ENFO if full Environmental Impact Assessments were provided to them in electronic PDF format.

In general the level of knowledge in relation to biological data is similar to the country as a whole. The main strengths include very competent, skilled researchers in a variety of institutions, good information on some habitats and species (peatlands, woodlands and vascular plants). The main weaknesses stem from limited funding for biodiversity research and study, a lack of basic information on the ecology of important habitats and a limited number of skilled taxonomists in some areas. It is also noteworthy that much biological data pertains to designated species or habitats of either national or EU importance. While this information is highly important for the conservation of these areas it leaves a basic gap in our knowledge of other habitats and species that may become vulnerable in the future.

5. Recommendations

Detailed recommendations in relation to the natural heritage of Co. Westmeath are outlined below. In addition to these specific recommendations it has become clear through the collection and collation of the data contained within this report that the necessity for a central database of biological data is critical for the future management of biodiversity at both national and local levels. It is therefore recommended that local authorities, through their Heritage Officers and liaison with the Heritage Council be provided with the means to input recommendations and methods for ensuring that the Biological Records Centre collects and collates information in a format useful for local biodiversity management. Specifically, the manner the data is held by the biological Records Centre should provide for the query and extraction of information relating to individual counties.

In order for the local authority database to be kept up to date it would be necessary for it to be produced in an on-line Internet accessible format (such as that provided by the Heritage Council). Such a database would then require considerable administration as passwords to allow data entry would be necessary and data entry fields would need to be created with strict criteria attached to ensure complete and accurate population. It is likely that the Biological Records Centre will provide a central service which may be a more cost effective method of ensuring that data relating to a particular county is kept up to date and accurate.

At a minimum the database that accompanies this report could be kept up to date by entering information from EIS's as they become available. In addition, while it may be difficult to encourage the relevant third level colleges to provide titles and abstracts of

undergraduate and postgraduate projects, such a request to such institutes may be granted and should be sought. Such a process would be more likely to be successful if all local authorities provided a simple and efficient standardised format through which such institutes could provide this information in one single exercise. The participation and active involvement of the local authority in the National Platform for Biodiversity Research would also provide them with a platform to initiate a working group to tackle issues relating to the dissemination of such information on an annual basis.

Currently it is not possible to ensure that all holders of data provide information on their datasets to either the Biological Records Centre or Local Authorities. However, the local authorities could make recommendations through their respective representatives to request that all national funding agencies and other institutes that provide funding do so on condition that the metadata from such projects is provided to the Biological Records Centre. Other incentives, which may encourage researchers who are not in receipt of funding to provide information on their datasets, could include the use of facilities of the local authorities such as access to data held by the local authority, including maps and Geographical Information System data.

A requirement of such funding could also stipulate that the data derived from such projects is treated in such a way to allow relevant queries to be carried out. Specifically, it would be useful if a standard format for database input were provided to research institutes and others willing to provide information on their datasets to either the Biological Records Centre, the Heritage Council or Local Authorities and such a format be adopted as a national standard. It is likely that it will be necessary for a working group to be established to formulate such a standardised format for metadata collation. However, at a minimum it should contain the same information fields contained within the database that accompanies this report, but with stricter criteria for data input applied to the various fields. The following specific information would greatly enhance the ability of a database to fully query and analyse datasets:

- Where the dataset applies to a number of counties the relevance of the data to each county should be provided as a percentage of the total dataset. This is particularly important for scientific publications where the full data is not provided and it is often extremely difficult to ascertain from the publication how relevant it might be to a particular county.
- If maps or GIS projects are carried out as part of a project or dataset, information detailing the type of maps produced, and the area covered should be provided along with information relating to the accessibility of such maps.
- A sub form specifically dedicated to the population of inventory data (such as that contained within Environmental Impact statements) as opposed to research projects concentrating on a particular habitat or species would also be beneficial.

The collation of biological datasets would also be greatly enhanced if local authorities requested that when Environmental Impact Assessments are carried out that the full species inventory (where appropriate) is included with the EIS and that the name of the actual biologist that produced the species list is included.

- Request that when Environmental Impact Assessments are carried out that the habitats described are based on the Fossitt (2000) habitat classification system.
- Encourage universities to carry out research in areas that are poorly studied by providing some level of financial support (travel and subsistence) for such studies to undergraduate students embarking on their final year projects.
- Seek to become partners in large-scale biodiversity studies (examples of which are Ag-Biota, BioForest and BioChange). By becoming involved in such projects

Westmeath County Council would be better placed to request such studies directly target either species or habitats that are poorly studied in the county. While the above projects may not be directly applicable to Co. Westmeath or are nearing completion, funding for large-scale projects normally come on stream on an annual basis. Agencies such as the Environmental Protection Agency, The Department of Agriculture and Food and the Marine Institute as well as EU Framework programmes all provide funding for biodiversity research.

In addition Westmeath Co. Council should seek to address the basic information gaps in relation to the habitats and species outlined in section 3.1 and 3.2, that indicated that there was little or no information available on the following habitats, which is the context of the habitat and species diversity of Co. Westmeath should have more information available:

Habitats:

1. Habitat class G: Grassland and marsh, with the exception of wet grassland is poorly represented.
2. Habitat class FW: Watercourses.

Species

1. Freshwater macroinvertebrates and non-marine molluscs.
2. Mammals, especially otters, bats and the Irish hare.
3. Freshwater fish of conservation importance.
4. Alien and non-native species.

Westmeath Co. Council should, while encouraging the on-going research into habitats and species of national and EU importance, also encourage studies and inventories of other habitat and species that are poorly know.

Appendices

Appendix 1: Sources consulted

Government Agencies	Coillte
	Teagasc
	National Parks and Wildlife Service
	National Botanic Gardens
	Environmental Protection Agency
	The Heritage Council
	Central Fisheries Board
	Natural History Museum
Non-government organisations	BirdWatch Ireland
	Irish Peatland Conservation Council
	An Taisce
	Irish Wildlife Trust
	Bat Conservation Ireland
Third level Institutes	University College Cork
	National University of Ireland Galway
	University College Dublin
	University of Limerick
	University College Maynooth
	University of Dublin, Trinity College
	Galway-Mayo Institute of Technology
Local Authority	
ENFO	Environmental Impact Statements
	Environmental reports
Others	Local BSBI recorder
	National Platform for Biodiversity Research
Publications	Royal Irish Academy Publications
	Irish Naturalists Journal
	Irish Biogeography Society
Consultancies	BEC Consultants Ltd
	Natura
	EcoServe
	RPS

Appendix 2: Database fields

Field	Field Title	Field Description
1	Autonumber	Provides a unique identifier for the record
2	Title of Data	Name of research project, study, or publication
3	Principal investigator	Name of the individual that actually carried out the work, normally main researcher or leader of a large scale project
4	Owner/Manager of data	Person/organisation that commissioned the work or currently manages it.
5	Address of Owner/Manager of data	
6	Phone number of Owner/Manager of data	
7	Email address of Owner/Manager of data	Hyperlink field
8	Name of Holder of data	Where the data is currently stored if access is required. Often the same as field 5
9	Address of Holder of data	
10	Description of data	Provides a brief description of what information is contained within the dataset.
11	Location of study site	The specific location of the study. This may not be available if the dataset relates to a larger area, such as All Ireland.
12	Townland	The name of the Townland to which the data relates if available.
13	Grid -easting	The grid reference (easting) of the study site if available
14	Grid- northing	The grid reference (northing) of the study site if available
15	Objective of research	E.g. Research, Inventory, management, EIS, etc.
16	Web address of data	Hyperlink field. If the dataset is online this field should be completed.
17	Web address of further information	Hyperlink field. If other information relating to the dataset is available, such as research projects information. This field should be completed
18	Project start date	
19	Project end date	
20	Confidential report	Check box if the report is a confidential report
21	EIS	Check box if the report is an EIS
22	ER	Check box if the report is an ER
23	Planning Reference Number	County Council Planning application reference number
24	Management Plan	Check box if the report is a management plan
25	Postgraduate thesis	Check box if study is produced as a Post graduate thesis
26	Book	Check box if study is produced as a book
27	Report	Check box if study is produced as a report
28	If Book Name of Book/Report	If a book or report give name
29	Book Publisher	If a book or report give name of publisher
30	Scientific publication	Check box if study resulted in a scientific publication
31	If Scientific publication name of publication	If scientific publication, give full publication reference
32	ISBN	If publication has been assigned an ISBN number, provide the number
33	CD	Check box if results are available on CD
34	Web based	Check box if results are available on the World Wide Web
35	Other	Provide information on other methods of data storage
36	No published findings	Check box if the study has resulted in no publications of any kind
37	Paper storage	Check box, if the data is stored on paper
38	Electronic storage	Check box, if the data is stored electronically
39	No Storage	Check box, if the data is not stored anywhere
40	Data Availability on request to holder	Check if further information on the dataset is available from the data holder.
41	Data Availability on request to owner	Check if further information on the dataset is available from the data owner or manager.
41	Memo re-data-request	Notes relating to any difficulties with data requests.

Appendix 3: Fossitt Habitat Classification

Non-Marine		
F Freshwater	FL Lakes and Ponds	FL1 Dystrophic lakes
		FL2 Acid oligotrophic lakes
		FL3 Limestone/marl lakes
		FL4 Mesotrophic lakes
		FL5 Eutrophic lakes
		FL6 Turloughs
		FL7 Reservoirs
		FL8 Other artificial lakes and ponds
	FW Watercourses	FW1 Eroding/upland rivers
		FW2 Depositing/lowland rivers
		FW3 Canals
		FW4 Drainage ditches
	FP Springs	FP1 Calcareous springs
		FP2 Non-Calcareous springs
	FS Swamps	FS1 Reed and large sedge swamps
		FS2 Tall herb swamps
G Grassland and Marsh	GA Improved grassland	GA1 Improved agricultural grassland
		GA2 Amenity grassland (improved)
	GS Semi-natural grassland	GS1 Dry calcareous and neutral grassland
		GS2 Dry meadows and grassy verges
		GS3 Dry-humid acid grassland
		GS4 Wet grassland
	GM Freshwater marsh	GM1 Marsh
H Heath and dense bracken	HH Heath	HH1 Dry siliceous heath
		HH2 Dry calcareous heath
		HH3 Wet heath
		HH4 Montane heath

	HD Dense bracken	HD1 Dense bracken
P Peatlands	PB Bogs	PB1 Raised bogs
		PB2 Upland blanket bog
		PB3 Lowland blanket bog
		PB4 Cutover bog
		PB5 Eroding blanket bog
	PF Fens and Flushes	PF1 Rich fen and flush
		PF2 Poor fen and flush
		PF3 Transition mire and quaking bog
W Woodland and scrub	WN Semi-natural woodland	WN1 Oak-birch-holly woodland
		WN2 Oak-ash-hazel woodland
		WN3 Yew woodland
		WN4 Wet pedunculate oak-ash woodland
		WN5 Riparian woodland
		WN6 Wet willow-alder-ash woodland
		WN7 Bog woodland
	WD Highly modified/non-native woodland	WD1 (Mixed) broadleaved woodland
		WD2 Mixed broadleaved/conifer woodland
		WD3 Yew woodland
		WD4 Conifer plantation
		WD5 Scattered trees and parkland
	WS Scrub/transitional woodland	WS1 Scrub
		WS2 Immature woodland
		WS3 Ornamental/non-native shrub
		WS4 Short rotation coppice
		WS5 Recently-felled woodland

	WL Linear woodland/scrub	WL1 Hedgerows
		WL2 Treelines
E Exposed rock and disturbed ground	ER Exposed rock	ER1 Exposed siliceous rock
		ER2 Exposed calcareous rock
		ER3 Siliceous scree and loose rock
		ER4 Calcareous scree and loose rock
	EU Underground rock and caves	EU1 Non-marine caves
		EU2 Artificial underground habitats
	ED Disturbed ground	ED1 Exposed sand, gravel or till
		ED2 Spoil and bare ground
		ED3 Recolonising bare ground
		ED4 Active quarries and mines
		ED5 Refuse and other waste
B Cultivated and built land	BC Cultivated land	BC1 Arable crops
		BC2 Horticultural land
		BC3 Tilled land
		BC4 Flower beds and borders
	BL Built land	BL1 Stone walls and other stonework
		BL2 Earth banks
		BL3 Buildings and artificial surfaces
C Coastland	CS Sea cliffs and islets	CS1 Rocky sea cliffs
		CS2 Sea stacks and islets
		CS3 Sedimentary sea cliffs

	CW Brackish waters	CW1 Lagoons and saline lakes
		CW2 Tidal rivers
	CM Salt marshes	CM1 Lower salt marsh
		CM2 Upper salt march
	CB Shingle and gravel banks	CB1 Shingle and gravel banks
	CD Sand dune systems	CD1 Embryonic dunes
		CD2 Marram dunes
		CD3 Fixed dunes
		CD4 Dune scrub and woodland
		CD5 Dune slacks
		CD6 Machair
	CC Coastal constructions	CC1 Sea walls, piers and jetties
		CC2 Fish cages and rafts

Marine		
L Littoral (intertidal)	LR Littoral rock	LR1 Exposed rocky shores
		LR2 Moderately exposed rocky shores
		LR3 Sheltered rocky shores
		LR4 Mixed substrata shores
		LR5 Sea caves
	LS Littoral sediment	LS1 Shingle and gravel shores
		LS2 Sand shores
		LS3 Muddy sand shores
		LS4 Mud shores
		LS5 Mixed sediment shores
S Sublittoral shores (subtital)	SR Sublittoral rock	SR1 Exposed infralittoral rock
		SR2 Moderately exposed infralittoral rock
		SR3 Sheltered infralittoral rock
		SR4 Exposed circalittoral rock
		SR5 Moderately exposed

		circalittoral rock
		SR6 Sheltered circalittoral rock
	SS Sublittoral sediment	SS1 Infralittoral gravels and sands
		SS2 Infralittoral muddy sands
		SS3 Infralittoral muds
		SS4 Infralittoral mixed sediments
		SS5 Circalittoral gravels and sands
		SS6 Circalittoral muddy sands
		SS7 Circalittoral muds
		SS8 Circalittoral mixed sediments
M Marine water body		MW1 Open marine water
		MW2 Sea inlets and bays
		MW3 Straits and sounds
		MW4 Estuaries

Appendix 4: Habitat breakdown

Habitat	Westmeath
All habitat types	18
B Cultivated and built land	0
BC Cultivated land	1
BC1 Arable crops	1
BC2 Horticultural land	1
BC3 Tilled land	0
BC4 Flower beds and borders	1
BL Built land	0
BL1 Stone walls and other stonework	2
BL2 Earth banks	0
BL3 Buildings and artificial surfaces	2
E Exposed Rock and disturbed ground	
ER Exposed rock	0
ER1 Exposed siliceous rock	0
ER2 Exposed calcareous rock	0
ER3 Siliceous scree and loose rock	0
ER4 Calcareous scree and loose rock	0
EU Underground rock and caves	0
EU1 Non-marine caves	0
EU2 Artificial underground habitats	0
ED Disturbed ground	0
ED1 Exposed sand, gravel or till	1
ED2 Spoil and bare ground	0
ED3 Recolonising bare ground	1
ED4 Active quarries and mines	2
ED5 Refuse and other waste	0
F Freshwater	1
FL Lakes and Ponds	18
FL1 Dystrophic lakes	0
FL2 Acid oligotrophic lakes	1
FL3 Limestone/marl lakes	0
FL4 Mesotrophic lakes	2
FL5 Eutrophic lakes	3
FL6 Turloughs	0
FL7 Reservoirs	0
FL8 Other artificial lakes and ponds	0
FP Springs	
FP1 Calcareous springs	0
FP2 Non-Calcareous springs	0
FS Swamps	
FS1 Reed and large sedge swamps	8
FS2 Tall herb swamps	3
FW Watercourses	1
FW1 Eroding/upland rivers	0
FW2 Depositing/lowland rivers	1
FW3 Canals	0

Habitat	Westmeath
FW4 Drainage ditches	1
G Grassland and Marsh	0
GA Improved grassland	0
GA1 Improved agric. grassland	0
GA2 Amenity grassland (improved)	0
GS Semi-natural grassland	0
GS1 Dry calcareous and neutral grassland	0
GS2 Dry meadows and grassy verges	0
GS3 Dry-humid acid grassland	1
GS4 Wet grassland	7
GM Freshwater marsh	4
GM1 Marsh	2
H Heath and Dense bracken	
HH Heath	0
HH1 Dry siliceous heath	0
HH2 Dry calcareous heath	0
HH3 Wet heath	0
HH4 Montane heath	1
HD Dense bracken	0
HD1 Dense bracken	0
P Peatlands	
PB Bogs	2
PB1 Raised bogs	16
PB2 Upland blanket bog	2
PB3 Lowland blanket bog	1
PB4 Cutover bog	0
PB5 Eroding blanket bog	0
PF Fens and Flushes	5
PF1 Rich fen and flush	0
PF2 Poor fen and flush	1
PF3 Transition mire and quaking bog	2
W Woodland and Scrub	
WD Highly modified/non-native woodland	2
WD1 (Mixed) broadleaved woodland	4
WD2 Mixed broadleaved/conifer woodland	2
WD3 (mixed) Conifer Plantation	3
WD4 Conifer plantation	2
WD5 Scattered trees and parkland	1
WL Linear woodland/scrub	1
WL1 Hedgerows	3
WL2 Treelines	1
WN Semi-natural woodland	11
WN1 Oak-birch-holly woodland	1
WN2 Oak-ash-hazel woodland	4
WN3 Yew woodland	1
WN4 Wet pedunculate oak-ash woodland	2
WN5 Riparian woodland	1
WN6 Wet willow-alder-ash woodland	5

Habitat	Westmeath
WN7 Bog woodland	3
WS Scrub/transitional woodland	2
WS1 Scrub	2
WS2 Immature woodland	2
WS3 Ornamental/non-native shrub	0
WS4 Short rotation coppice	0
WS5 Recently-felled woodland	0

Appendix 5: Species/species groups

Species	Number of datasets
Vascular plants (except trees)	50
Trees	27
Fungi	0
Lichens	4
Bryophytes	14
Liverworts	1
Hornworts	0
Ferns	1
Insects - (Diptera, Coleoptera, Odonata, Hemiptera, Lepidoptera, Hymenoptera)	36
Molluscs (non marine)	1
Fish	11
Arachnids	3
Amphibians and Reptiles	7
Birds	47
Waterbirds	
Crustaceans (non-marine)	0
Mammals	0
Mammals - bats	0
Mammals - carnivores	1
Mammals - deer	0
Mammals - Insectivores	0
Mammals- rodents	0
Lutra lutra	2
Meles meles	4
Circus cyaneus	1
Falco peregrinus	1
Austropotamobius pallipes	5
Lepus timidus hibernicus	2
Margaritifera margaritifera	1
Lampetra fluviatilis	2
Lampetra planeri	2
Alosa fallax	0
Salmo salar (freshwater)	0
Vertigo moulinsiana	0
Vertigo geyeri	0
Vertigo angustior	0
Trichomanes speciosum	0
Pyrrhocorax pyrrhocoras	0
Algae (non marine)	0
Macroinvertebrates (freshwater)	1
Rhinolophus hipposideros	0
Euphydryas aurinia	1
Rana temporaria	3

