The NBN Data Model and its Implementation in Recorder 2000

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Abstract

The UK National Biodiversity Network (NBN) Data Model was developed from an analysis, undertaken in 1997-1998, to provide a replacement for the existing Recorder biological records software. The original Recorder software, a DOS program built using Advanced Revelation, did not use a fully relational data model and was principally aimed at species recording. The objective of the analysis was to develop a relational model that would incorporate all forms of biological recording including biotope mapping.

The NBN data model is both modular and extensible. The basic modules include Survey, Locations, Contacts, Sources (References) and dictionaries. The dictionaries include taxa, biotopes and administrative/geographic areas and in their populated form are also NBN standards. New modules (e.g. earth sciences or collections management) can be added to the model and existing modules extended to cover new requirements.

The core of the NBN data model consists of a set of tables relating to locations (bounded areas) and a set of tables relating to observations (records) of taxa and biotopes. Individual biotope or taxon observations are linked within samples (e.g. a list of taxa recorded in a quadrat), which are linked within survey events (e.g. several quadrats on one site in one day), which are linked within surveys (a collection of events with a common purpose). Survey events are usually linked to a location but samples may simply have a spatial reference (e.g. O.S. Grid reference).

Observations (e.g. a taxon occurrence) may have any number of measurements attached to them and the model allows for the addition of new measurement types. Specialist recording, such as bird ringing details, can be accommodated by the addition of new measurement types, new fields or new tables to the core model.

Locations can have features to which management aims, threats and damage records can be attached. Features are very flexible and can be used to link observations to specific aims. For instance, a colony of a rare species could be a feature of a location to which both management aims and population monitoring counts can be attached. Actual counts or measurements would be recorded in the Survey Module and linked to the feature.

The dictionary modules do not hold single, definitive lists of terms but collections of lists that can be mapped to each other. For instance, the Biotope Dictionary includes the UK National Vegetation Classification (NVC), a marine habitats classification, a Phase I land cover classification and many others. The Taxon dictionary holds numerous taxonomic and legislative lists and their revisions. The

intention is that biological records are always entered using their original determinations (either that given by the recorder or first referee) and that other or later names allocated are stored as redetermination records.

The NBN Data Model was used to define the database in the new Recorder 2000 software, which was released in September 2000. Recorder 2000 is a windows-based biological recording application, which utilises NBN standards including the NBN dictionaries and data exchange standard. The database used is Microsoft Access although the three-tier architecture allows for the use of other database 'back-ends'.

The basic installation of Recorder 2000 is able to handle most forms of species and habitat records including those from sample-based surveys such as quadrats and transects. The functionality includes validation, data security (e.g. different user levels and you can't edit other people's records), internal mapping facilities and data import/export that reads and writes data in XML format. The report system is powerful but basic (places for things or things for places) as the intention was that Recorder 2000 would frequently be used with external reporting tools. Reporting tools might include links from Microsoft Office, GIS packages or SQL reporting tools

Recorder 2000 is a modular application and has menu facilities for loading Add-Ins that extend the application's functionality. Add-Ins can be written for almost any purpose but commonly would change, extend, replace or add forms and reporting programs. Add-ins can access existing modules such as the validation and mapping routines, which offers a rapid and relatively straightforward means of extending Recorder to cover new types of data.

Details of the Recorder 2000 implementation and a summary of related NBN standards are given in Section 2 of this paper. Further details including the original Recorder systems analysis and NBN Data Model can be found on the NBN website at www.nbn.org.uk

Section 1: The NBN Data Model

Introduction to the NBN Data Model

The UK National Biodiversity Network (NBN) Data Model was developed from an analysis[1], undertaken in 1997-1998, to provide a replacement for the existing Recorder[2] biological records software. The original Recorder software, a DOS program built using Advanced Revelation, did not use a fully relational data model and was principally aimed at species recording. The objective of the analysis was to develop a relational model that would incorporate all forms of biological recording including biotope mapping. The analysis involved a fundamental review of the way that data recorded for different purposes relate to each other. In the process, a new modular general model for environmental records was proposed.

The NBN model is both modular and extensible. The basic modules include Survey, Locations, Contacts, Sources (References) and dictionaries. The dictionary modules include taxa, biotopes and administrative/geographic areas, which in their populated form are also NBN standards[3]. New modules (e.g. earth sciences) can be added to the model and existing modules extended to cover new requirements.

The model has been tested and modified through the creation of prototype databases including habitat databases for the Countryside Commission for Wales (CCW), a UK Grasslands and UK Uplands databases and databases within the Joint Nature Conservation Committee (JNCC) including the Marine Nature Conservation Review (MNCR) Database. More recently, the model was used to define the database underlying the New Recorder 2000 biological recording application[4] and a number of important datasets have already been successfully migrated to Recorder (including the MNCR).

The NBN Model is a logical model that describes the relationships between data items important to biological recording and similar environmental information systems[5]. Logical models can be extended to describe all the data fields (attributes) that belong to each entity in the model. A logical model provides a guide for building actual databases and a physical database may very closely resemble the logical model but it is up to the database builder to create the tables, fields and application that best meet the needs of the user and the constraints of the development software used.

Where a data model is adopted as a standard, as with the NBN model, any application database that wishes to comply with the standard must be readily mappable to the model and respect any conventions or standards (e.g. use of standard term lists or formats for spatial references) integral to the model.

In the case of the NBN model, a very specific application such as a butterfly monitoring scheme field data capture program to be run on a palm computer could

[1] Copp 1998 – The Recorder Project Systems Analysis (276pp) – JNCC Unpublished Report available from NBN website.
[2] Recorder User Manual – versions 1992 and updates. JNCC
[3] For details of standards see Annex 2 and www.nbn.org.uk

[4] See the NBN web site (www.nbn.org.uk) for details of availability
[5] It is described as a relational model

use a very stripped down, denormalised[6] version of the model as long as sufficient information is recorded to satisfy the model's mandatory requirements. Where an application is being written for more general purposes and where it will have to handle more types of survey data, the closer it will have to match the full model.

The new Recorder 2000 software was designed to be applicable to many types of survey and for use in local records centres where information from many sources is collated. For this reason, Recorder 2000 adheres closely to the full NBN Data Model although there are a number of differences (notably with sources) that reflect choices made to enhance database performance and a few omissions for practical or financial reasons.

A new way of looking at biological records

The NBN Data model was designed to provide a robust theoretical basis for the development of biological recording software. The underlying aim was to be able to provide a means of delivering standards for record content, controlled terminologies and data transfer. The application of standards would help overcome the long-standing problem of incompatibility leading to difficulties in merging and re-use of data.

There has been a long-standing debate about the differences between species, habitat and site recording. These forms of record are commonly believed to be different and incompatible. Most existing biological records software addresses only species recording although they may also handle basic site descriptions. Recorder 3.3 is currently the most widely used and powerful biological records software in the UK but also suffers from these weaknesses. Whilst it handles species occurrence records well, site and habitat records are limited by the lack of ability to record changes or repeated samples. This means that it is not possible to record changes in the area of a habitat over time or repeated sampling of physical factors such as water or soil acidity. This problem derives from the origin of the software, being based on a requirement to record species distributions and numbers where for the purpose of the envisaged analysis, site and habitat details were of secondary importance.

Many recorders keep their records in spreadsheets where the recorded data are even more limited. For instance a simple table with columns for species name, site name and/or grid reference, date and recorders name. For the majority of recorders, using their own data for distribution mapping this is entirely sufficient and complies with the long stated minimum biological record consisting of who, what, where and when. Work on the NBN data model shows the structure required of compatible and transferable biological records to be rather more complex than the classical model. All forms of biological records can be mapped to this deeper underlying structure and the various general and specialist biological records databases can be regarded as 'views' of this underlying theoretical structure.

[6] Normalisation refers to Relational Data Analysis where data fields are allocated to tables in such a way as to reduce the amount of repetition (redundancy) and to clarify the various relationships (dependencies) of data items. The NBN model is highly normalised.

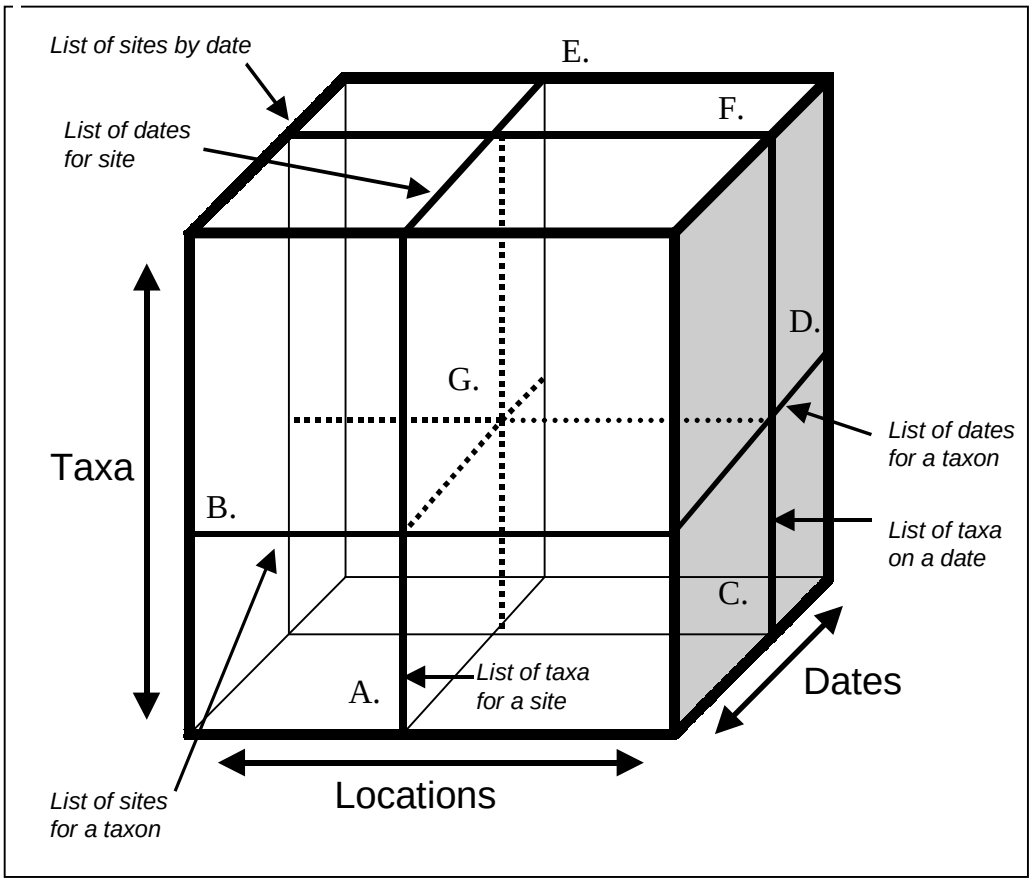


Figure 1: Biological records cube showing the relationship of 'data views' to the underlying data structure

It is very difficult to envisage how a database with perhaps many data fields can be a view of another more complex model but the relationship can be shown in a simplified manner in a diagram. Figure 1 shows a 'biological records cube' based on just three variables (species, site, date). In this diagram the faces of the cube represent apparently different types of record. The front face represents the intersection of species and sites. It can, for instance, provide a list of species for a site (Line A.) or sites for a species (Line B). The top face can provide a list of dates that a site was visited (Line E) or sites visited on a date (Line F). The side face provides a list of species recorded on a date (Line C.) or dates when a single species has been recorded (Line D). Internally, the cube is a matrix of points, which individually represent a species at a site on a date (Point G). These types of relationship are well known in the field of 'Data Mining' where information cubes are extracted from complex databases to enable managers to view the information that is pertinent to their requirements.

The cube illustrated in Figure 1 is just one of many that can be imagined and with a little effort it is possible to create a mental picture of a 'cube' with sides of species, place and recorder that also has a time dimension, which would describe our classical minimum biological record. From there it is possible to understand (if not picture!) the principle of an 'n'-dimensional cube that includes all the various aspects of species, habitats, recorders and sites that could be recorded in the great variety of surveys that are undertaken. The advance that the NBN model made was to map these many dimensions into a relational model from which databases can be constructed.

The core structure of the NBN Model

The NBN data model does not attempt to describe in detail every possible form of biological record or site descriptor. It does, however, offer a core structure which describes the data requirements common to virtually all types of survey and provides the 'hooks' which link the common structure to survey specific or specialized data. Even in its most basic form it is remarkably applicable without modification to the majority of survey types

One of the principles of the model is that every piece of data recorded must be attributable to a source and although data may be augmented or its interpretation changed it cannot be altered. The outcome of this constraint is that all fields containing observations or measurements must be repeatable and each uniquely identifiable. For example boundaries of sites may change with time and boundary files used in mapping may come from different sources. Areas of habitat may be measured at various times by different people and may be part of a repeated sampling program. Species records may be spatially related as in transect or line trapping survey methods and may be repeatedly sampled.

Until now, it has been rare for biological records software to include provision for information relating to sampling or the source and ownership of records. One reason for the lack of recorded source data is that in the past data transfer and merging of datasets has been so difficult (due to incompatible data formats and term lists such as taxon names) and therefore it has not been seen as important. With the development of the NBN and a nationwide network of Local Record Centres this situation has to change. For this aim to be successful it requires a change in practice for many recorders and biological records software designers.

Recorder 2000 is the first piece of widely available software to be built upon the NBN data model and to incorporate NBN standards. The application has been designed to make it easy for recorders to exchange data and therefore there is a need to keep track of 'metadata' about the source and origin of records and the relationship between surveys, events and samples, which lies at the heart of the NBN Data Model.

The modular nature of the NBN Data Model

A data model aimed at describing the full range of biological recording and extendible to other similar recording schemes (e.g. earth sciences) is going to be large and therefore, potentially difficult to maintain. The NBN model was designed from the outset to be modular. This modularity gives a number of advantages.

- Discrete modules can be managed separately, possibly by different expert 'custodians' (e.g. the taxon and biotope dictionary modules), which spreads the load of maintenance and enhances quality.
- Individual modules can be updated without affecting the rest of the model.
- Applications can be built using only the specific modules required.
- New modules or sub-modules can be added (e.g. earth science records or site feature management) without compromising the model
- It becomes easier to release and track updates of the model

The key recording modules are:

- Survey module
- Location module and related Location Feature module
- Contacts module.

These are supported by the dictionary modules and controlled term lists including

- Taxon Dictionary
- Biotopes Dictionary
- Geographic (Administrative Area) Dictionary
- Controlled Term lists

All information recorded should be linkable to a source and this is handled by a group of Source modules

- Source module
- Text References module
- Image module
- Metadata module

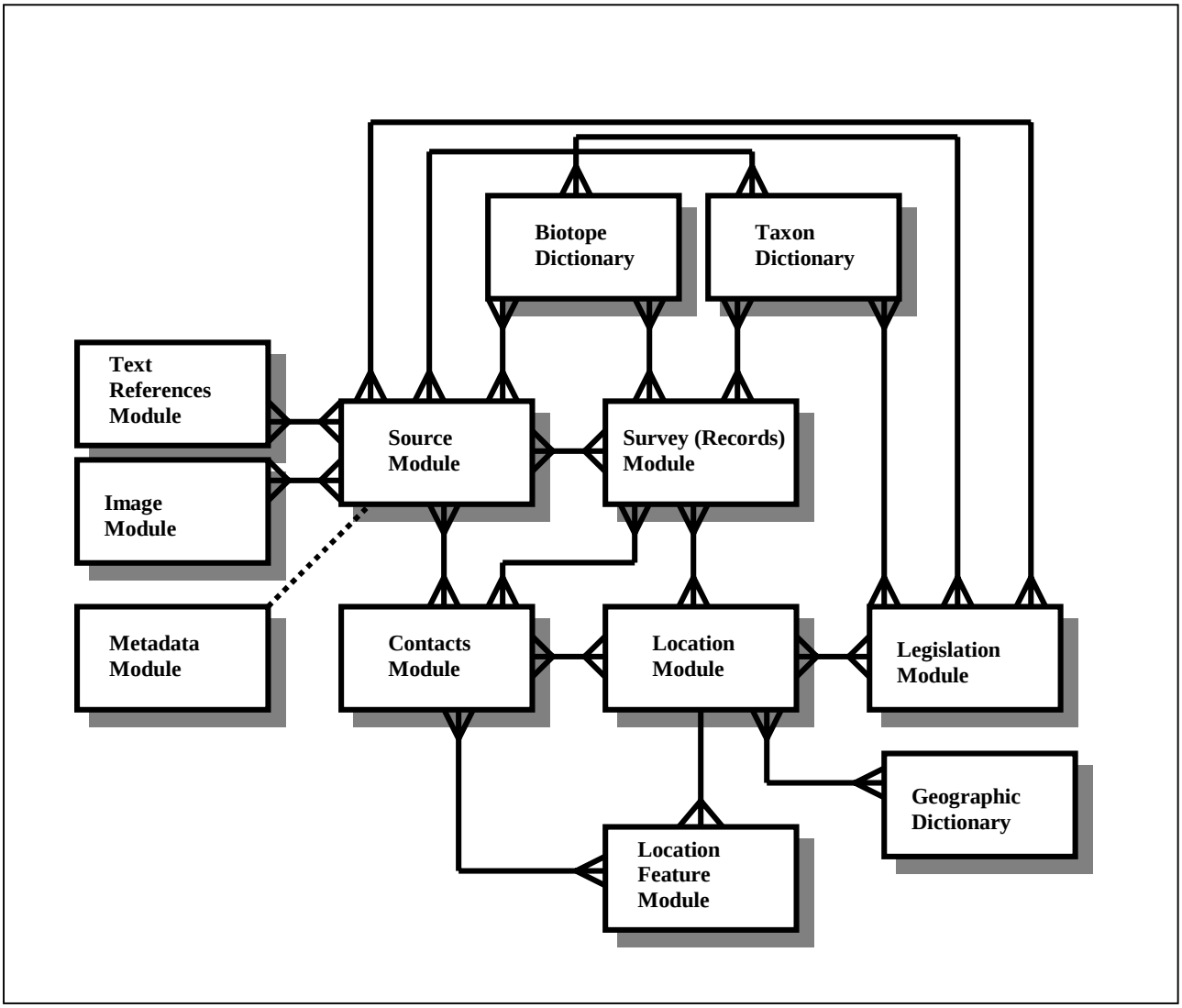


Figure 2 shows the relationships between the principal modules in the NBN Data Model

The Survey Module

Surveys, Survey Events and Samples

The Survey module, illustrated in Figure 3, contains that part of the model that describes traditional biological records. The logical structure includes a number of hierarchically related entities[7] that allow for different survey methodologies and levels of detail to be recorded. The key entity in the Survey Module is the **Sample**.

Every observation must be linked to a Sample, be it a single observation (e.g. a bird at a place) or a whole list associated with a specific sampling method (e.g. plants recorded in a quadrat or insects from a malaise trap). The sample links observations of different types together, for instance a list of plants (here called taxon occurrences) can be related to the NVC stand (a biotope occurrence) in which they were recorded.

Samples link actual observations such as taxon or biotope[8] occurrences with recording events, here called Survey Events. The **Survey Event** is the entity that includes information about the time and location that recording took place and the recorders who took part. This means that many samples can be made within one survey event e.g. several quadrat samples may be taken on a site in single recording visit. Spatial locations may be recorded for both events and samples and can be references to places recorded in the Location Module or spatial references such as OS Grid Reference or latitude/longitude readings. Where a detailed reference is given for a sample, it must fall within the scope of the event location (e.g. exact grid references for pitfall traps on a named site).

This separation between the sample and the event will be new and potentially confusing for many users, as they may not think of their recording activities in terms of sampling. Most recording cards do not differentiate between the event details (who, where, when) and the sample details (observations and measurements). The power of the sample is more readily appreciated where the survey includes sets of observations related either spatially (e.g. records from a trap line or transect) or in time (e.g. repeated visits to the same trap or fixed quadrat). Another place where this separation between event and sample shows up is that the event will link to a list of all recorders present at a recording event whilst a sample may link to a subset of that list. For instance several people may jointly visit a site but each record different samples and taxa.

The **Survey** is another feature of the model that is rarely represented in existing recording applications. The Survey entity links survey events together under a common purpose. Details associated with the survey include who organized it, for what purpose, over what geographic area and over what time span. It may also include details of ownership of the data and constraints on its use. For the single naturalist managing their own data this may seem unnecessary as they hold the information in their heads but when records are transferred or collated as in a Local Records Centre then this information becomes essential for proper management of the records.

[7] Entities in data models refer to objects or things about which information is stored. Entities often translate into database tables although the way entities are translated into actual databases depends on the choice of the database designer and constraints of the data management software used.

[8] Biotope is used here and in the model in preference to habitat as it more correctly describes classifications based on plant and animal associations

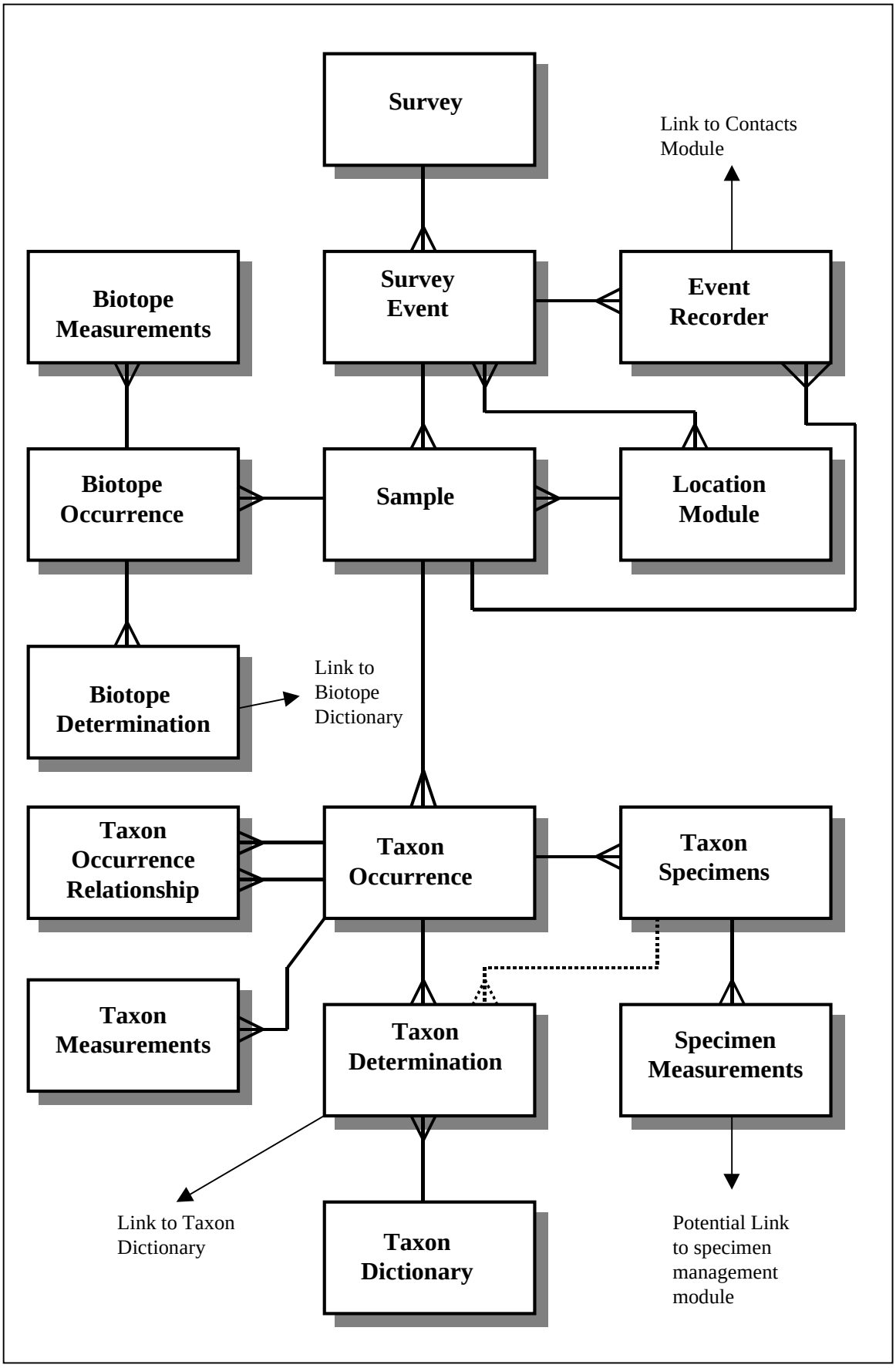


Figure 3: Simplified overview of the Survey module.

Biological records are about observations and in the Survey Module these are separated into **taxon occurrences** and **biotope occurrences**. The model can be extended to cover any other type of sample-based record including spatially referenced physical measurements (e.g. pollutant levels on a site) or earth science records (e.g. fossils collected from a particular sedimentary layer at a site).

Each sample may have one or many observations (occurrences) linked to it and occurrences may be of more than one type (e.g. a grab sample might include information on type of substratum, organic content of sediment, and a species list). It is also possible to link individual occurrences together within or between samples. For instance, to record the relationship between a parasite and host or predator and prey.

Every occurrence record can have one or more measurements associated with it. **Measurements** can be of any type including counts, length or breadth, weight or any number of physical data readings. For instance a record for a flock of Eider Duck might include counts of adult males, adult females and juveniles or a plant community record might include maximum and minimum stand heights together with Domin values for individual species.

The measurement entity is used in several places in the model (e.g. taxon occurrence measurements, biotope occurrence measurements, location measurements, specimen measurements) and always has the same structure. There are four measurement attributes: Measurement Type, Qualifier, Data and Accuracy. For instance, a taxon occurrence measurement might consist of Type = Count, Data = 2, Qualifier = Adult males and Accuracy = exact.

One very important aspect of the Survey Module is that of determinations (e.g. **Taxon Determination**). This refers to the identifications or names given to things that are recorded. In the case of taxon occurrences this means the names given to the species recorded. It is seen as important that the original name (determination) given to a record by its recorder or first person responsible for identification is preserved along with information about which name list or reference work the name derives from. This is because many problems have arisen in the past where records have been altered due to either taxonomic change or disagreements over identification and the original information lost. This can be problematical for a number of reasons. If the record has been passed to a record centre, the owner of the record might be very unhappy to have their records altered. The redetermination might also be wrong or linked to a different reference or taxonomic fashion, which might be reversed. For this reason determinations form a separate entity linked to an occurrence type (e.g. taxon or biotope), which makes it possible to track all the determinations and opinions associated with a record. This arrangement would, for instance, make it possible to record all the opinions and name changes written on herbarium sheets. Determinations can also be linked to specimens so that different names can be allocated to specimens originally thought to be of one species but separated out by specialists.

The requirement to maintain original determinations and to refer names to different lists or reference works has an impact on the dictionary modules (e.g. taxa and biotopes) because they must preserve separate lists and versions of lists and cannot be simple ‘latest name’ lists. It also has an impact on any applications built using the model because it implies that searches and reporting must be able include synonyms and links between different lists.

Specimens

The model allows for recording details of actual specimens collected from a sample (e.g. see **Taxon Specimens** in figure 3) and recording measurements for them. Problems can arise where specimens are collected. The specimens may not be identified yet although their location, date and collector are known so that they represent a valid biological record (and voucher). Things can get complicated if the specimens originally lumped together as one record turn out to represent different species and for this reason the model allows for determinations to be applied to specimens as well as taxon occurrences.

The specimen entity could then provide the hooks for a specimen management module that opens the possibility for museums to integrate their collections and field data (e.g. the management of voucher specimens linked to records). In museum collections the specimens may be identifiable but other important parts of the record might be missing. In this instance, the determination would be linked to the specimen and there would be no connection up through the Survey hierarchy.

The Location Module

Definition of sites

The definition of sites and geographic areas has always been a problem in biological records databases. Until the more widespread use of GIS[9] very few applications could directly link sites to actual boundaries and therefore changes in the definitions of the sites or their relationships with associated geographic and administrative areas were hard to track. This has the potential for introducing errors into the interpretation of biological records that use only a site name as their spatial reference[10].

These problems are compounded where different recorders or surveys interpret the extent of sites differently or use different names for the same place. Many location names do not have delineated boundaries, for instance, the Roman Camp and Nightingale Valley are both well-known locations in the Avon Gorge National Nature Reserve although their extent is only vaguely defined. Larger geographic areas, such as the Mendip or Malvern Hills, likewise have only vague boundaries. Administrative areas and sites protected by statute do, however, normally have well delineated boundaries although tracking changes in boundaries over time can also be very difficult.

The first conclusion that arises from this situation is, that wherever possible, all biological records should be associated with accurate map references (e.g. OS grid or Lat./Long.) even where they are associated with a site name. Secondly, organisers of surveys (and especially Local Record Centres) should work to produce lists of recording sites with commonly agreed boundaries.

Theoretically, there is no underlying difference between sites, administrative areas and geographic areas. All have names, boundaries (accurate or vague), which may change through time and may be hierarchically linked to other places under various classification schemes. In practice the lists and definition of different types of locations are managed by separate organisations e.g. in England, English

[9] Geographical Information Systems
[10] A surprisingly common practice even in survey methodologies as detailed as Phase II quadrat surveys

Nature is responsible for the designation of SSSIs[11] whilst the Boundary Commission are responsible for defining the boundaries of administrative areas.

We also normally wish to record different attributes for each type of location. Sites have ownership and access details, protected sites are associated with statutory or non-statutory designations whilst administrative areas are larger and in biological recording principally used for collation of records. For these reasons the various types of site are usually managed separately in biological records software.

NBN Location Main Module

In the NBN data model a distinction is made between sites used for recording and administrative or geographic areas used for context. Figure 4 shows a simplified model for the Location Module (term lists and dictionaries are excluded as are link entities to other modules).

In the Location Module any bounded area or named sites (a site might not be associated with a digital boundary but must have at least a centroid grid reference or bounding box) used for recording either survey observations or site features is stored is called a **Location**. Locations (sites) can be associated with any number of **location names** (e.g. historical names and alternative names) and a preferred one chosen for display. Locations may also have any number of statutory and non-statutory **designations** (e.g. protected status) attached to them. In the NBN model, designations are linked to a legislation module although this is handled differently in the Recorder 2000 build.

It is not always convenient or possible to use GIS to place sites in geographic or administrative context and so a separate entity, **Location Geographic Context** (called Location_Admin_Areas in Recorder 2000) links locations to the Admin (Administrative Areas) Dictionary. The Admin Dictionary includes numerous lists of administrative and geographic names, some in hierarchical relationships (e.g. parishes, districts and counties). Locations may also be linked to **Land Parcels,** compartment numbers recorded on detailed UK Ordnance Survey maps and used for planning purposes. A site defined for recording purposes might include several land parcel numbers. Sites and land parcels may have one or more **location codes** associated with them including the filing code numbers used for site identification in a LRC or key codes from other gazetteers.

Locations (sites) may be related to each other in various ways. Sites might be part of a site cluster, abut, overlap or enclose. Sites can have sub-sites nested to any depth. Relationships between sites can be handled by the **Location Relations** entity or by a 'parent site' attribute in the main location entity (table). The **Location Types** entity allows for sites to be classified in various ways useful for reporting purposes (e.g. Ancient woodland or Wetland Bird Survey Site).

The model allows for the storage of any number of digital **boundaries**, which allows for changes over time. A separate **Spatial References** entity allows for the storing of grid squares that can be used for geographic sorting of sites and validating site-subsite relationships where GIS validation is unavailable.

Ownership and occupancy of land can include complex relationships and, if fully analysed, could form a separate sub-module. For most biological recording applications the information required about tenure is simpler and can be handled in a single **tenure** entity.

[11] Sites of Special Scientific Interest

As in the survey module, any number of measurements can be linked to a location (**location measurements**) and a variety of descriptive text entries stored (location descriptions). Links to stores of photographs, maps, word-processed documents and other electronic documents can be made through a link entity to the **Source Module** (not illustrated in figure 4).

Location Feature Sub-module

Location features include any biological, physical or historical aspects of a location that are deemed of special interest and to which management aims, condition (or population) monitoring or criteria used in site designation are attached. For instance, a population of a rare species might be a special feature of a site as could be a single veteran tree or a well-preserved example of ridge and furrow ploughing. On a geological site a feature might be an igneous dyke crossing the site or a particularly fossiliferous bed.

The Location Feature sub-module allows for the recording of potential and actual threats (**Threats**) and accounts of actual damage (**Damage Occurrence**). It allows for the setting of **management aims** and recording of actual management events (**Location Events**) and the people (**Event People**) who took part. Features may be used as the criteria for site designation and as such can have **feature gradings** attached to them as well as monitoring **condition statements**.

Features may be linked to the Survey module by a **Sample-Feature Link** entity (not shown in the diagram). This can be used in various ways, for instance if the feature is a notable population then successive monitoring samples can include population counts. For some applications features might have **feature measurements** directly associated with them. These might be measurements of physical aspects of the feature (e.g. dip and thickness of a fossil bed).

For some purposes features may include sub-features, nested to any depth. For instance a population of veteran trees might be declared a feature of a site and individual trees features of that population whilst individual trees might have physical characteristics such as a stag's horn crown regarded as a special feature. For any site it might be desirable to group many kinds of feature (e.g. geological, biological, hydrological, archaeological etc.) and to maintain controlled term lists in relation to each type. The model therefore allows for features to be allocated to types and the types can be hierarchical in relationship.

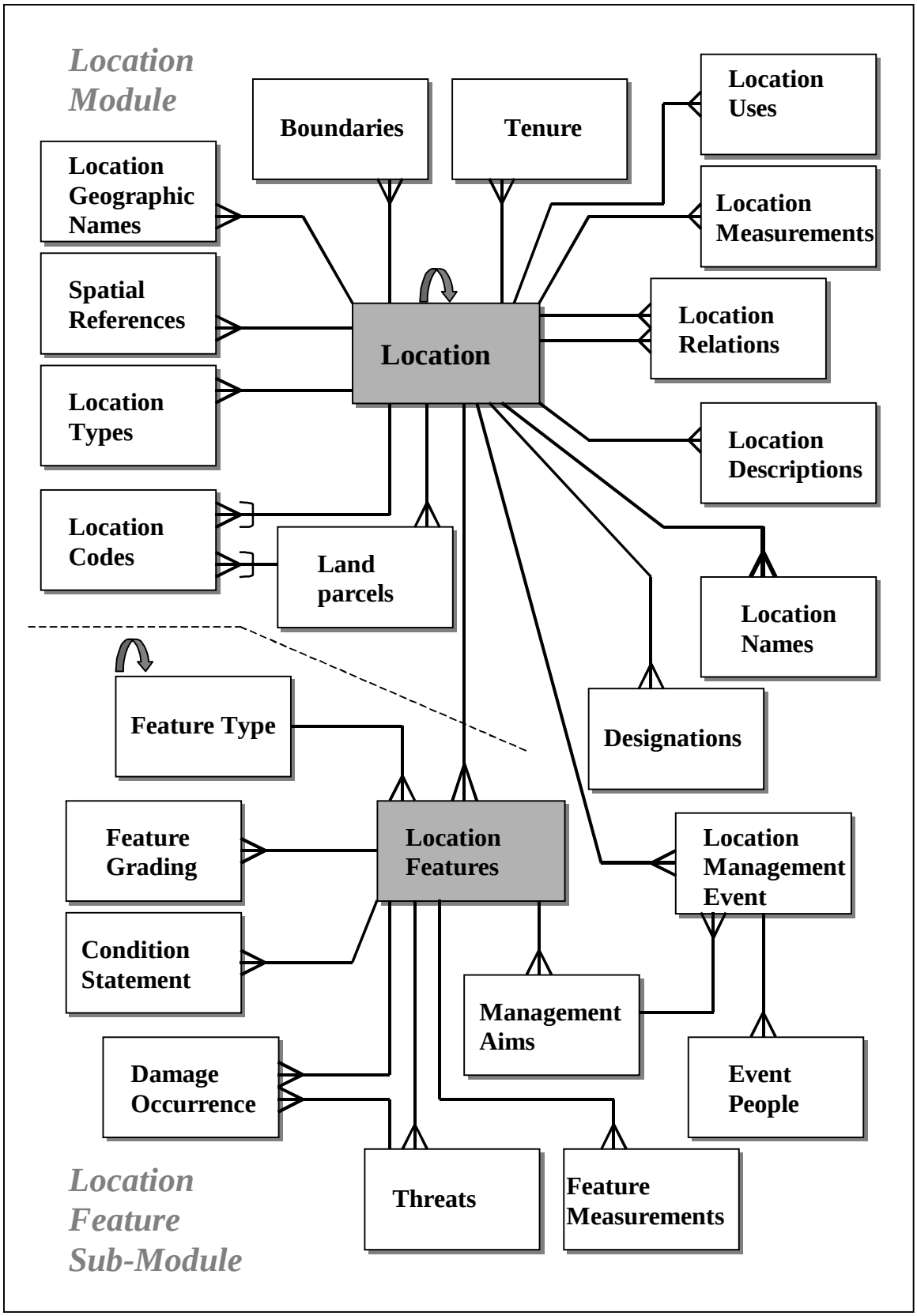


Figure 4: Simplified view of the Location Module and Location Feature Sub-module

The Contacts Module

The contacts module assumes that links may be needed to both individuals and organisations. The key entity of the contacts module is called **Name,** which holds the information common to both and points to either **Individual** or **Organisation** sub-types[12], each with their own appropriate attributes.

In Recorder 2000, names of people or organisations are required throughout the application, for instance as recorders, determiners, authors, owners, participants in events and so on. Some of the links are single-valued and stored as attributes using the Name_Key. Where several names can be linked to an item a special link table is used such as **Survey_Recorder** in the Survey Module. Logically it is possible to generalise the relationship by creating a multi-purpose link entity, which could associate any name with any table or attribute but this would have very few build advantages and has not been done in Recorder 2000.

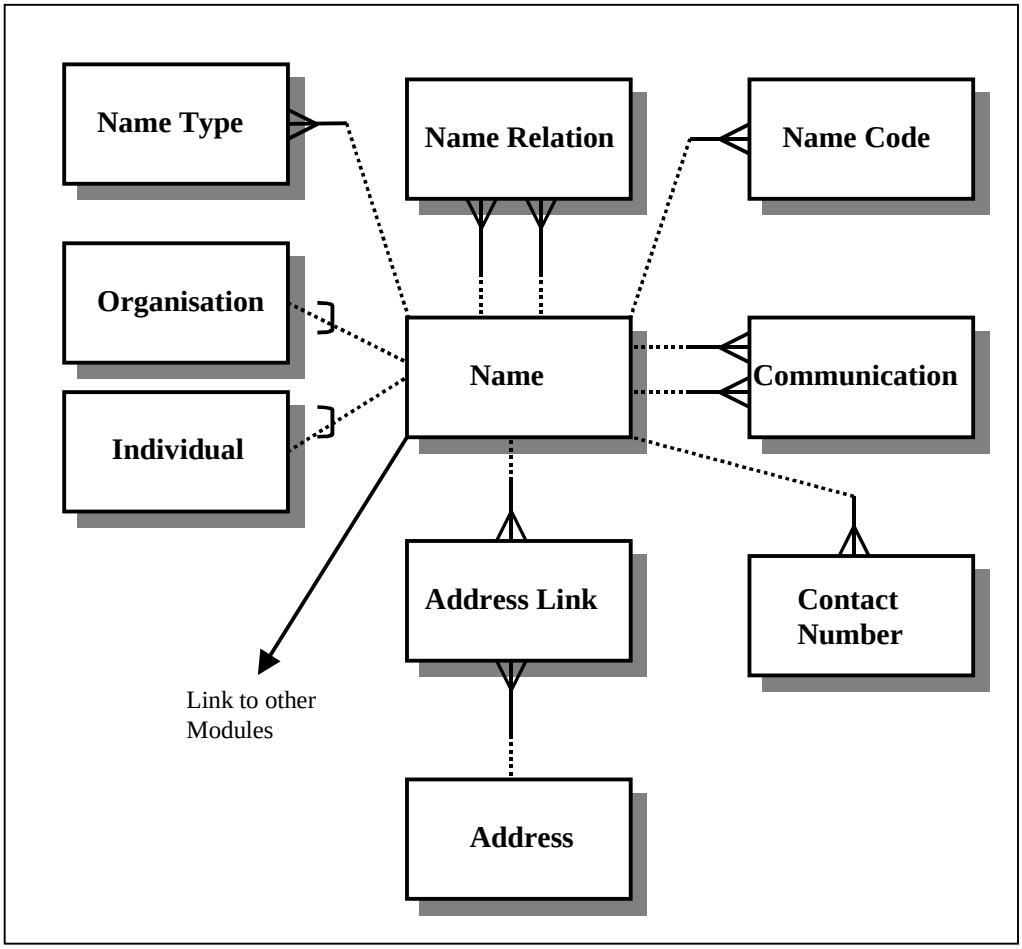


Figure 5: Structure of the Contacts Module

Individuals and organisations may also be known by one or more codes (e.g. a survey recorder code) each of which can be stored in the **Name_Code** entity**.** In Recorder 2000 this is handled differently and name codes are stored in the **Name_Relation** table.

[12] A sub-type is an entity that exists in a one-to-one relationship with a parent entity and which allows the information stored with the parent entity to be varied according to type e.g. both organisations and people have names and addresses but people have biographical details and organisations have business details.

Details of addresses (**Address**) are kept separately and in the logical model are associated with individuals or organisations through a linking entity (**Address_Link**), which includes dates. In this way several 'names' can share one address and one 'name' can have several addresses either simultaneously (home & work) or sequentially (changes of address). In Recorder 2000 Addresses are linked directly to name with no link table. This arrangement works well in practice but has the potential drawback that some addresses may need to be entered several times (e.g. where organisations or individuals share an address).

Any name can be linked to any number of electronic communication numbers such as telephone, fax or email through the **Contact_Number** entity. In Recorder 2000 this table includes a field for 'preferred' so that the most recent or currently preferred number can be selected.

Names (individuals and organisations) can be linked together through the **Name_Relation** entity that records the dates and nature of the association. This entity can be used to record anything from membership of societies, marriage and employment to corporate mergers.

It would also be possible to use the Contact module as the basis for tracking interactions with any individual or organisation. This is represented in the model by the **Communication** entity, which includes attributes for communication type and file reference. It could include copies of files or pointers to them in other systems. This could include notes of telephone conversations, copies of letters or data supply agreements and could also be linked to a data transfer-tracking module (not yet modelled). The use of name keys from Name in the same way as the Name_Relation table (logically this is a sub-type of Name_relation) means that communication between any individuals or organisations in the database can be recorded.

The Dictionary and Term List Modules

In the NBN model terminology is controlled by either term lists or dictionaries. The availability of standard electronic dictionaries and term lists is central to the implementation of the NBN data model. The model provides a structure and syntax for data but the dictionaries control the content. Using standard terminology can save users considerable time and cost and is a pre-requisite of successful exchange and re-use if data.

Term lists are normally single, usually short, lists of terms that are used to control entries into data fields. Typically they would be used to populate a 'drop down edit box' in a windows database application. These terms might be official or internationally registered standards (e.g. units of measurement) or locally created, application specific lists (e.g. insect recording trap types).

Term lists may be linked in a hierarchical manner. Measurements are a good example where the parent list 'Term Type' might include Imperial or Metric measures and the 'Terms' might include inches, feet and yards or centimetres and metres. Term lists can be stored simply in one or two tables or even within the application software form design.

In Recorder 2000, term lists are stored with provision for a short name (or code), a long name and description together with information on whether the term is system supplied or added by the user. System supplied terms are supplied with the

software (e.g. Recorder 2000). They are common to all users and therefore ensure comparability between datasets.

More complex term relations have to be managed in dictionary modules. The key concept of an NBN dictionary module is that it handles multiple lists or classifications and can handle the situation where a term or name might appear in more than one list and where it is likely to be important to map equivalencies from one list to another. Dictionary modules may also include a variety of 'value-added' information that makes the dictionary a product in its own right rather than a simple name list.

The two most developed NBN dictionaries are the taxon dictionary and the biotope dictionary, which are described in the following sections. The full NBN model also includes an administrative areas dictionary and a prototype stratigraphic terms dictionary that are not described in detail in this paper[13].

The dictionary modules have especial importance within the NBN and as products in their own right. They not only provide a basis for standardization between datasets but the mechanism to deliver habitat and species related information for many practical uses.

The **benefits** of using standard dictionaries and term lists include:

- Easier development of new database applications requiring lists of species names, administrative areas or biotope/land cover classifications.
- Discouraging users and developers from creating their own local, non-standard versions of checklists.
- Data will be **standardised**. The dictionary data will be validated, version controlled and documented to source so that users will know the origins and limitations of the terms they are using.
- Reference to standard checklists ensures that **meaning** is clear
- Opportunities for the **exchange and re-use of data** will be increased.
- It will be possible to develop a mechanism for synchronising the dictionaries used by different organisations.
- Improved **data retrieval** across data sets from different sources
- The potential for building **term correlations** into retrieval software e.g. matching Annex 1 habitats to NVC habitats and translating data for different uses.
- Standard dictionaries available in a choice of formats will **save time**. For instance, an individual, writing a report may require a table in word processor or spreadsheet format (e.g. a list of Annex 1 habitats) and could pick this up directly from the appropriate dictionary.
- Updating existing applications with additions to previously supplied dictionaries
- Essential building blocks for the development of reference information systems to support conservation work. The current versions of the taxon and biotope dictionaries include species accounts from Recorder and marine habitat descriptions (with photographs) from the Marine Nature Conservation Review (MNCR).
- Provision of lists or directories to specialist interest publishers as a means of distributing information to a wider audience.

[13] The full model can be downloaded from the NBN website.

- Potential for development of a variety of publications in new formats including CD ROM (i.e. along lines of the UK Countryside Information System)

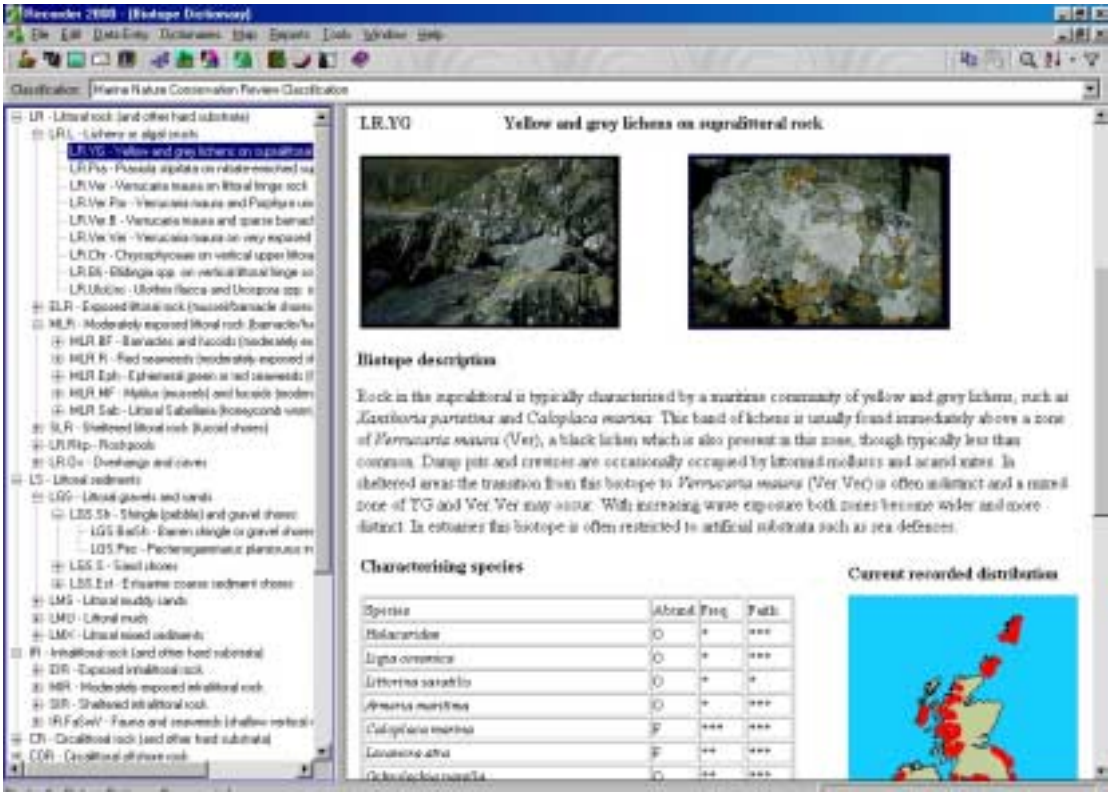


Figure 6: The Dictionary modules can be used to develop a means of delivering a variety of value added information linked to taxa or tax lists as seen here using the Recorder 2000 Biotope Dictionary Viewer.

The Taxon Dictionary

A checklist of species is an essential requirement for any activity involved with biological recording, biodiversity or conservation. Although recent or reliable checklists are not available for all groups of organisms there is already a huge and continuing investment amounting to many man-years, both voluntary and funded, in creating checklists and taxonomic revisions. The old Recorder 3.3 and also the BRC species lists attempted to create single UK checklists from selections of these individual lists, although neither was complete.

The Recorder list, in particular, did much to standardize species recording but problems arose where names given by recorders or determiners were changed to match the database species list or when recorders wanted to add or use more recent names than those in the species list. Trying to maintain a single 'preferred list' of taxonomic names can be problematical because checklists change with time and there can also be several competing classifications for the same organisms regarded as valid at any one time. For these reasons, it was seen as important that the new NBN taxon dictionary could handle and cross-reference many different lists of names and versions of lists.

The NBN Taxon Dictionary is not, therefore, a single checklist of taxa but is a mechanism for storing many checklists and versions of checklists together with the means for translating from one to another. This is what makes it different from most other taxonomic list databases. The principle of this approach is the view that biological records should be stored with their original determinations to which re-determinations may be added if desired. It should be possible for the software to retrieve taxa using correspondences of names in alternative checklists. Needless to say this is an ambitious target and will require a lot more work to achieve satisfactorily for all groups. This is why in the populated version of the NBN taxon dictionary there is a 'preferred taxon' list based on the Recorder 3.3 species list, which will continue to be widely used.

The structure for the taxon dictionary is given in Figure 6. This model differs substantially from other taxonomic databases (e.g. the IOPI data model) because it is primarily concerned with the relationships of names in checklists so that essentially there is no single 'right' list of taxa although the 'preferred list' attempts to fulfill this role as a baseline reference for currently accepted terms.

The key to the model is the relationship between lists (**Taxon List**) at one end of the model and names (**Taxon**) at the other. The same name may be used in many different checklists but both names and checklists are subject to revision and exist in versions. It is the intersection of name versions and list versions (**Taxon List Item**) that provides the actual list of taxa for any purpose.

A further feature of the proposed structure is that it can accommodate lists of taxa other than just checklists compiled for taxonomic purposes. A Taxon List may be any defined grouping of taxa, most commonly a published list but it can also be a legislative schedule of protected species, an informal list used for some particular recording project or even locally used common names. Storing legislative schedules in this fashion means that the actual names used in the printed legislation (which may not be either current or correct!) can be stored and cross-linked to other checklists.

In the NBN model, the legal conservation status of a species is not, therefore, held in a single list associated with a single taxon name but would be constructed for any species by looking at the status attached to it or its synonyms in a selection of lists representing different acts of legislation (and amendments). This method also allows the recording of status given in other types of list including red data books and biodiversity action plans. The model takes account of the possibility that a species may be given more than one status in a particular list (e.g. a Red Data Book might list world, European and UK status) and also geographic limits to protection or status.

Ideally the legislative lists of taxa would be linked to a **Legislation Module** that contained full details of schedules, revisions and jurisdiction. A legislative module is provisionally modeled in the full NBN data model but has not been built into Recorder 2000 as it was beyond the current scope of the software.

In the model represented in Figure 7 the **Taxon** entity holds all unique name and author combinations with date of introduction. This entity (table) should include all synonyms, genus/species combinations, infraspecific and subspecific names as well as hybrids. These names are the raw material, which is interpreted and related through other tables in the module

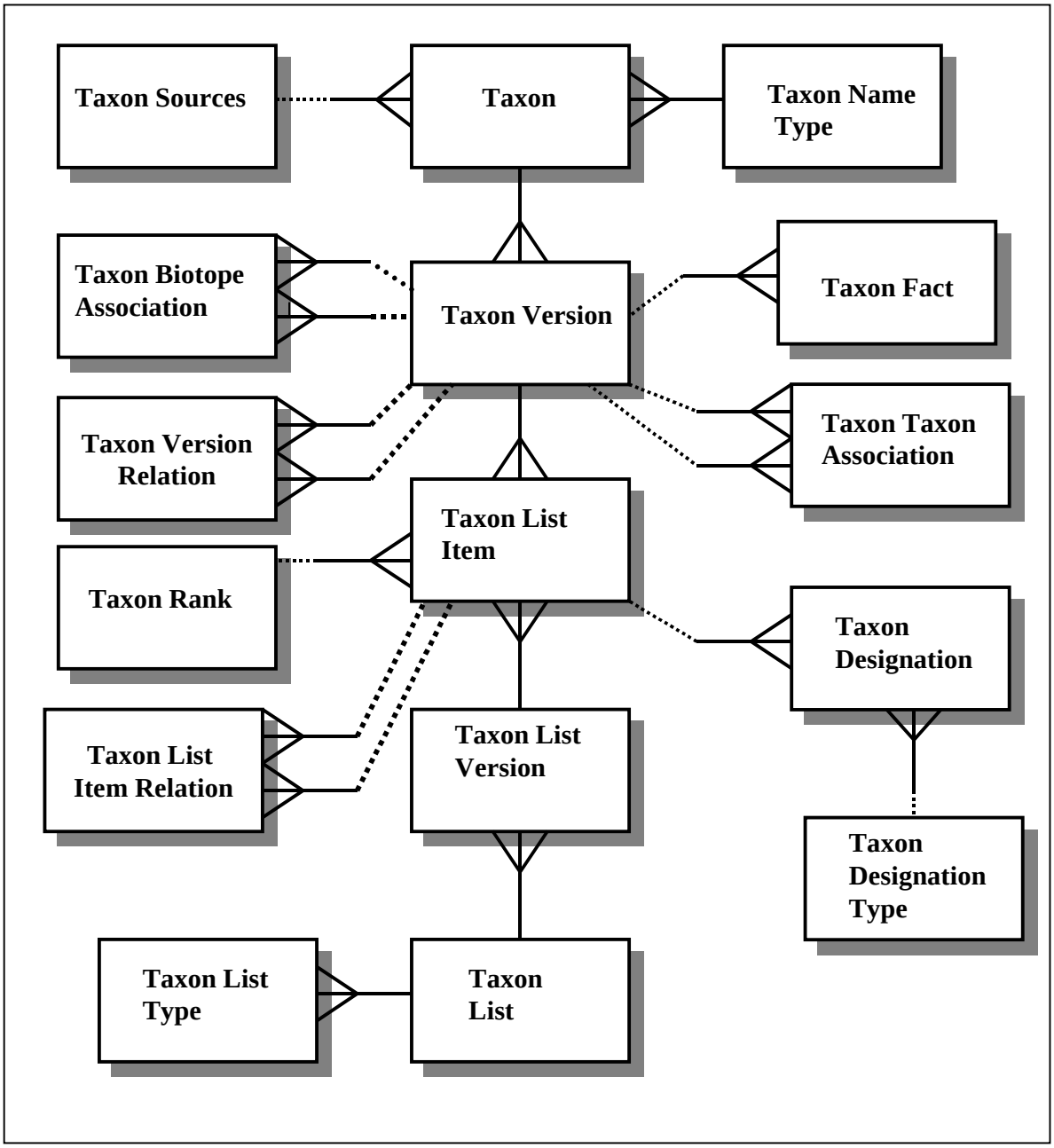


Figure 6: Overview of the Taxon Dictionary Module

Every taxon (name) must have a **name type**, which allows separation between binomials, common names (in various languages) and informal group terms. Earlier versions of the model held common names and informal groupings of taxa (e.g. waders) in a separate table linked to taxon but analysis shows that there is no difference between formal taxa (ones created within the rules of the taxonomic conventions) and informal ones in terms of versions, relationships and associated information. For instance, bird recording in the UK is almost exclusively carried out using common names and protected status, distribution facts and family relationships are all linked to the common names. In this version of the model all naming terms are therefore placed in taxon and taxon version. This does not preclude separation for convenience in particular applications. Provision is also made for recording the **source** of a name such as the original publication reference although for common names this might not be known.

All unique taxonomic appellations must have at least one version but the same name may be used in several contexts through the process of taxonomic revision (e.g. lumping and splitting). It is thus necessary to store taxon keys in a **Taxon Version** table so that the right 'meaning' of a taxon can be linked to specific **Taxon Lists** or **Taxon List versions**.

Hierarchical relationships of taxa and taxon synonymies are functions of individual versions of checklists. It is quite common for 'competing' checklists/revisions to have quite different relationships for taxa. This is handled by the **Taxon List Item** entity to which a **Taxon List Item Relation** entity is linked. Hierarchical relationships within a checklist/list can also be handled by a combination of declaring the taxon's rank (see **Taxon Rank** lookup table), declaring the immediate parent term for the current item (as an attribute of Taxon List Item) and storing a checklist item sort code to ensure listings come out in an appropriate order.

It is assumed here that for all practical purposes, facts about the taxon such as its association with given biotopes or other taxa and general information (biology, behaviour etc.) are linked to the taxon version. There may actually be information about a taxon, which is specific to an individual list and therefore should be linked to Taxon List Item (e.g. the scientific description) but this could be overcome by including a link to the individual Taxon List in the fact table (e.g. by including a Source Key in the record).

One of the major problems of managing taxonomic lists is sorting them into order for retrieval and reporting. Taxonomic hierarchies are not fixed and levels vary widely from group to group. Most applications overcome this problem by the use of taxonomic sort codes, which may be simple integers or complex codes with several parts which attempt to codify a taxon's hierarchical position (e.g. a code for phylum + code for class + code for family + code for genus + code for species). Some codes are confined to the original list for which they were created whereas others have been more widely used in various databases or on a variety of recording cards. In the evolution of the NBN model, taxon codes started out as a separate table linked to taxon version but are now represented as an attribute of taxon list item linked to the original list that created the coding system. Where other lists use a code from another system (e.g. a recording card which refers to the BRC taxon list) this is pointed to by a taxon code source attribute in taxon list item.

The Biotopes Dictionary

A wide range of habitat and biotope classifications is in use worldwide ranging from global habitat classifications down to country vegetation classifications and informal land use types. For the purpose of this work all habitat, community and land cover classifications are referred to as biotopes. Biotope classifications are generally based on a hierarchical code expanded by an equivalent term (see Figure 8).

As with the taxon dictionary, each biotope classification (list) may exist in more than one version. Version differences may be due to extensive revisions or small accretional changes. Some of the classifications in use have also accumulated undocumented changes over time. Complications affecting data exchange can arise when copies of the classification are distributed with applications and not subsequently updated or are altered by the application author. This has happened, for instance, with copies of the NVC installed with the VEGAN (Vegetation Analysis) database used in the UK country conservation agencies.

National Vegetation Classification (NVC)

1. Aquatic communities
   - A Floating aquatic
     - A1 Lemna gibba community
     - A2 Lemna minor community
       - A2a Lemna minor - typical subcommunity
       - A2b Lemna trisulca subcommunity
       - A2c Riccia fluitans - Ricciocarpus natans subcommunity
       - A3 Spirodela polyrhiza .....
       - etc.

Figure 7: Hierarchical structure of biotope classifications reflected in the codes and names used. Example from the UK National Vegetation Classification.

The creation of biotope classifications has not stopped and new ones appear with great regularity. Widely used, existing classifications such as NVC and Corine/Eunis are also being added to and modified. The Biotopes Dictionary must be able to provide the user with the right version of the classification for their purposes e.g. for a new application or for understanding an older dataset. For this reason it is necessary to track updates of the classifications and flag changes so that users do not lose information when updated.

For many purposes recorders may only need a simple 'flat-file' listing the biotope or land cover checklist that they favour and this may be all that is supplied with a simple data-capture program. A more functional application will, as demonstrated, need access to a wider range of checklists and versions and be able to translate between them. The NBN biotope dictionary data model (Figure 9) attempts to deal with all of the considerations listed above.

The design of the biotope dictionary module is similar to that of the taxon dictionary. The names of biotope and land cover terms are held in the **Biotope** entity. Biotopes are related to **Biotope classifications** (and more particularly **Biotope Classifications Versions**) by their appearance in individual checklists (**Biotope List Items**). Biotopes may be protected under various legislative schedules and this is modeled in the same manner as in the taxon model.

The order of biotopes within checklists is important. This can be managed by using a sort number in the Biotope List Item whilst hierarchical relationships between biotope ranks can be tracked using a parent item code. Some biotopes may be known by a code as well as a name and in some classifications by both long and short biotope names. Biotope codes could be stored in a separate codes entity although most will have only a single code within the original classification, which is probably best stored as an attribute of the Biotope.

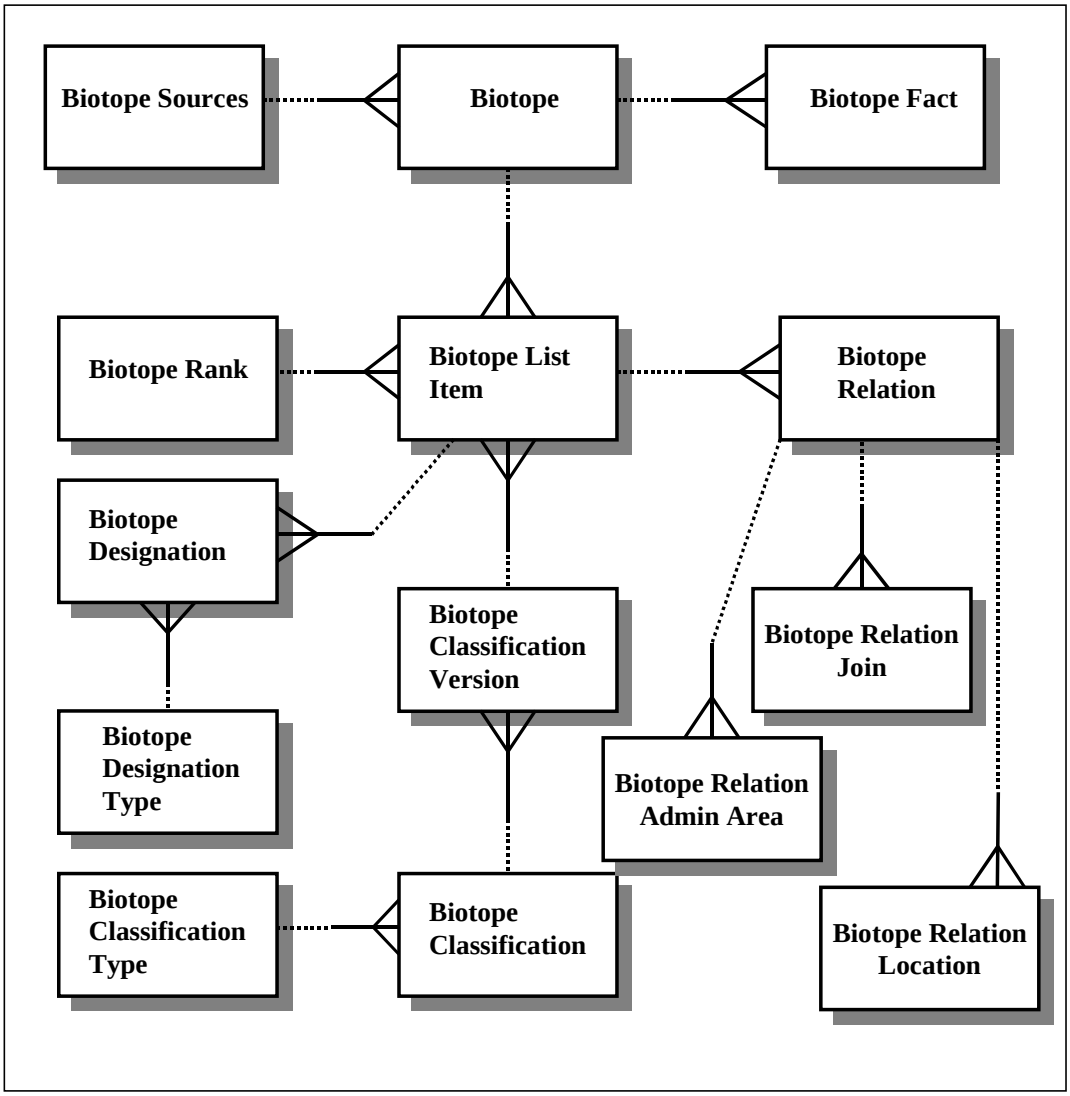


Figure 9: Overview of the Biotope Dictionary Module

Biotope records can be linked to any number of descriptive items (**Biotope Facts**), which may be divided into types and displayed in various ways. Figure 6 is an example of how the Biotope Dictionary is displayed in Recorder 2000. The drop-down edit box allows the user to pick a biotope classification, which is then shown in tree view in the left hand panel of the window. Clicking on any item in the left panel displays its details in the right hand pane. This window uses HTML to format the records according to their type.

Correlation between biotope classifications

There is a keen interest in the correlation of specific habitat classifications e.g. matching site data recorded using the Corine-based habitats used in the EC Sites and Species Directive to NVC terminology or vice versa. Many older surveys used classifications which have since been superseded, for instance the Birks & Ratcliffe Upland Habitats Classification has been superseded by the NVC and users will wish to translate old records into their newer equivalents for analysis and comparison with more recent surveys.

The task of mapping biotopes in one classification to equivalents in another is not simple because most classifications will not have a direct one-to-one equivalence. The classifications may be based on different criteria or set at different levels of 'lumping' or 'splitting'. A further complication can arise from the way that classifications may have been interpreted in different surveys or in different areas. In this case habitat translation may be specific to a country, region or even a single site.

In the NBN model, biotopes may be related to one another (e.g. for the purposes of mapping equivalents in different classifications) through a **Biotope Relation** entity. This entity acts as a link entity to lists of other biotopes (**Biotope Relation Join)**, locations (**Biotope Relation Location**) and administrative areas (**Biotope Relation Admin Area**). In this way it is possible to record complex relationships such as; in Area 1, biotope A in classification X is equivalent to biotopes B, C & D in classification Y but in Area 2 it is equivalent to C, D & E. Unfortunately, the fact that it is be possible to record such fine levels of discrimination does not mean that it is either simple to obtain the necessary information or easy to write applications that can use this information! Biotope equivalence tables have been built into Recorder 2000 but have not, as yet, been populated.

The Sources Module

The source module provides a means of tracking the origin of any information in the database, ranging from a whole dataset to individual items of data in the dictionaries. It can also provide a link to further information that expands that held in the database. The source record can be a link to pointer data such as bibliographic references and web addresses or to actual information such as on-line documents and images.

There can be many types of source ranging from word-of-mouth, through text references, electronic documents and images to collections of specimens. The information pointed to by the source record will change depending on what the source is referring to. The four source types included in the logical data model illustrated in Figure 10 allow linkage to details of images, references, on-line documents and physical collections.

The entities illustrated are by no means exhaustive and others could be created to suit individual application requirements. For instance it would be possible to include a Dataset_Source record that held details of the individual copy of information entered into either Survey or Location Modules. A dataset source might include the dataset name, information on the owner of the data, what copy version this is, what validation has been used and what restrictions are placed on use. This comprises the metadata record for the dataset and this entity could provide the metadata summary for the NBN Index

A Source record can link to the references, images and contacts modules through link entities as required. This means that, for instance, the source of a taxon record could be a literature reference or it could be linked to people with whom a data supply agreement is documented in the Communications table of the Contacts module. The source record can be linked to any entity or attribute through a source link record. In the NBN model this is represented as a single entity but in Recorder 2000 source links are stored in several 'module specific' tables (see Annexes 4 & 5)

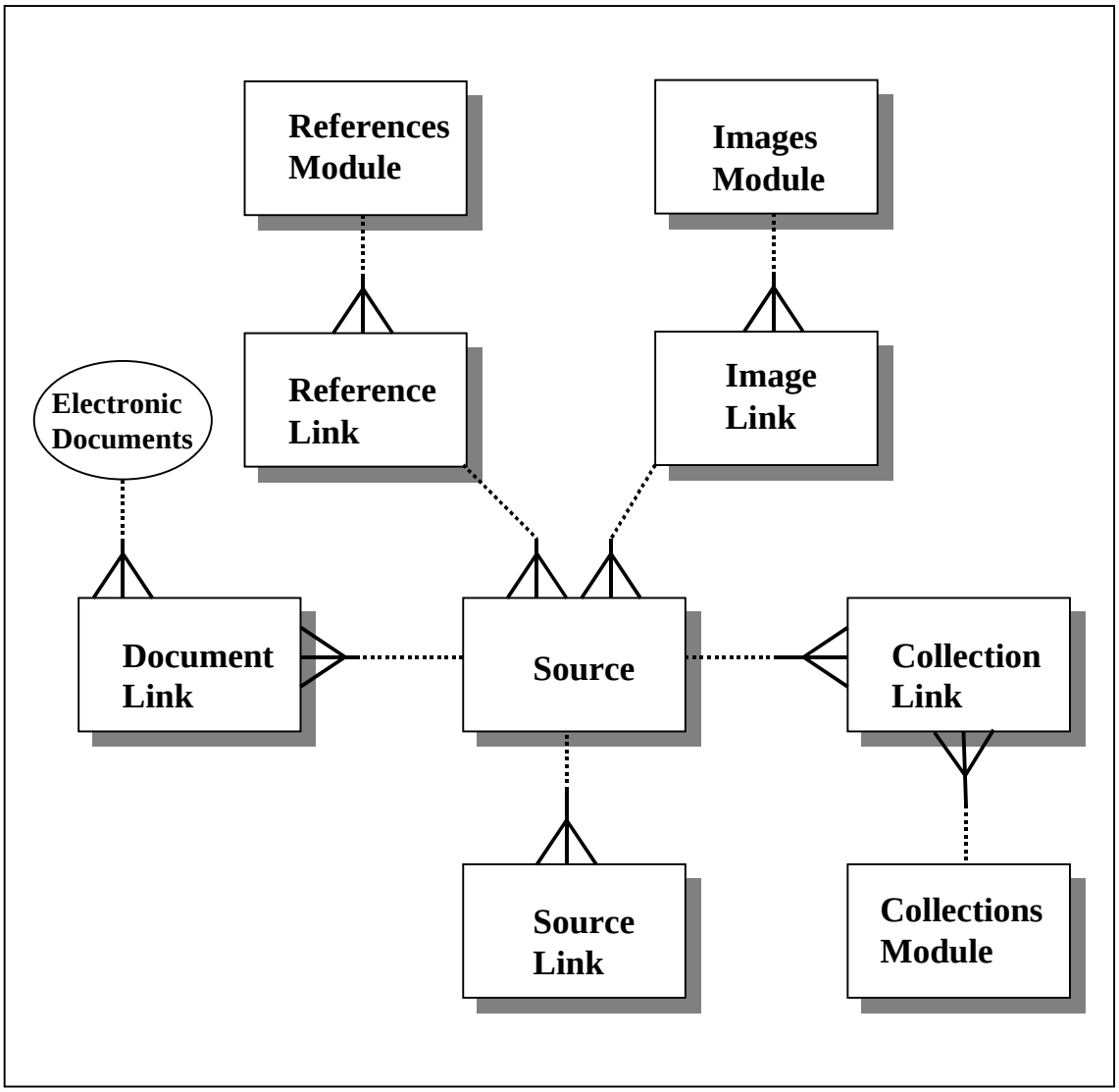


Figure 10: Overview of the Sources Logical Model with example sources.

Images

The image module (Figure 11) offers an integrated way of documenting images of all types from oil paintings, photographs and bookplates to digital video. The image module could be used both to describe and catalogue images and to link them through the source link to biological or geological records and collections. The management of image information could become important in future applications as machines become better able to store and display electronic images.

The basic identifying information is maintained in the **Image** entity, which could also store actual images or pointers to images in other systems. The Image entity is linked to subtype entities to provide the appropriate attributes for different kinds of image, for instance **Moving_Image** includes information on format, duration and soundtrack whilst **Artwork_Image** would include information on the materials used and so on. Not all of the attributes of these subtypes have been elucidated for the NBN model so far, but most of the requirements for image description and cataloguing are already well known in the museum world. For

instance, the MDA[14] have done much work in this area over the last twenty years and detailed modeling of museum collection data (including images and references) was carried out under the LASSI[15] project in the mid 1990's.

In addition to subtype information, other entities are linked to the main image entity. These include **Image_Measurements** and **Image_Codes**. Images can be related to each other through an **Image_Relation** entity which could, for instance, relate copies of images in different formats, prints from negatives and so on.

For illustrative purposes, the model presented here shows three link entities to cover images in survey records (**Survey Link**), images of locations (**Location Link**) and links to publications and manuscripts (**Reference Link**). In practice these are more likely to be handled by a single link through the Source entity.

The image module was not incorporated into Recorder 2000 although images can be linked to most other modules (e.g. locations or survey events) as either internal or external references.

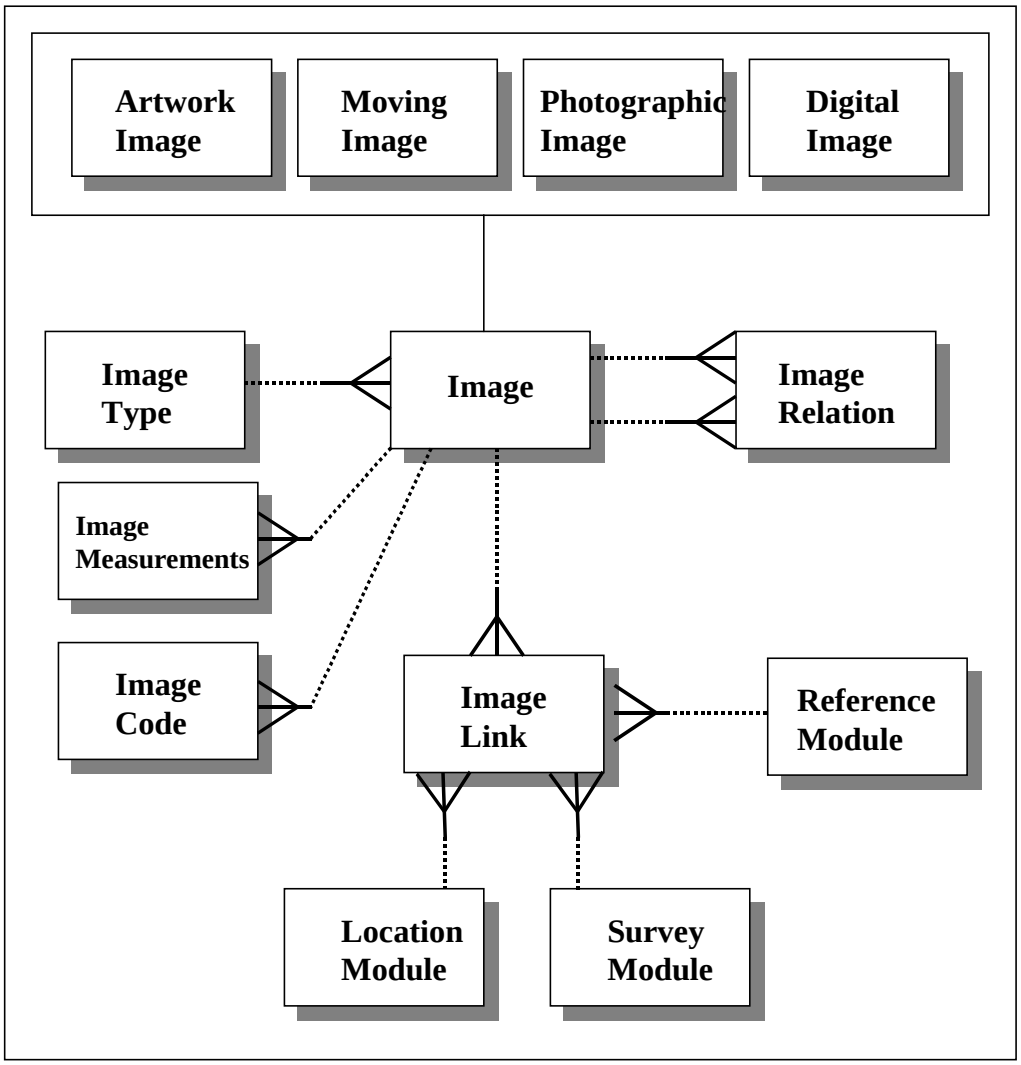


Figure 11: Overview of the Image Sub-module

[14] Museums Documentation Association
[15] Large Scale Systems Initiative

References

The Text and References module is similar in structure to the Images Module in that it has a central entity (**Reference**), which could be sub-typed to match different types of publication and manuscript. In the model illustrated (Figure 12) and in the Recorder 2000 build these subtypes are merged into one table. In Recorder 2000 the application interface logic calculates which attributes to display on the basis of the type of reference.

The Reference model is essentially a very simple one, which includes a dictionary of Journal and Serial names (**Serial**) to provide terminological control for data entry. **Reference Code** allows various reference numbers to be associated with any publication or manuscript including shelf numbers, Library of Congress and ISBN numbers, which are listed under **Reference Code Type**.

A **Reference_Keywords** entity is included because many users like to link publications to specific concepts such as a taxon and whether this is an identification text. Keywords are notoriously difficult to control and this area would benefit from a degree of controlled terminology.

References are linkable to any other entity or its attributes through a linking entity (**Reference_Link**) connecting to the Source entity.

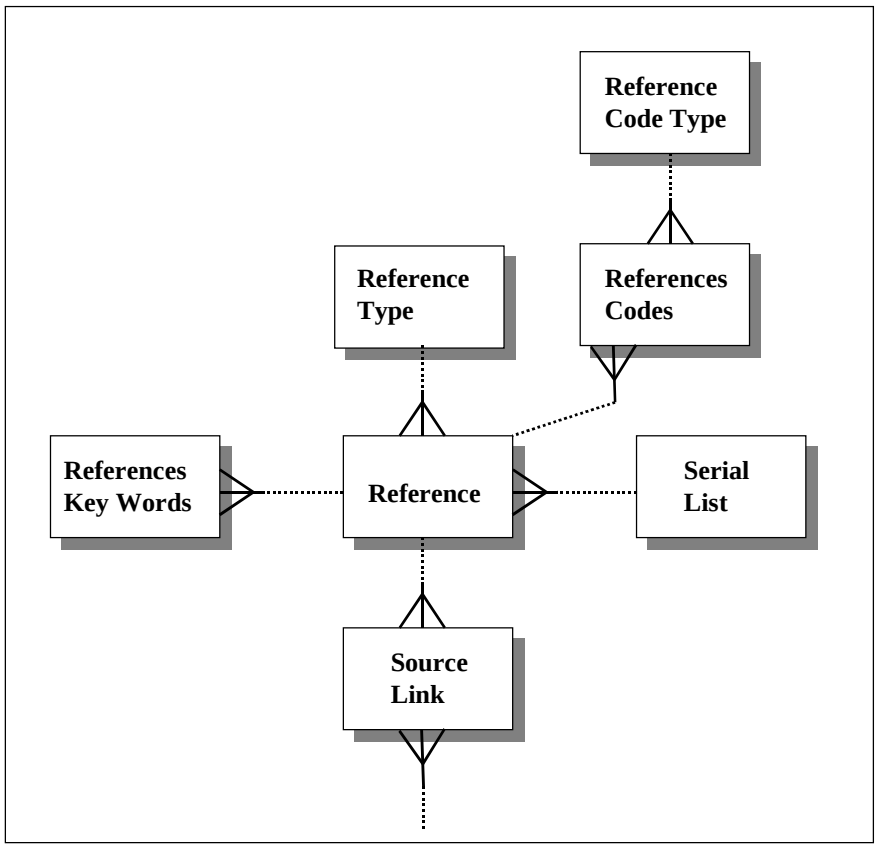


Figure 12: Simplified overview of the Reference sub-module

Metadata

The recording of metadata (information about the source, ownership, scope and quality of data sets) is vital to enterprises such as the NBN that seek to make wildlife information more widely available. The NBN data model allows for the recording of source information including metadata although in the Recorder 2000

application the scope for recording metadata is quite limited. The NBN does, however, have a Gateway and Index project that utilises a metadata model based on NBN standards such as the taxon, biotope and administrative dictionaries and also complies with other metadata standards such as the GEMET keyword thesaurus of the European Environment Agency. Further information on the NBN metadata model and the NBN Index can be found on the NBN website.

Extending the NBN Data Model

The NBN data model has been designed to be extensible. The modularistaion of the model means that new application areas can be addressed and new modules added without compromising the original. Modularisation also means that specialists can take on the role of custodians for specific areas. For instance, extension into earth science recording would require a custodian for the associated stratigraphic dictionary.

It is unlikely that one application would ever include all aspects of the model although Recorder 2000 has been written to be easily extensible through add-ins and has already shown itself to be remarkably adaptable. This is encouraging for those organisations wishing to integrate their data such as LRCs that wish to manage both biological and earth science data, or museums that wish to include specimen management.

In addition to being able to add whole new modules, the NBN model allows for extending existing modules to match new types of recording. Extending existing modules needs some care and a good understanding of how the model works. In tests with Recorder 2000 it has been found that the model is robust enough to accommodate many different forms of recording data and that customization can be relatively easily achieved by adding new terms to look up tables and modifying the application. Modifications to the application might include adding new forms (e.g. images of actual recording cards), controlling the contents of drop-down boxes or writing new report programs.

Extensions to the NBN model currently being investigated include earth science recording and museum specimen management.

Section 2: Recorder 2000

Overview of Recorder 2000

Recorder 2000 is a totally new piece of software, quite unlike any other biological recording application. It is not a simple replacement or update of the old Advanced Revelation Recorder 3.3. The underlying philosophy of Recorder 2000 is that it is a tool to deliver and support NBN data standards. It is not, therefore a fixed or monolithic application. It has been designed from the start to be modifiable or extensible to meet the data management requirements of the widest possible number of users and for many types of data. The basic application is a 'container' into which modules can be added or removed. Added modules have full access to all the built in validation, dictionaries and security. This power and the fact that Recorder 2000 cost around £400,000 to develop means that it would be very hard to justify writing separate stand-alone applications for related types of recording (e.g. one to record RIGS[16]).

The basic installation of Recorder 2000 comes already able to handle most forms of species and habitat records including those from sample-based surveys such as quadrats and transects. It comes with included data security (e.g. you can't edit other people's records), mapping facilities, export to Dmap[17] and NBN standard data exchange. The report system is powerful but basic (places for things or things for places) as the intention was that Recorder 2000 would be used with external reporting tools. Reporting tools might include links from Microsoft Office, GIS packages or SQL reporting tools.

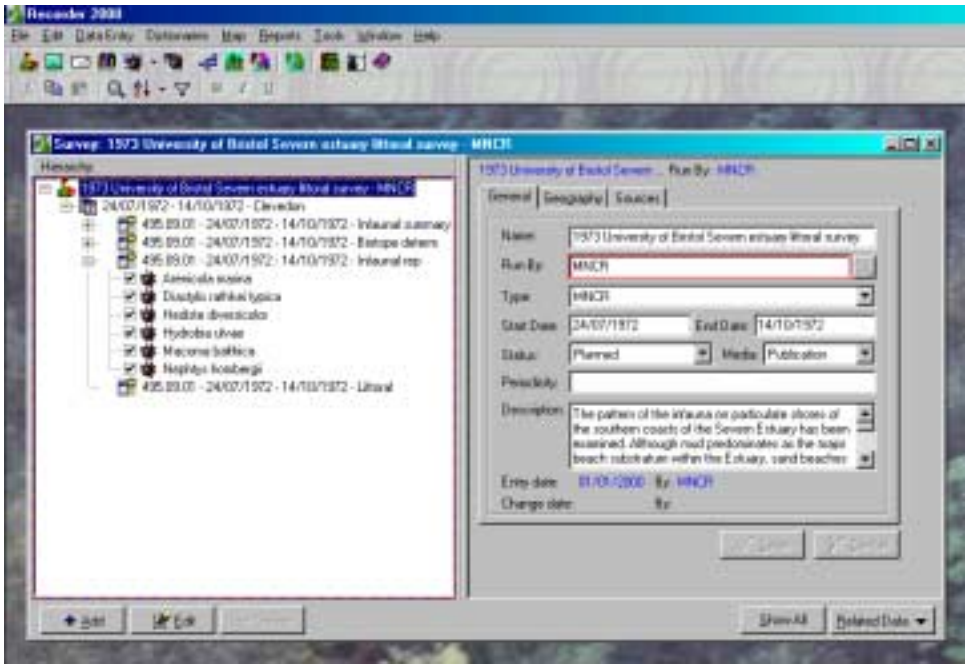


Figure 13: Recorder 2000 Observations window showing tree view of Survey, Survey Event, Sample and Taxon Occurrences with detail pane for Survey record.

[16] Regionally Important Geological Sites
[17] Dmap is a simple stand-alone distribution mapping program that is widely used in the production of atlases and floras.

The main shortfall of the release version of Recorder 2000 is that it is limited to a Microsoft Access backend database and is not database independent, as was the original hope. The Access database format is suitable for most purposes but in the form delivered is limited to a network of 10 concurrent users and a total database size of 1 gigabyte. These are serious limitations for 'corporate' users with power databases such as ORACLE. An LRC database collating information from a whole county could very soon pass the one gigabyte limit.

The limitations on the size of individual databases may well be partly overcome by using Access 2000 tables or eventually in a version 2 of the software. It might be possible to alter Recorder so that the taxon and other dictionaries, which are very large, are held in a separate database. It would be wise to make allowance for the size limitation problem in the early stages of the LRC project. One way to do this might be to use Recorder 2000 as the main data capture software, distributed among a number of data custodians (see section 8.2) and their satellites whilst a county 'union' database could be based on a set of NBN-compliant tables held in a larger database such as ORACLE.

Recorder 2000 Technical Details[18]

Requirements

- Recorder 2000 runs under a 32 bit Windows operating system - Windows 95, 98 or NT
- Requires a machine suitable for running one of these operating systems. A Pentium 233 or better processor with 32mb or more of RAM is desirable
- Requires a CD-ROM for installation. If the user chooses not to install the whole taxon dictionary to their hard disk, the CD may also be required for operation.
- 800x600, 256 colour graphics card or better
- A full installation occupies about 100mb of hard disk space, about 85mb of which is occupied by the taxon dictionary.

Interface

- The main application employs a Multi-Document Interface, i.e. it is like a word-processor or spreadsheet that allows the user to have a number of documents open at one time within the main application window and to switch between them.
- The principal windows employ a Windows Explorer-like interface with a list of available items displayed on the left and details of the currently selected item displayed on the right.
- Hierarchical tree-views are used extensively to visualise taxonomic hierarchies or the relationships between sites and sub-sites, for example.
- Commands are available via a dynamic menu system, configurable toolbars and right-click menus

[18] Much of the information in this section was provided by Dr Stuart Ball of JNCC

- Extensive use is made of drag & drop, but alternatives mechanisms are available via cut & paste and keyboard short cuts.

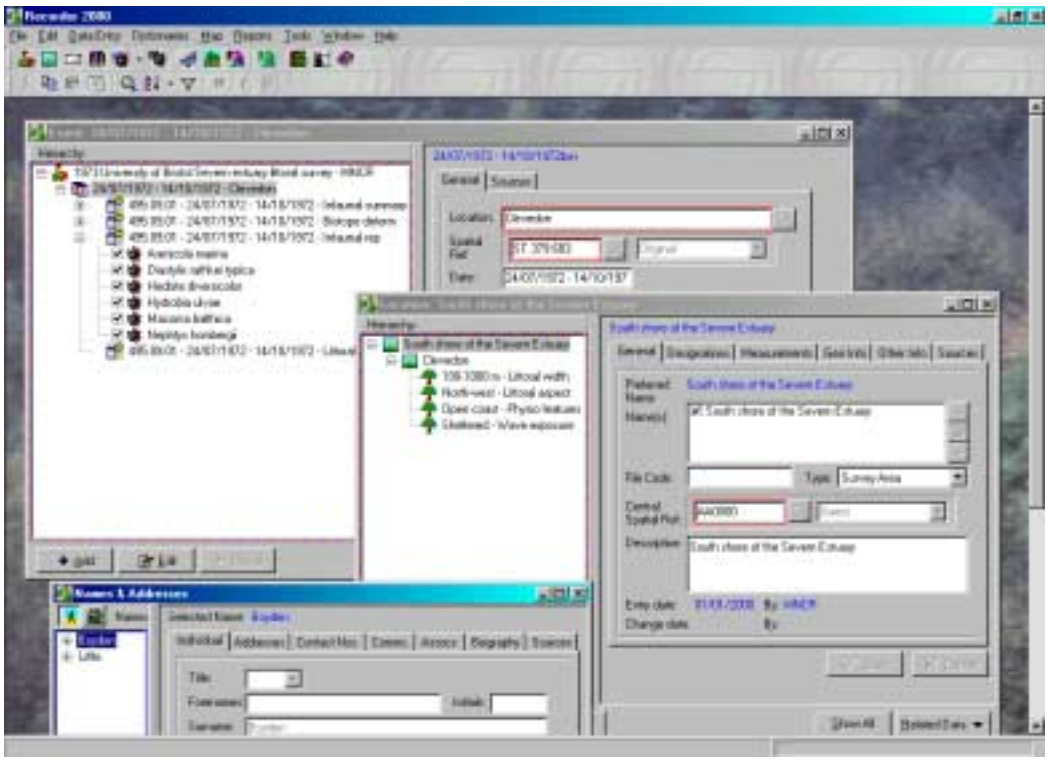


Figure 14: Recorder 2000 showing multi-document Interface

Technical background

- The underlying database is Access 97
- Help is implemented via Microsoft HTML help
- Extensive technical documentation includes:
  - Technical System Documentation - comprehensive documentation of the software and database
  - COM documentation - documents COM interfaces to customise and extend the application
  - Documentation of NBN transfer format
  - Administrators guides for the taxon and biotope dictionaries

Data items - Special Fields

Mandatory Fields

In Recorder 2000 all mandatory fields are highlighted on the application forms (e.g. for a Survey Event, date and recorders are highlighted).

Key Fields

All key fields in Recorder 2000 use NBN-style 16 character unique key format. This consists of 8 characters that identify the source of the record followed by 8 characters representing a running integer e.g. TEST000100000021. TEST0001 is the registration identity of the copy of Recorder2000 and 00000021 is the record number.

Recorder uses a table (LAST_KEY) to keep track of the last running integer used in the creation of keys for editable tables.

Dates

Dates may be stored as exact dates or Vague dates. Vague dates are represented in Recorder 2000 by 3 fields.

- VAGUE_DATE_TYPE: 2 character text field describing form of vague date (e.g. Y or D)
- VAGUE_DATE_START: Date/Time field (e.g. 26/08/80)
- VAGUE_DATE_END: Date/Time field (e.g. 30/08/80)
- These fields are used to delimit the range of a vague date e.g. a year such as 1977 would be stored as type= Y start = 01/01/1977 end=31/12/1977

The format of dates is set by the Regional settings of the version of Windows upon which Recorder 2000 is run. Ordinary date fields must be valid dates and are displayed using slashes (e.g. 26/8/1949). The vague date format can accept a number of types of entry including date ranges, month or season, year or year range. Vague date values are interpreted by the software as exact starting and ending dates. If a two digit year (e.g. 99) is encountered the software interprets the century according to a user set cut-off year in the software options (e.g. <40 is the next century >=40 is the last century)

Spatial References

All spatial references are stored internally as latitude and longitude in degrees and a SPATIAL_REF_SYSTEM field is used to lookup the output conversion needed for reports and display.

Spatial References are stored under five fields:

- SPATIAL_REF e.g. ST 423 718
- SPATIAL_REF_SYSTEM (e.g. OSGB)
- LAT (e.g. 51.4417602287966)
- LONG (e.g. –2.83028793601795)
- SPATIAL_REF_QUALIFIER - denotes where spatial reference is obtained from and its likely accuracy. (e.g. Internal Map denotes the reference was obtained by clicking on a map in Recorders map module)

The standard spatial reference systems provided with Recorder 2000 are:

- OS National Grid for Great Britain (uses 2 letter 100Km codes)

- OS National Grid for Ireland (uses 1 letter 100Km codes)
- Latitude and Longitude coordinates
- Universal Transverse Mercator coordinates

Other spatial reference systems can be added as 'Add-Ins'. Only one spatial reference system can be used in any working session.

Measurements

Measurements can be attached to various types of record such as biotope or taxon occurrences or site descriptions. All types of measurements and counts can be entered using the same set of core fields:

- MEASUREMENT: Descriptive term for type of measurement, chosen from a term list. Typical values would be Area or Count.
- QUALIFIER: Free text to specify what is being measured (e.g. number of males, area of habitat, maximum stand height etc.)
- DATA: Free text for the actual count or measurement made. Could be numerical or a code (e.g. DAFOR).
- UNIT: A value chosen from a user-editable term list. Units are linked to the type of measurement selected
- ACCURACY: Optional field indicating how accurately the measurement was made (e.g. estimate, exact etc.)

One way to customize Recorder 2000 to a specific recording scheme would be to control the terms (and therefore the entries) used in the measurement fields (e.g. a botanical survey application might only allow Domin, DAFOR and Counts in the unit field.)

Memo Fields

In Recorder 2000 many of the description and comment fields are set as memo fields and use Rich Text Format (RTF) for text enhancement and display. This is application specific and not defined by the underlying data model.

Recorder 2000 Modules

Locations

- Stores information about well defined sites such as nature reserves, designated sites, etc
- A wide range of information can be stored includes name(s), description, location, designations, ownership,
- Any measurements relating to the location (e.g. area, altitude, soil pH) can be stored
- Supports sites and sub-sites to an unlimited level of nesting. The site - sub-site hierarchy is viewed and managed graphically making it very easy to rearrange.

- Locations can be associated with digitised boundaries or lines (e.g. transect routes) on the map. Selecting the object on the map will take you directly to the appropriate Location entry

Features

- Features are associated with a location
- They document important features of a location and stores information about management, threats and damage

Features are significant aspects of Locations, which are managed or monitored. They could, for example, be the reasons for which a designated site was notified or the items for which specific provisions are made in a management plan. Features are likely to be used by organisations responsible for the management of sites. Features may also be of importance in the recording of information for conservation purposes. For instance, in an earth science application Location Features could be used for identifying the criteria by which a site is chosen for RIGS[19] status. Gradings could be applied to the feature and management aims or condition statements attached to the record.

Names and addresses

- Stores information about the name, address(es) and contact details for organisations and individuals
- Can store information about communications received from organisations and individuals
- Can associate organisations and individuals, e.g. record that an individual is a member of an organisation
- These are referenced elsewhere as the recorders and determiners of observations, participants in surveys, owners or managers of Locations, etc.

Documents

- Stores references to published or unpublished work
- These can be referenced as the source of any other information in the system
- Documents can be pointers (e.g. bibliographic references) or links to the actual documents (e.g. a word processed document), which can then be displayed in a suitable viewer.

Surveys

- Contain information about who organised a survey, over what time period, using what methods and with what results (e.g. publications).
- Records the geographic coverage of surveys. This can be given as a "bounding box" - a rectangular area on the map, in which case it is used to validate that all sample and observations included in that survey are within the same geographical area.

[19] Regionally Important Geological Site

- All survey events, samples and observations MUST belong to a survey

Survey events

- These document the site visits of which a survey is composed
- Store information about the location, date and surveyors who were involved

Samples

- Store information about the sampling that was carried out during survey events, for example quadrats, traps, field observations, transect walks
- The information includes the sampling method used, the surveyors who carried it out, its date/time and duration and precise location
- Any measurements that were recorded can be included, e.g. vegetation height
- Samples can be related (e.g. if a series of samples were made along a transect or the sample was repeated at different times)
- Store location data, which can be more detailed than that for the survey event to which the sample is related. This allows samples to be precisely located within larger survey areas.

Taxon occurrences

- Stores information about the species which were recorded in a particular sample
- Can cope with re-determinations of specimens resulting in name changes
- Stores information about the quality of the observation (has it been checked and validated) and confidentiality
- Can store information about specimens that were retained (e.g. the type of specimen, its location, accession numbers, etc).
- Any measurements that were recorded can be included, e.g. counts or other measures of abundance, size, weight etc.
- Observations can be related, e.g. a caterpillar feeding on a plant, a predator and its prey

Biotope occurrences

- Stores information about the biotope(s) (habitats) observed in a particular sample
- Can cope with re-determination
- Stores information about the quality of the observation (has it been checked and validated)
- Any measurements that were recorded can be included, e.g. area or percentage cover.

Dictionaries and term-lists

Taxon dictionary

- Designed as a means of managing multiple checklists and the relationships between names that appear on them
- Taxon observations should record the name reported by the observer (including which checklist it was derived from) and this information should not change
- The dictionary can then report the "correct" name for the taxon from the checklist that is preferred at the time
- The dictionary will be maintained by an NBN project led by the Natural History Museum
- Updates will be made available as NBN transfer format files
- The dictionary also contains a variety of related information including designated statuses of taxa and "facts" (species accounts) about taxa from a variety of sources
- Users can add statuses and facts
- Users can add new taxa although observations associated with such user-added taxa are not exported. Facilities are available to reconcile these entries with a main dictionary update.

Figure 15: The Taxon Dictionary window showing the Recorder 3.3 taxon list in hierarchical tree view and associated data pane.

Biotope dictionary

- Designed as a means of managing multiple biotope classifications
- The dictionary will be maintained by an NBN project led by JNCC
- Updates will be made available as NBN transfer format files
- The dictionary also contains a variety of related information including "facts" (species accounts) about biotopes from a variety of sources
- Users can add facts
- Users can add new categories although observations associated with such user-added biotope categories are not exported. Facilities are available to reconcile these entries with a main dictionary update.

See Figure 6 for an illustration of the Biotope Dictionary

Administrative areas dictionary

- Contains a lists of the names of administrative areas (e.g. pre 1974 counties, 1974-1996 counties and districts, current unitary authorities, Watson Ian vice-counties)
- These lists can be hierarchical when appropriate (e.g. county, district, parish)
- Updates will be made available as NBN transfer format files

Term lists

- A wide variety of terms are used throughout the system (e.g. sample methods, designation types, measurement units)
- These are managed in term-lists to which users can make additions if necessary

Recorder 2000 Application Features

Rapid data entry

- Many species observations are initially recorded via "recording cards" which include a section in which the basic information (date, place, observer's name) and a list of the species that were observed
- A facility to rapidly capture this sort of data is provided which has a header section and a list of species which can be "ticked-off"
- The species list and associated information presented on this screen are configurable and the configuration details are saved in text files which can easily be distributed to others
- A mechanism is also provided to allow rapid entry of individual records which allows rapid entry, for example, of a list of locations for a species
- "The Rucksack" is an innovation that allows users to store named lists of frequently used items (names of species, locations, observers, etc.), which can be saved and loaded at any time. These are then quickly to hand during data entry, avoiding having to look them up each time from the main tables - which may be very large.

- Five letter abbreviations are now implemented. These abbreviations of scientific names, familiar to users of Recorder 3.3, are formed from the first two letters of the generic name and the first three letters of the specific name. For example, the Wood Warbler, Phylloscopus sibilatrix, has the abbreviation "phsib". When searching for species names this is quicker to type than whole words from the name and will usually result in fewer "matches" being found from which to choose.

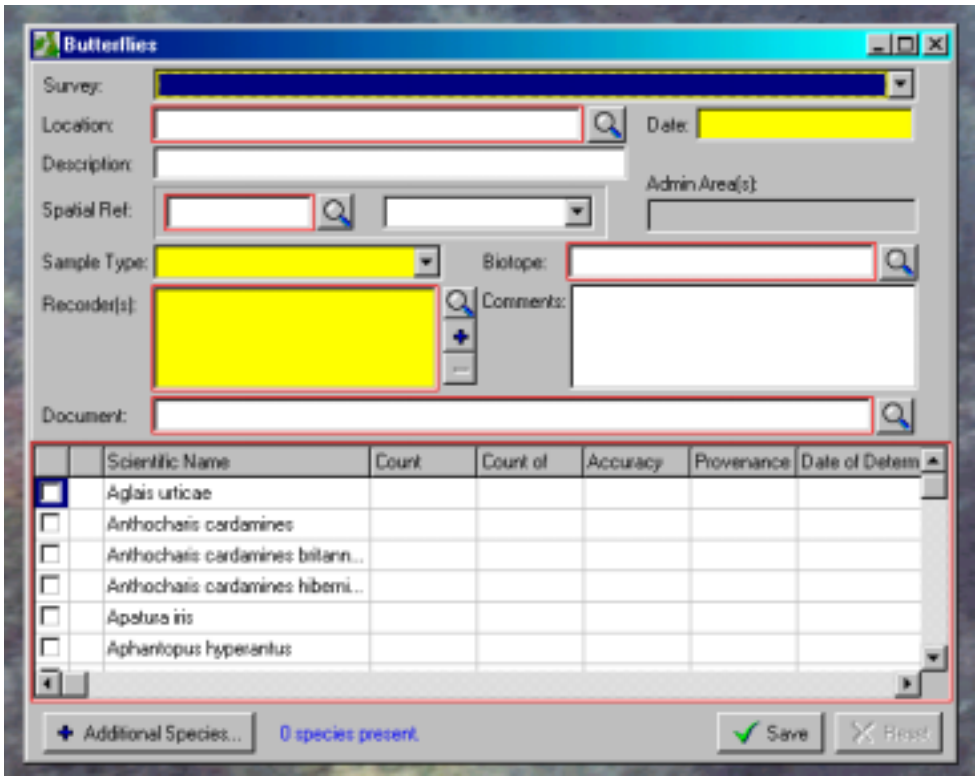


Figure 16: User defined rapid data entry card for butterflies at a location

Reporting facilities

- The built in reporting facilities are designed to provide quick and easy answers to the questions:
- What taxa and or biotopes occur at a given place?
- What occurrences of given taxa or biotopes are available?
- The resulting report can be printed, mapped or saved in a variety of file formats including plain text, comma separated text (CSV), RTF, HTML and Excel spreadsheet files (XLS).
- Reports are generated using a Report Wizard which leads the user through the process of building a query in simple steps
- A banded report designer is used to layout the resulting report
- These facilities are NOT designed to provide comprehensive reporting facilities. Not all data stored in the database is available through reports generated by the Report Wizard and there are limitations relating to memo fields imposed by Access SQL and the report writer
- One of the main reasons for developing software based on an "open" Windows database was that data is available directly from the underlying database to other Windows software. Therefore, more

complex reporting and analysis should rely on other software (word-processors, spreadsheets, statistical packages, GIS) directly querying the Access database.

Mapping

- The application can display a background map over which distribution data can be displayed. Background maps can be imported in a variety of common raster and vector formats including BMP, TIF, SHP, MIF, DXF.
- Distribution maps of observations, sampling stations and "survey events" (site visits) can be displayed and printed.
- Locations can be associated with digitised boundaries. Boundaries can be drawn using the mouse, or imported in a variety of common vector formats.
- The map can be used to obtain spatial references and identify the location of observations by clicking on a point on the map. The accuracy of the co-ordinate that is returned depends on the scale of the map that is being displayed.
- If the point that is clicked is within a digitised boundary associated with a location, then both a co-ordinate and the Location name are returned. This allows users to precisely locate their observations at the same time as associating them with large geographical areas such as "sites".
- Outline maps of Britain and Ireland and some administrative area boundaries will be supplied with the application.
- Observations can also be exported in Dmap format.

Miscellaneous

- Records in any of the main windows can be associated with external files (e.g. images, sounds, word-processed documents). Double clicking on such a file will display it in the application with which it is associated (e.g. double click on a sound file and the sound will play).

Data transfer

- The application can read and write data in "NBN transfer format".
- NBN transfer format uses XML version 1.0.
- The Document Type Definition for NBN data transfer format is published on the NBN web site and is freely available.
- Facilities have been provided to export data currently held in Recorder 3.3 and BioBase in NBN transfer format so that such data can be transferred into Recorder 2000.

Help and documentation

- Extensive, context sensitive on-line help is available
- A printed installation and "getting started" guide will be supplied

Users, security and networking

- Each copy of the application is given a unique identifier, which forms part of all record keys. This allows information to be moved from one copy to another without conflict or over-writing.
- A user must be registered in a particular copy to use it and must enter their user-name and password at logon. All records are stamped with the identifier of the user who added and last changed them.
- Users can configure the appearance and behaviour of the application. Configuration settings are saved on a per user basis, so multiple users of the same copy can each have their own preference settings.
- Five levels of user access are supported from "System manager" - who can create other users, to "Read-only".
- The application supports multiple concurrent use in network environments. It was specified to cope with up to 10 concurrent users of a database containing up to one million observations.

Customisation

- The application supports the addition of COM objects to customise and extend its functionality.
- Documentation of the COM interfaces supported by the application will be published and freely available.
- Add-ons can:
  - Customise existing screens within the application by adding, modifying or removing controls
  - Add pages to tab controls in existing screen
  - Replace existing screens in whole or in part
  - Add new screens and dialogs
  - Add new menu commands and toolbar buttons which could be used to launch any Windows application
  - Add new spatial reference systems
  - Add new validation rules
  - Implement new import methods
  - Implement new export methods

References

Ball S.	1992	*Recorder Manual* Includes various updates. JNCC Peterborough.
Burnett J, Copp CJT & Harding P.	1995	*Biological Recording in the United Kingdom: Present practice and future development*. Prepared on behalf of the co-ordinating Commission for Biological Recording. 2 vols + appendix. . Publ. DoE HMSO
Copp CJT	1998	*The Recorder Project – Systems Analysis.* Unpublished contract report. JNCC England

Annex 1: The UK National Biodiversity Network

The UK National Biodiversity Network (NBN), which was formally established as a trust in April 2000, represents a unique combination of governmental and non-governmental organisations and naturalists who are concerned with the conservation and enhancement of UK biodiversity.

The Report of the Co-ordinating Commission for Biological Records (CCBR) on *Biological Recording in the United Kingdom* (DoE 1995) found that less than 10% of all records collected were ever used for more than their original purpose or passed to other users. Governmental agencies were particularly bad on the lack of re-use of data. Furthermore the Report highlighted great geographical variation in the availability and quality of wildlife information. Although a number of well-established and effective LRCs[20] existed, many areas had no such facilities and frequently even active centres were unable to access all of the potential information.

The issues that needed to be addressed included:

1. There was a range of isolated recording networks (e.g. country agencies, bird organisations and national recording schemes) with different priorities and different recording standards.
2. There were few common standards for data format and management
3. There was no straightforward way to share data using a common data transfer standard or a metadata standard for describing the content and use constraints of datasets
4. There was a need to establish common term lists or dictionaries for taxa, habitats (biotopes) and administrative areas.
5. There were no formal common standards or operating policies for LRCs or other data managers
6. There was a lack of a common core of training opportunity for environmental and wildlife data managers

The coincidence of the appearance of the CCBR Report and the upsurge in interest in biodiversity following the Rio Conference in 1992 was fortuitous, as it has fuelled much of the subsequent developments. Despite consistent failure to obtain lottery funds for the NBN, the major governmental and non-governmental organisations involved have diverted their own resources to the development of the NBN and particularly to the work on developing standards. Other grant aid has been forthcoming which has enabled the Wildlife Trusts to take a lead on the development of local records centres and operating policies. More recently, the government through DETR has pledged substantial funds to the NBN to help maintain the momentum.

The aims of the NBN are to:

- Link the demand for biodiversity information to its collection

[20] Local Record Centres – also called Biological Record Centres and Environmental Record Centres

- Ensure that decisions affecting wildlife are based on sound, good quality data
- Improve access to reliable biodiversity information to anyone who needs it

The way these aims will be realised is through the establishment of local and national data centres (nodes) working within a framework of shared common standards. The nodes, which will include LRCs, national recording schemes, NGOs [21] (e.g. RSPB) and government funded national centres (e.g. BRC[22]) will co-operate to manage and provide access to biodiversity data in the UK. It is expected that all nodes will be linked to a common index and access gateway using the Internet.

LRCs will act as one type of node whose work will focus on the collation, management and dissemination of wildlife (and earth science) information relevant to a local area, which will usually be based on a county or some convenient grouping of administrative areas.

LRCs are expected to work through partnerships made up of local organisations, local government and individual naturalists. The role of the LRC is to manage and co-ordinate a wide range of data on behalf of partners and to ensure that needs of both data suppliers and users are met both effectively and economically. The commitment of the NBN to making wildlife information available to all means that the LRC partnership must include provision of information to the wider public and for educational purposes.

The aims of the NBN can only be met through long-term commitment and a willingness of partners to embrace change. The investment required will certainly be financial for some but it will also include considerable work to put new standards and practices in place.

[21] Non Governmental Organisations
[22] National Biological Records Centre at Monks Wood

Annex 2: NBN Standards

Making wildlife information available is all about standards. These include operating standards and technical standards. The NBN 'Linking Records Centres Project' is currently working on all aspects of setting up and operating local records centres. This is being achieved through the establishment of three pilot LRCs, in Brecon & Powys, Cheshire, Halton, Warrington & Wirral and North East Scotland and through a separate project to establish a complete set of guideline operating policies. Work is also progressing on the framework for an accreditation scheme for LRCs.

NBN Technical Standards

The NBN technical standards are based around:

- The **NBN data model**: A description of the relationship between items of information (logical model) which provides a framework that can be used to describe the relationships of all aspects of biological and earth science data. The model, therefore, provides the means to 'map' one collection of data to another and also the means to create new software for managing biodiversity data.
- **NBN dictionaries**: A suite of models, which manage the relationships between commonly used term lists (e.g. different habitat classifications) and which enables the development and dissemination of standard lists of terms (e.g. taxa, biotopes and administrative areas) to promote compatibility between records.
- **NBN Metadata Model**: A means of describing the origin, content and constraints of individual datasets. This will provide the means for creating the NBN Index that will lie at the heart of the national network and enable widespread access to available data (subject to appropriate safeguards).
- **NBN Data Transfer Standard**: The NBN data transfer standard is derived from the NBN data model. It provides the means to exchange information between databases or databases and other applications such as public information websites. To achieve this, items of information are enclosed by 'tags' that describe what the items are and how they relate to each other and the NBN data model. The format used for the tags is called Extensible Mark-up Language (XML). XML is similar to the Hypertext Mark-up Language (HTML) that is used in all World Wide Web pages and is rapidly becoming the main way in which heterogeneous information is moved in electronic systems.
- **Recorder 2000**: Recorder 2000 is an entirely new application written at a cost of c. £400,000 under the auspices of the NBN. It is the first piece of software to embody all of the NBN standards (data model, dictionaries and transfer standard) and has been designed to be easily modifiable to meet evolving user needs. Recorder 2000 will be the standard database software for the majority of nodes in the national network and will also be available to local naturalists. It is envisaged that LRCs will provide 'satellite' copies of Recorder 2000 to local naturalists and societies as a means of disseminating standards and also overcoming the ever-growing backlog of paper records.

Annex 3: NBN Data Exchange - Framework of Principles

Much of the philosophy of the NBN is summed up in the recently circulated *Framework of Principles for Data Exchange*[23]. There are seven basic principles to which all nodes in the NBN are expected to subscribe. Most of these can be met through adopting the NBN standards and policies outlined above. These principles can prove useful during the establishment phase for LRCs. The principles clearly establish that, although many users should have free access to information, other users, to whom the use of information is integral to their work or for meeting statutory requirements, should be prepared to pay towards the collection and management of the data, not just for derived products. This is a useful argument in negotiating financial support from potential partners whilst maintaining the principle of generally free access.

The principles are:

- Biodiversity data should be easily accessible to enable their use for not-for-profit decision making, education, research and other public-benefit purposes
- Making biodiversity data available should reduce the risk of damage to the environment. If, exceptionally, it is likely to have the opposite effect, availability may need to be controlled
- Biodiversity data suppliers should make available sufficient meta-data to allow biodiversity data users to assess the scope and potential uses of their information holdings. When biodiversity data are supplied, accompanying information (metadata) on its ownership, methods and scale of collection and limitations of interpretation should be provided
- A clear transfer of authority should be made when a biodiversity data resource is put together, to allow biodiversity managers to act on behalf of the biodiversity data owners.
- Managers of biodiversity data should make their framework of terms and conditions publicly available, allowing biodiversity data owners to have confidence that control will be exercised in the management and use of their data.
- Personal data must be managed in accordance with the principles of the Data Protection Act 1988 and/or any subsequent legal provisions.
- Access to data
- Managers and funders of biodiversity data should make basic facts freely available (except for handling charges if needed) for not-for-profit decision-making, education, research and other public-benefit purposes
- Biodiversity data suppliers should try to arrange resourcing of information provision so that charges for commercial users are realistic but do not prevent the use of biodiversity data.
- Biodiversity data users should expect to contribute to sustaining the provision of biodiversity data through contributing either in kind or financially to the collection, collation and management of biodiversity data, or at the point of use.

[23] Available as a download from the NBN website: www.nbn.org.uk

Annex 4: Relationship Diagrams for Tables in Recorder 2000

This annex contains table relationship diagrams for the Recorder 2000 implementation. The key diagram below can be downloaded as a windows metafile from the NBN website. The metafile can be scaled up to any size in order to view the table and relationship details. The Recorder modules are also illustrated in the following pages.

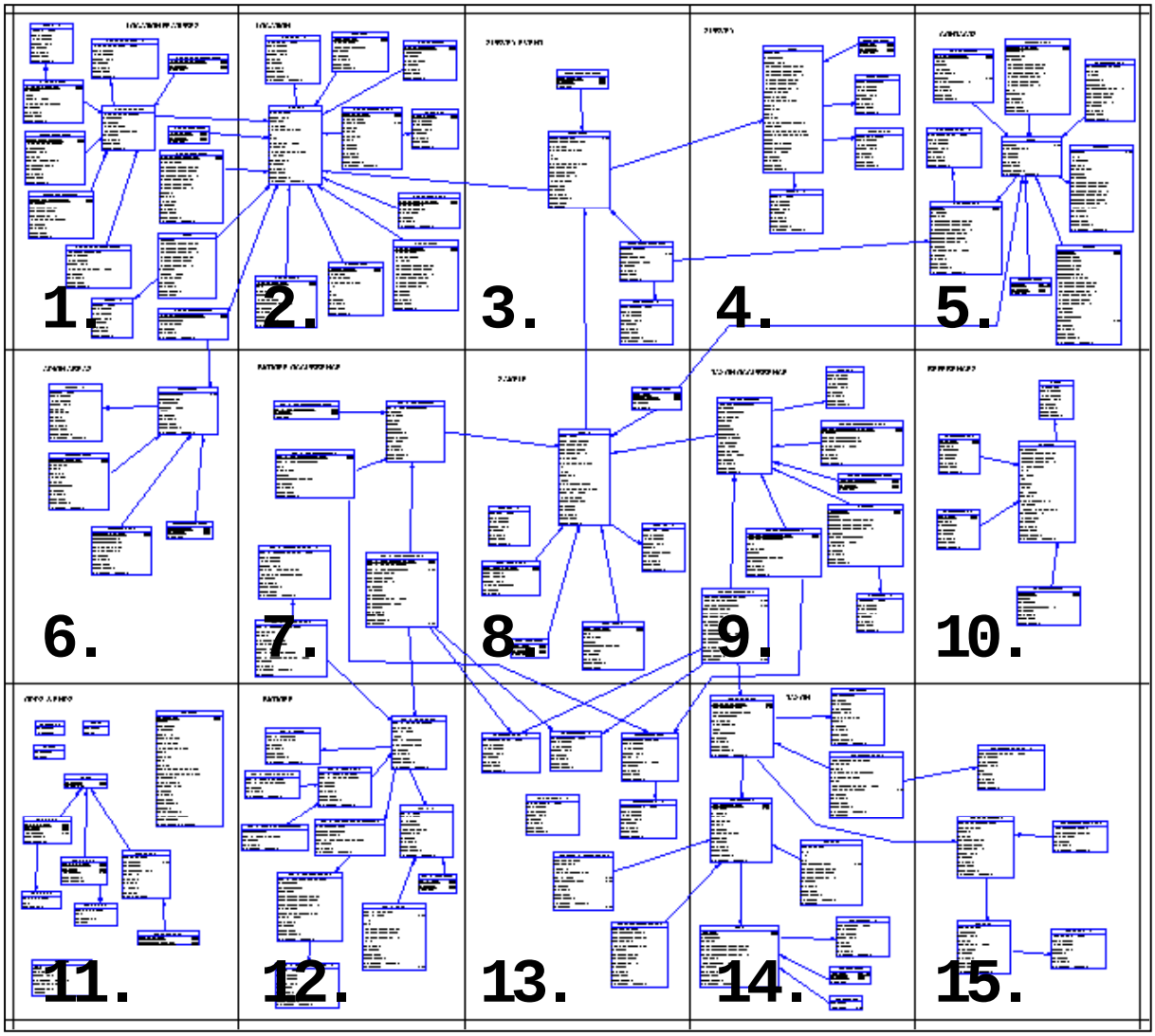
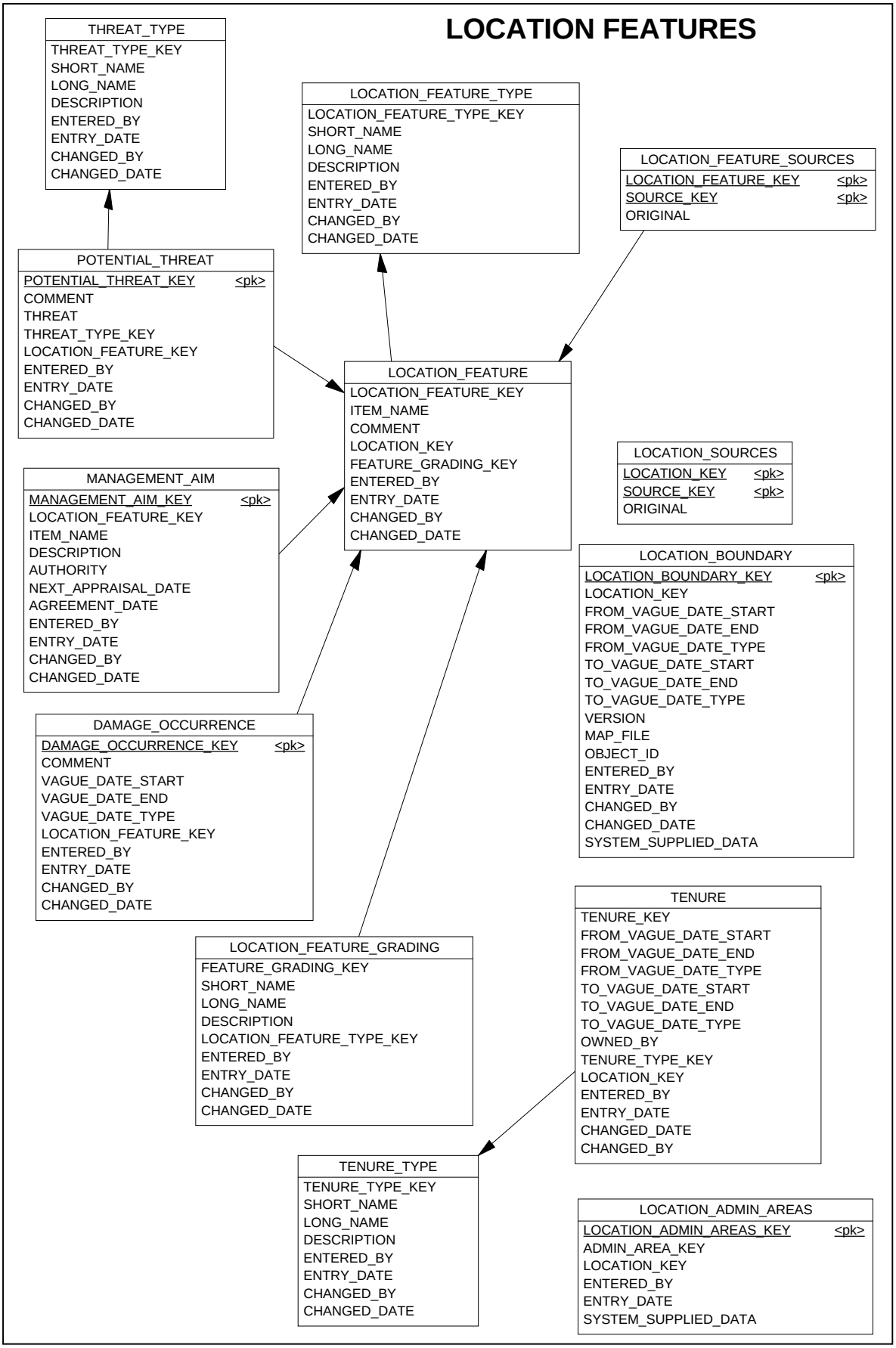


Figure A4.0: Overview of table relationships in Recorder 2000

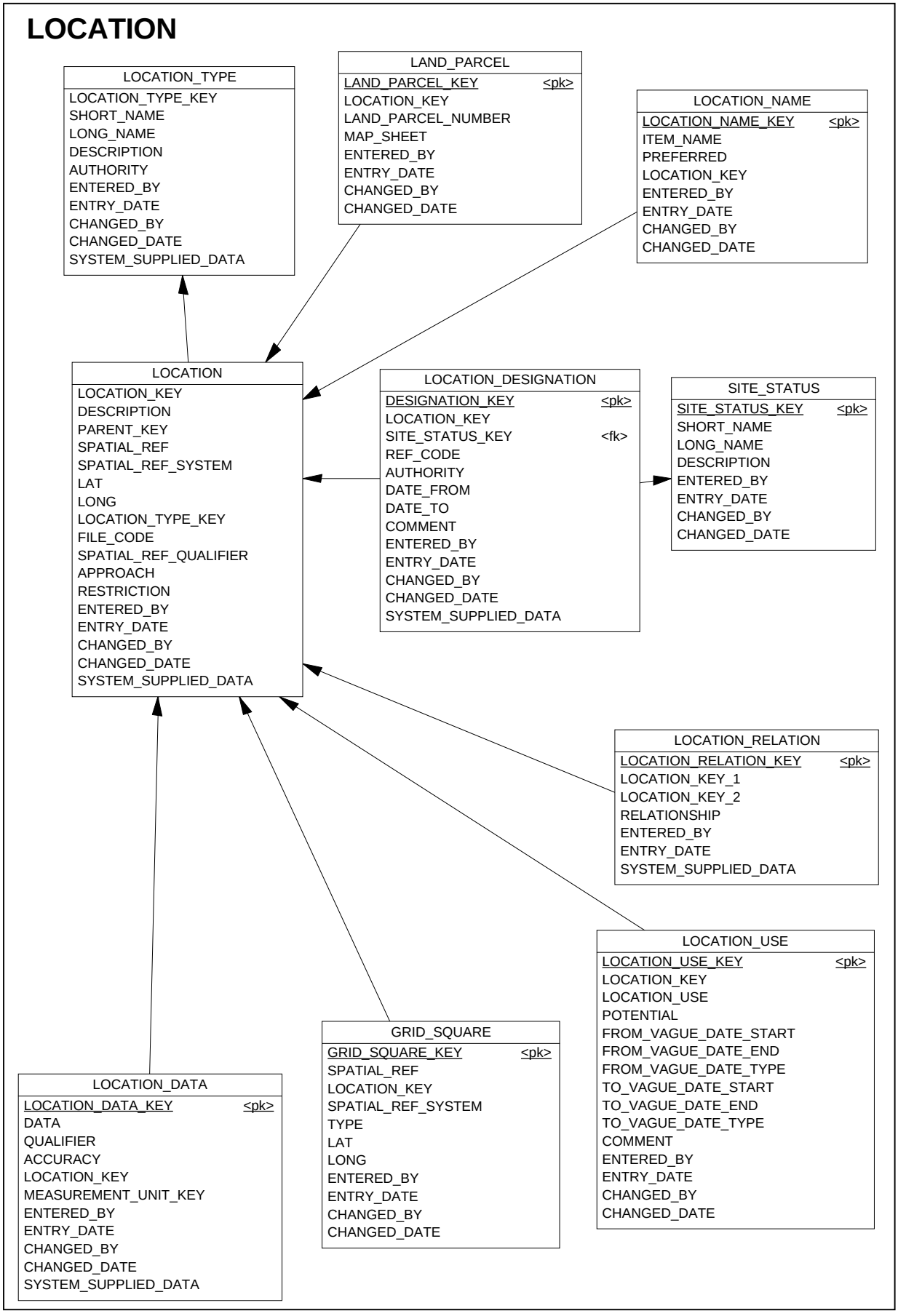
Key to Modules:

1. Location Features	9. Taxon Occurrences
2. Location	10. References
3. Survey Events	11. Application specific tables
4. Survey	12. Biotope Dictionary
5. Contacts	13. Lookup tables and part of Taxon Dictionary
6. Administrative Areas Dictionary	14. Taxon Dictionary
7. Biotope Occurrences	15. Taxon Dictionary
8. Samples	

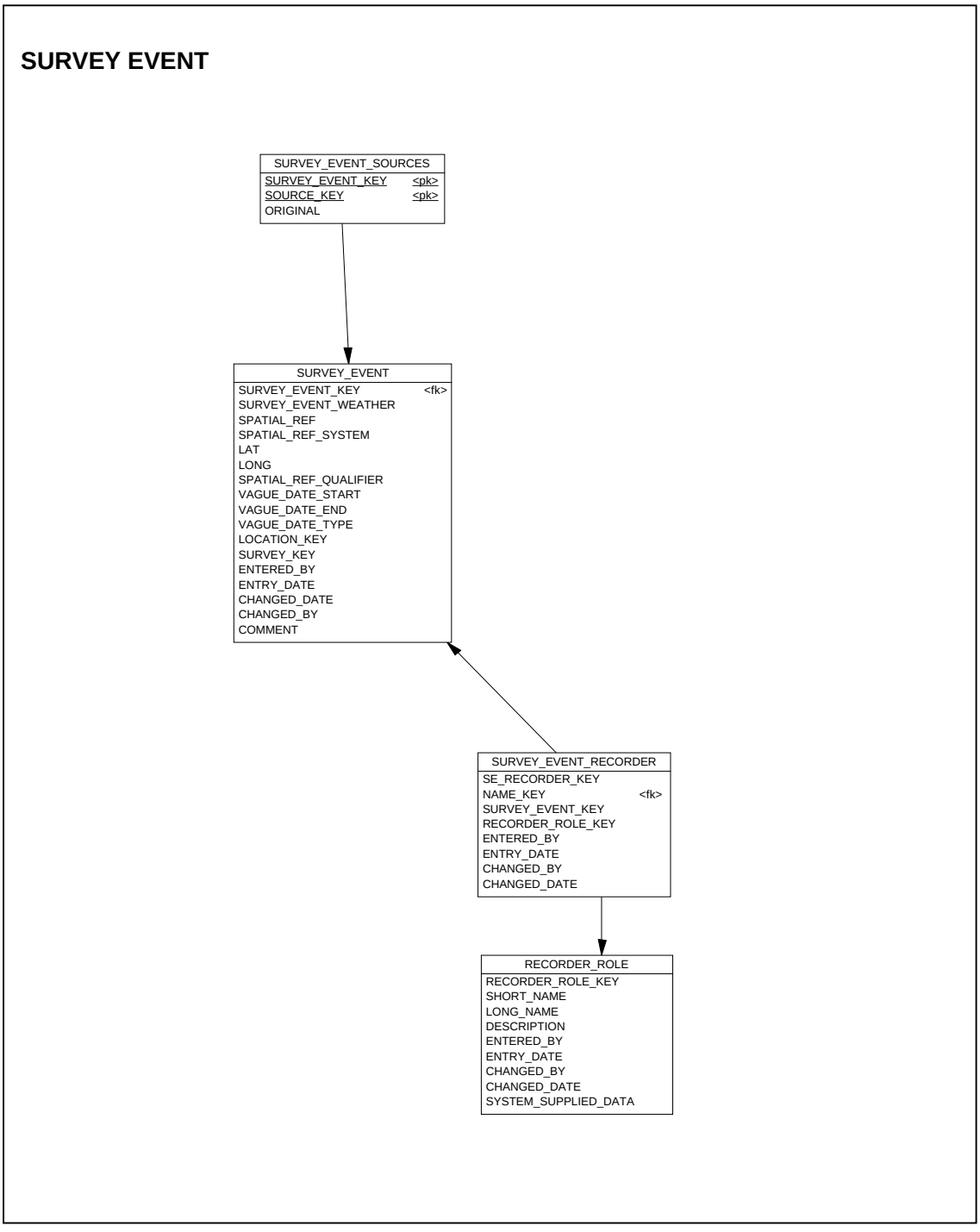
A4.1 Location Features



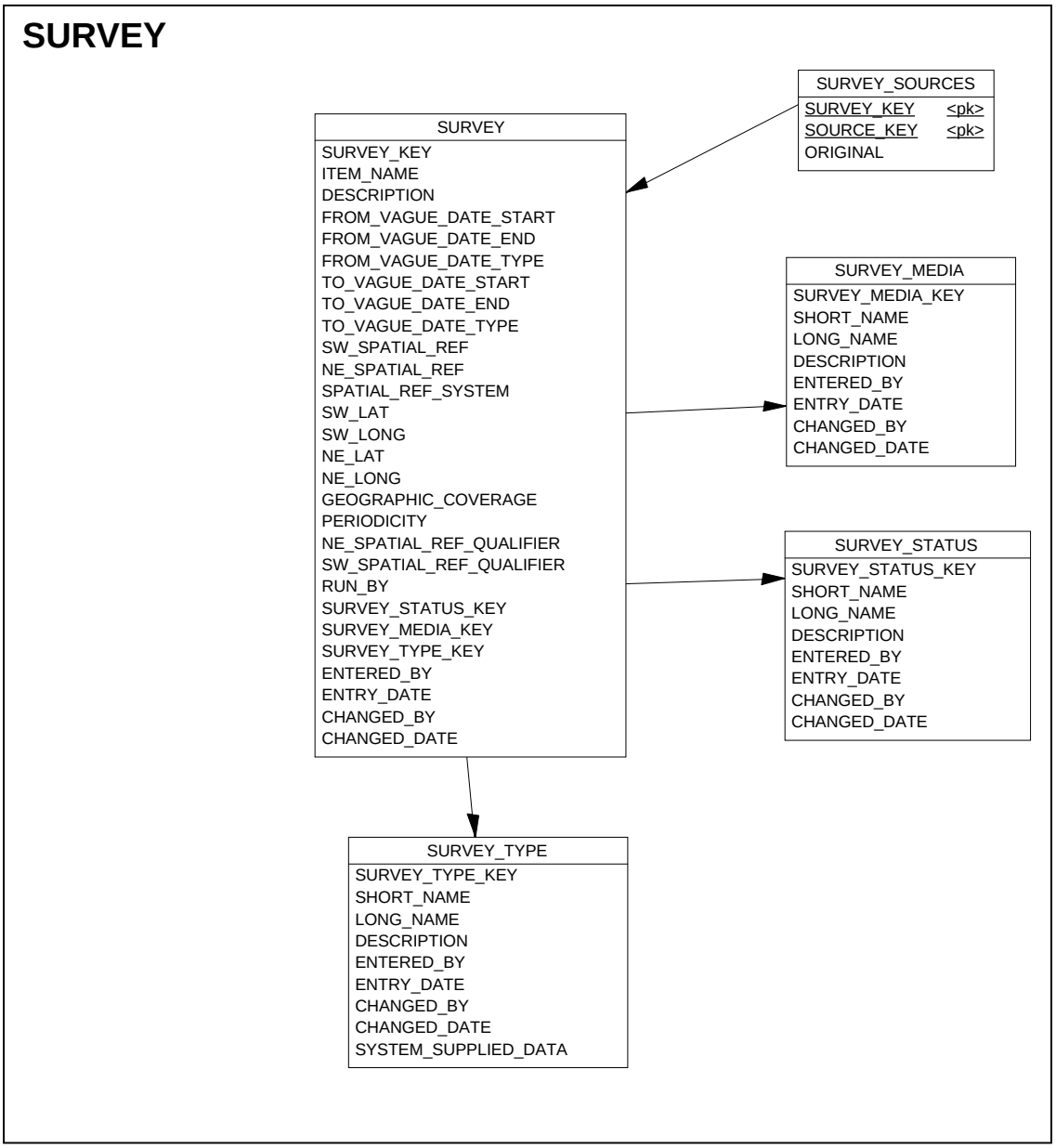
A4.2 Locations



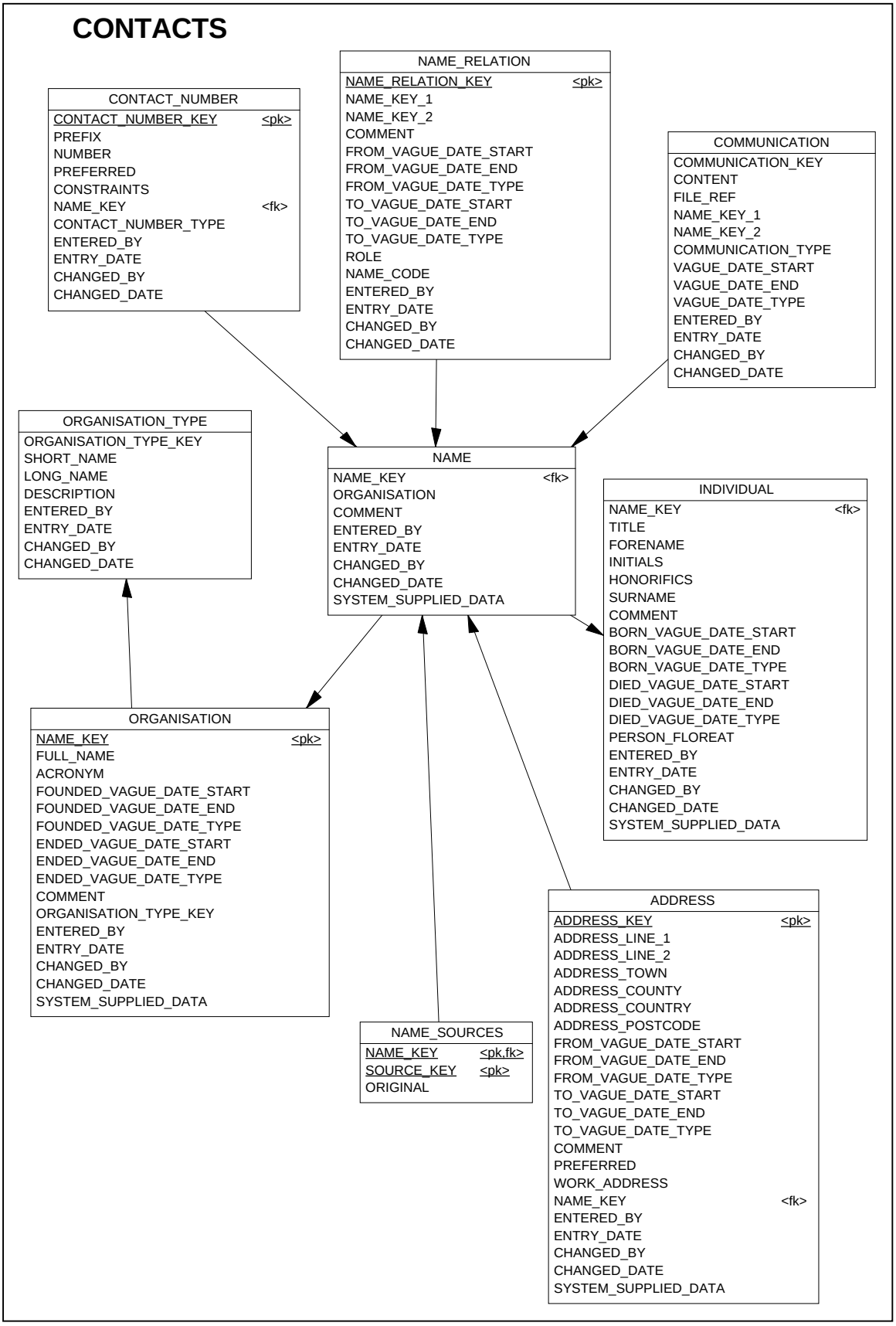
A4.3 Survey Event



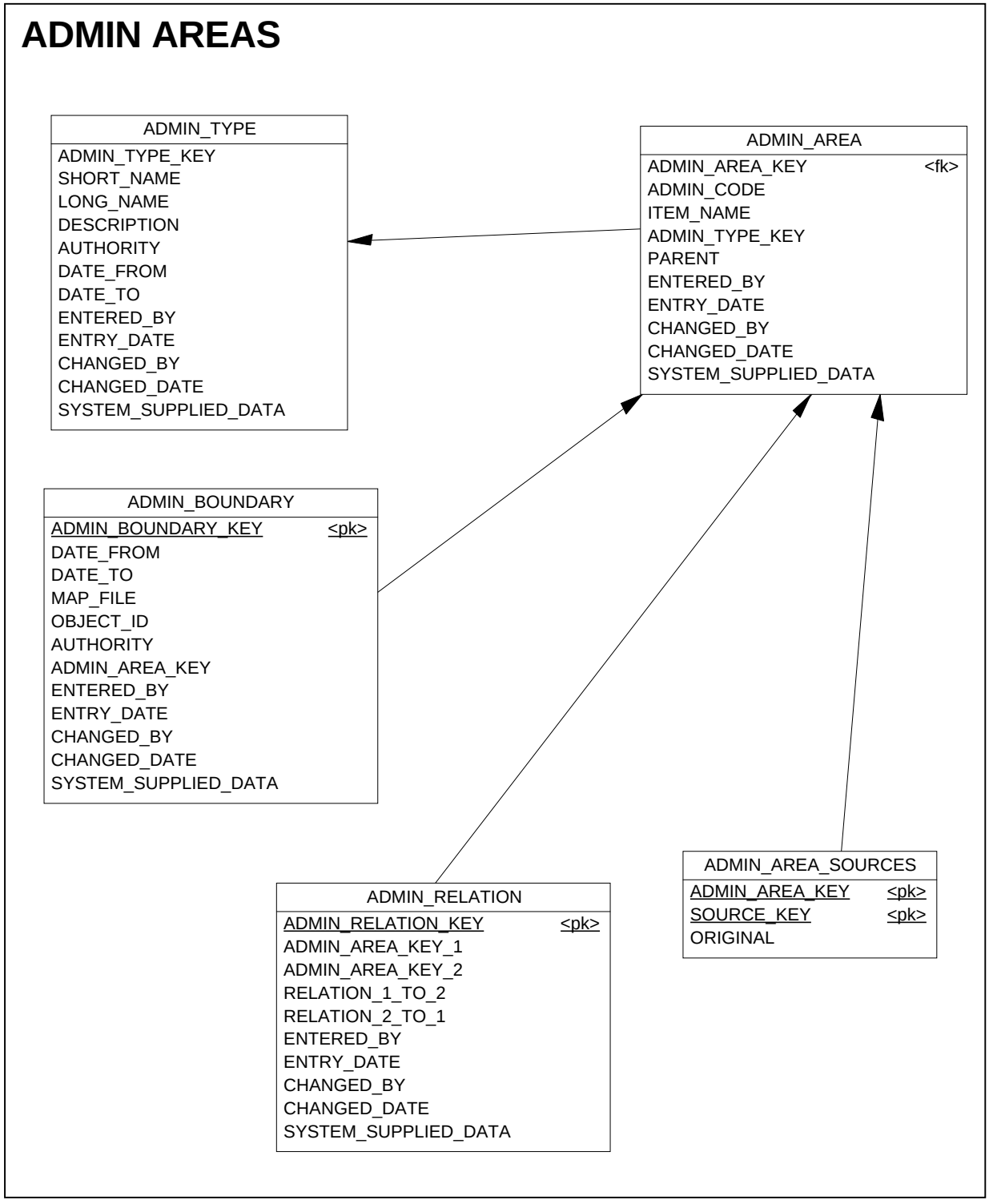
A4.4 Survey


SURVEY
SURVEY_SOURCES
SURVEY_KEY <pk>
SOURCE_KEY <pk>
ORIGINAL
SURVEY
SURVEY_KEY
ITEM_NAME
DESCRIPTION
FROM_VAGUE_DATE_START
FROM_VAGUE_DATE_END
FROM_VAGUE_DATE_TYPE
TO_VAGUE_DATE_START
TO_VAGUE_DATE_END
TO_VAGUE_DATE_TYPE
SW_SPATIAL_REF
NE_SPATIAL_REF
SPATIAL_REF_SYSTEM
SW_LAT
SW_LONG
NE_LAT
NE_LONG
GEOGRAPHIC_COVERAGE
PERIODICITY
NE_SPATIAL_REF_QUALIFIER
SW_SPATIAL_REF_QUALIFIER
RUN_BY
SURVEY_STATUS_KEY
SURVEY_MEDIA_KEY
SURVEY_TYPE_KEY
ENTERED_BY
ENTRY_DATE
CHANGED_BY
CHANGED_DATE
SURVEY_MEDIA
SURVEY_MEDIA_KEY
SHORT_NAME
LONG_NAME
DESCRIPTION
ENTERED_BY
ENTRY_DATE
CHANGED_BY
CHANGED_DATE
SURVEY_STATUS
SURVEY_STATUS_KEY
SHORT_NAME
LONG_NAME
DESCRIPTION
ENTERED_BY
ENTRY_DATE
CHANGED_BY
CHANGED_DATE
SURVEY_TYPE
SURVEY_TYPE_KEY
SHORT_NAME
LONG_NAME
DESCRIPTION
ENTERED_BY
ENTRY_DATE
CHANGED_BY
CHANGED_DATE
SYSTEM_SUPPLIED_DATA

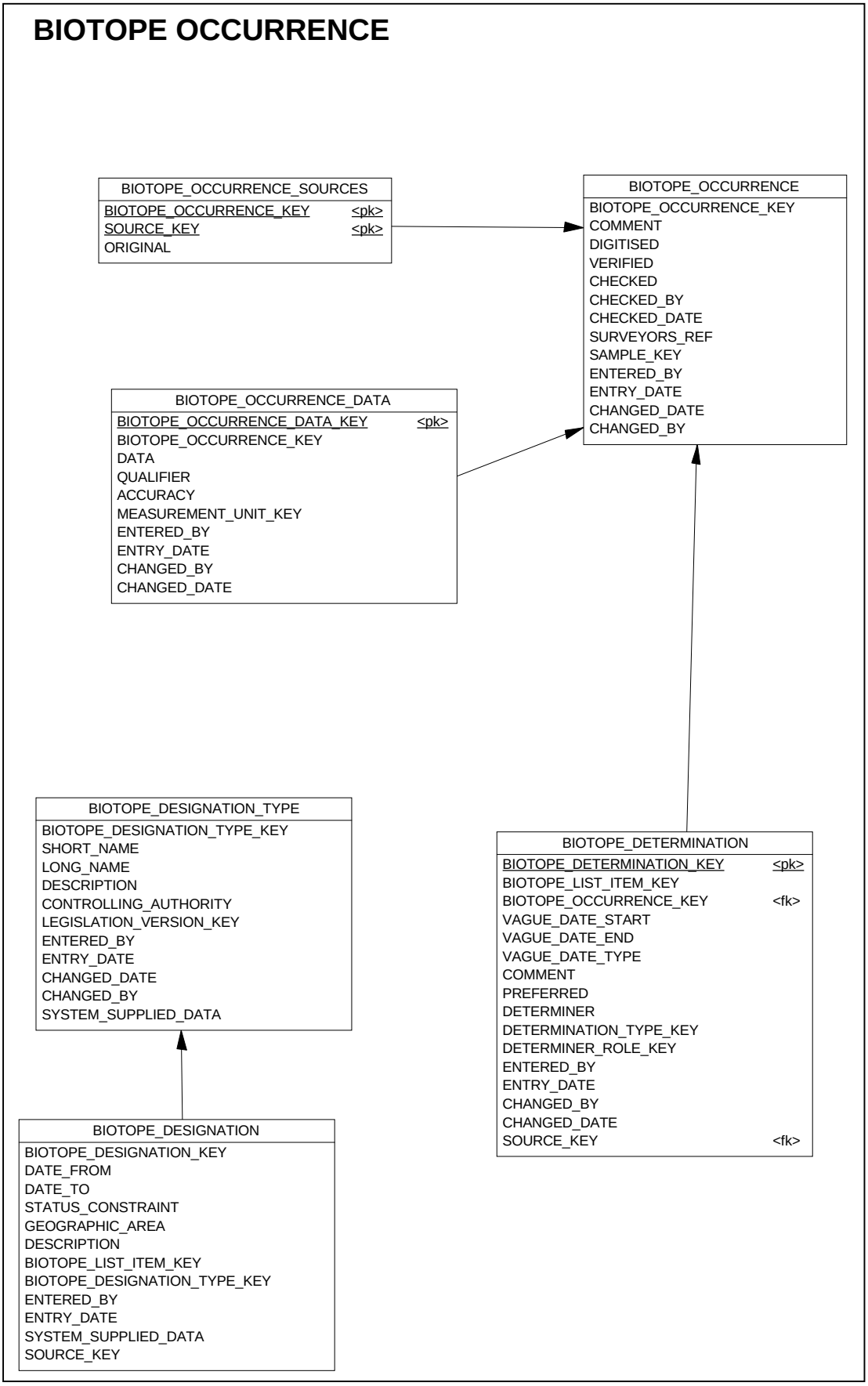
A4.5 Contacts



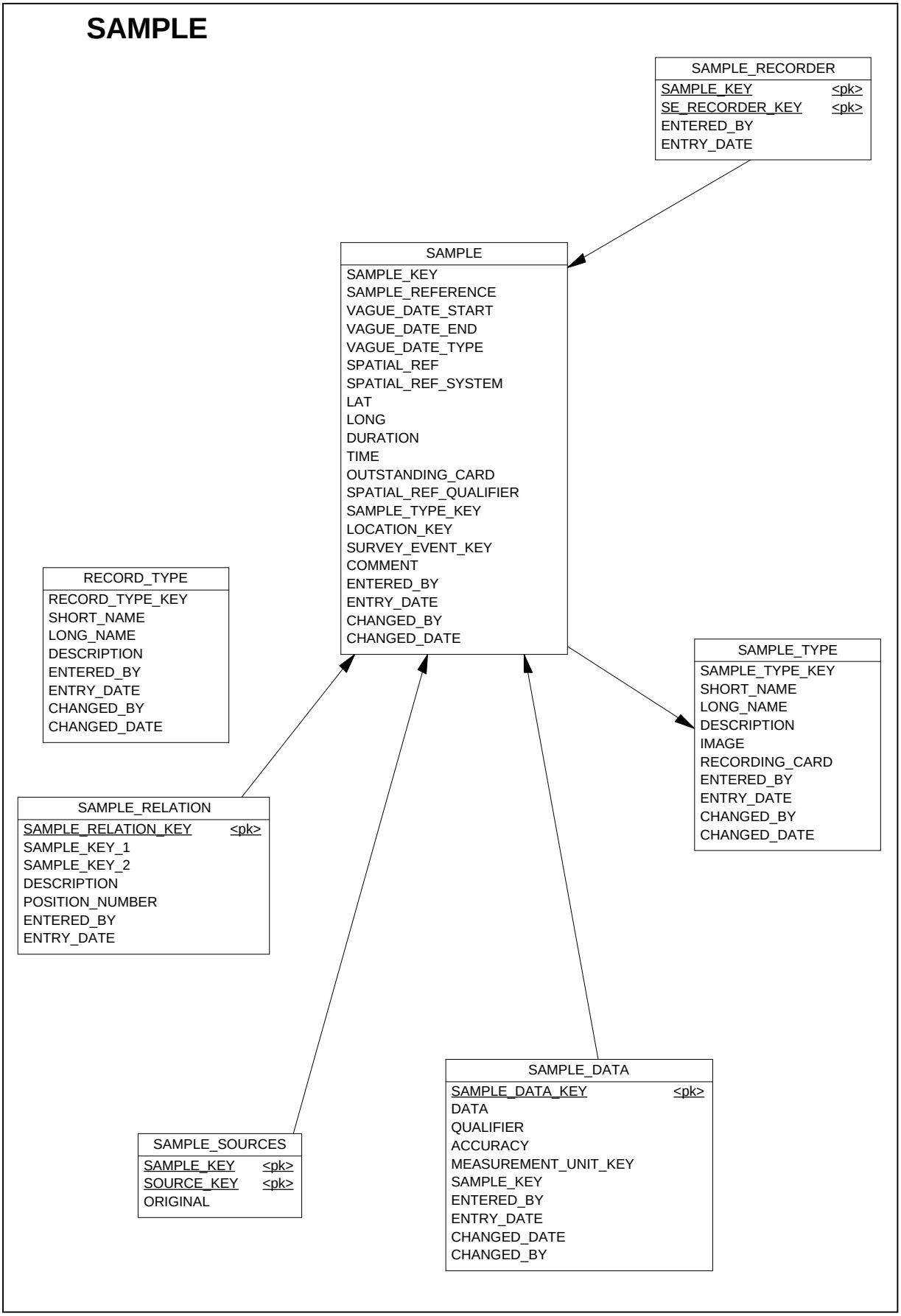
A4.6 Admin Areas



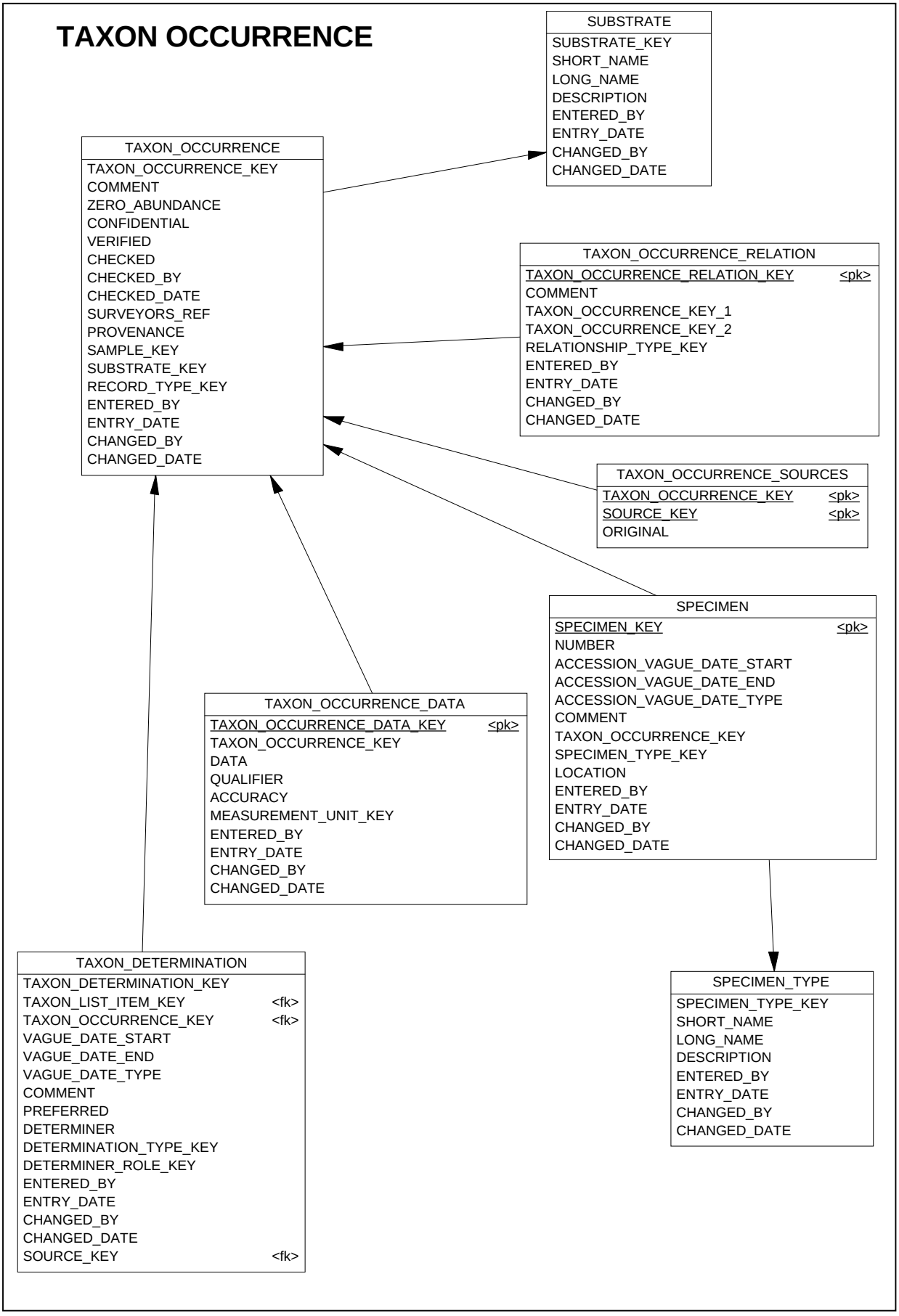
A4.7 Biotope Occurrences



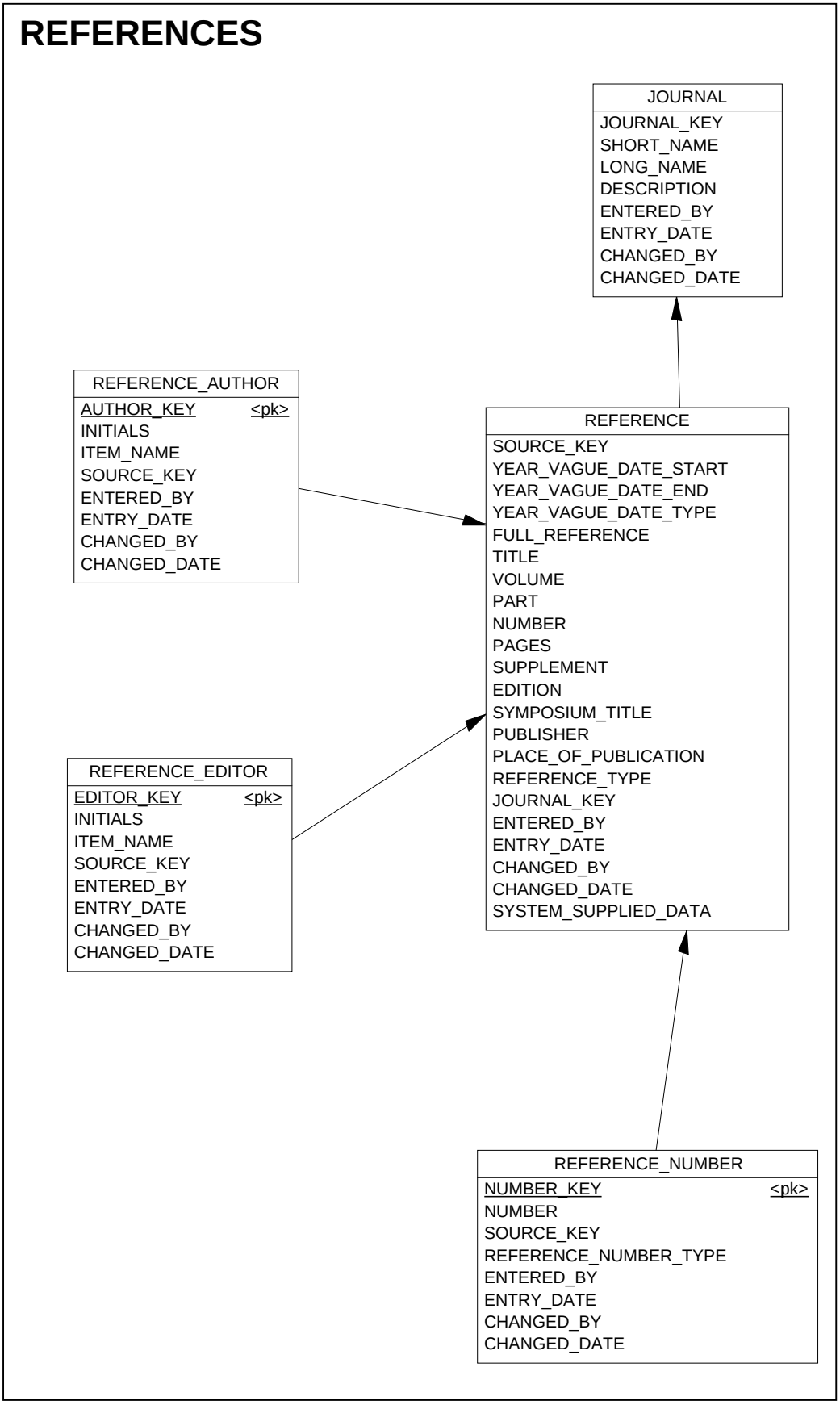
A4.8 Sample


SAMPLE
SAMPLE_RECORDER
SAMPLE_KEY <pk>
SE_RECORDER_KEY <pk>
ENTERED_BY
ENTRY_DATE
SAMPLE
SAMPLE_KEY
SAMPLE_REFERENCE
VAGUE_DATE_START
VAGUE_DATE_END
VAGUE_DATE_TYPE
SPATIAL_REF
SPATIAL_REF_SYSTEM
LAT
LONG
DURATION
TIME
OUTSTANDING_CARD
SPATIAL_REF_QUALIFIER
SAMPLE_TYPE_KEY
LOCATION_KEY
SURVEY_EVENT_KEY
COMMENT
ENTERED_BY
ENTRY_DATE
CHANGED_BY
CHANGED_DATE
RECORD_TYPE
RECORD_TYPE_KEY
SHORT_NAME
LONG_NAME
DESCRIPTION
ENTERED_BY
ENTRY_DATE
CHANGED_BY
CHANGED_DATE
SAMPLE_TYPE
SAMPLE_TYPE_KEY
SHORT_NAME
LONG_NAME
DESCRIPTION
IMAGE
RECORDING_CARD
ENTERED_BY
ENTRY_DATE
CHANGED_BY
CHANGED_DATE
SAMPLE_RELATION
SAMPLE_RELATION_KEY <pk>
SAMPLE_KEY_1
SAMPLE_KEY_2
DESCRIPTION
POSITION_NUMBER
ENTERED_BY
ENTRY_DATE
SAMPLE_SOURCES
SAMPLE_KEY <pk>
SOURCE_KEY <pk>
ORIGINAL
SAMPLE_DATA
SAMPLE_DATA_KEY <pk>
DATA
QUALIFIER
ACCURACY
MEASUREMENT_UNIT_KEY
SAMPLE_KEY
ENTERED_BY
ENTRY_DATE
CHANGED_DATE
CHANGED_BY

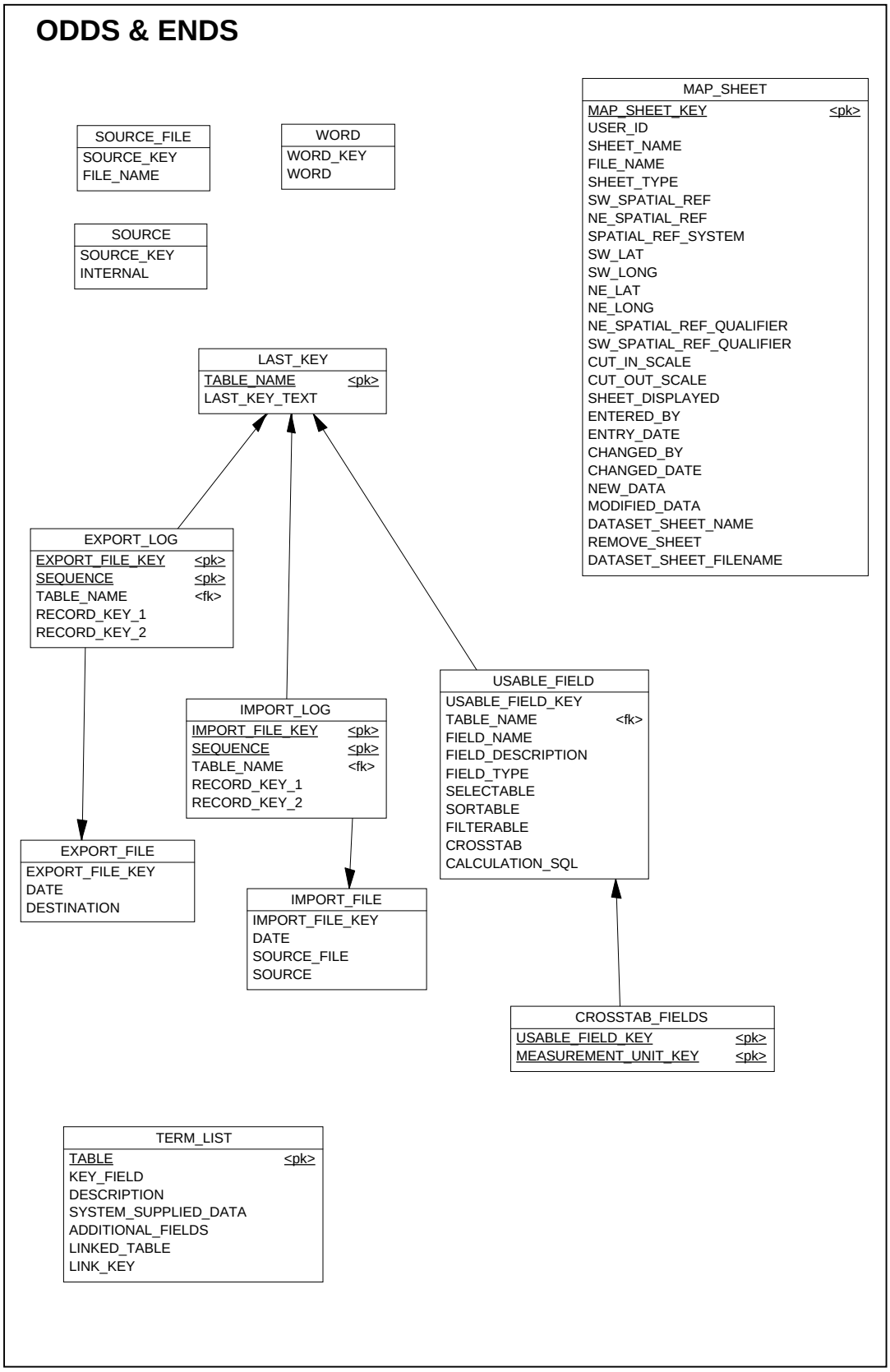
A4.9 Taxon Occurrences



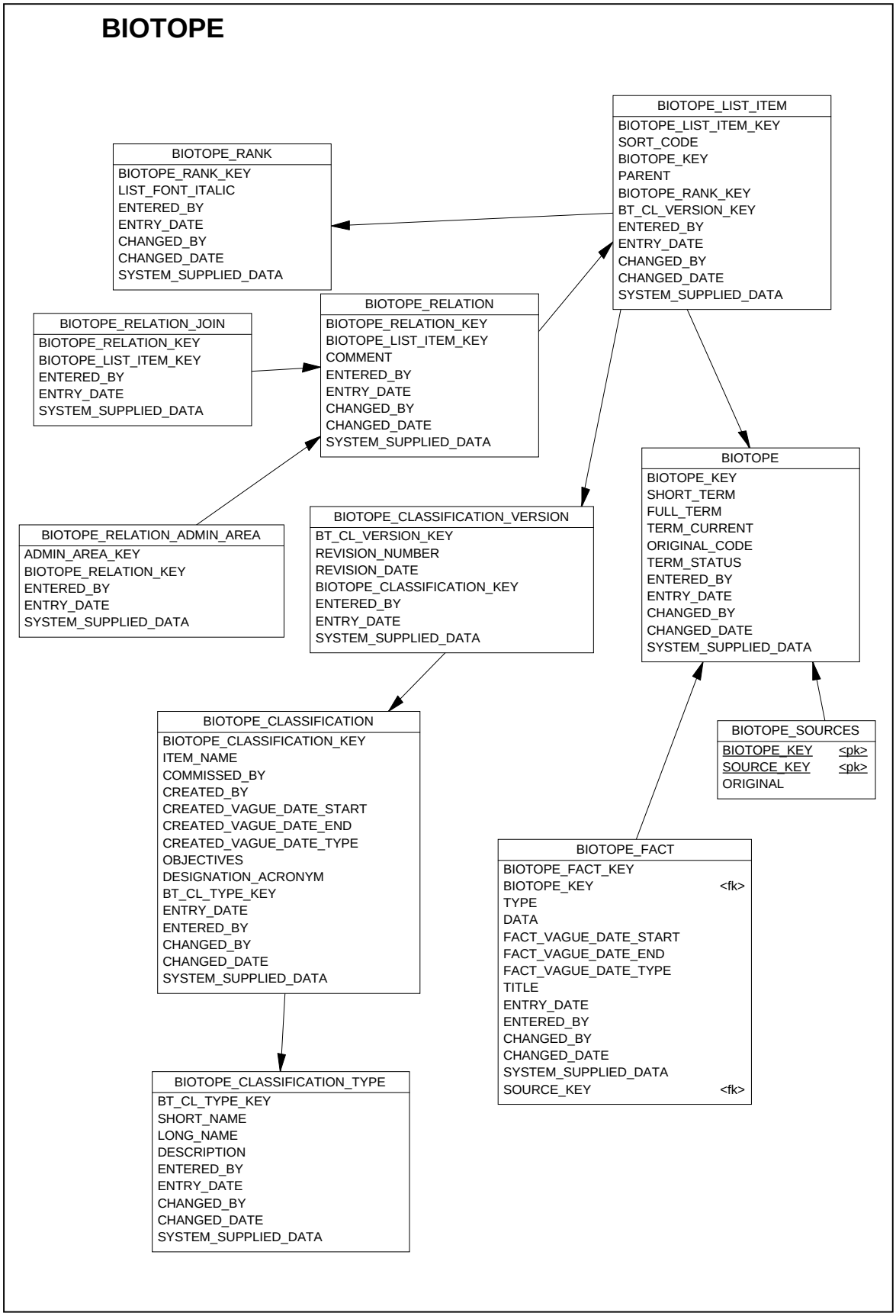
A4.10 References



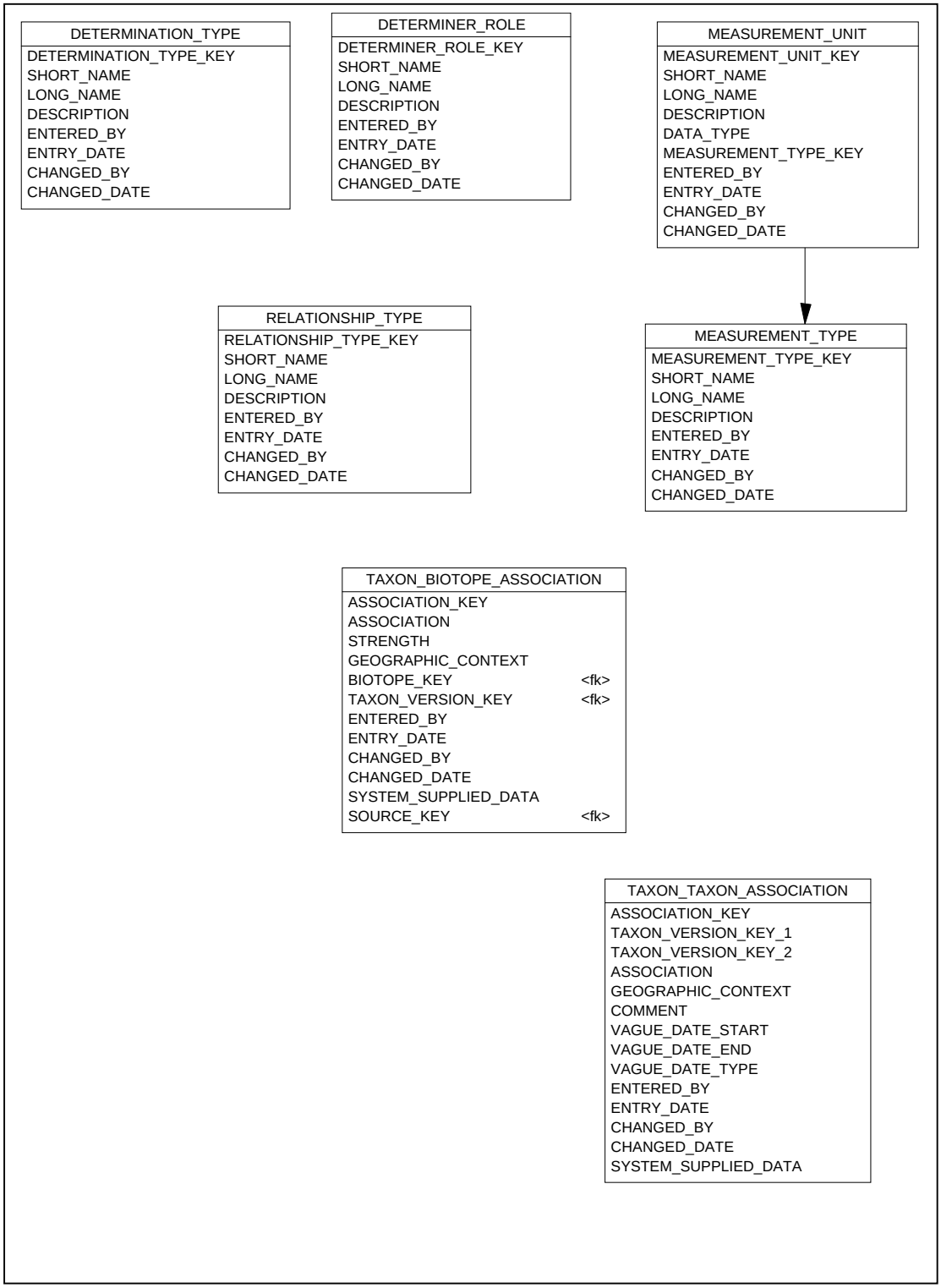
A4.11 Application specific tables



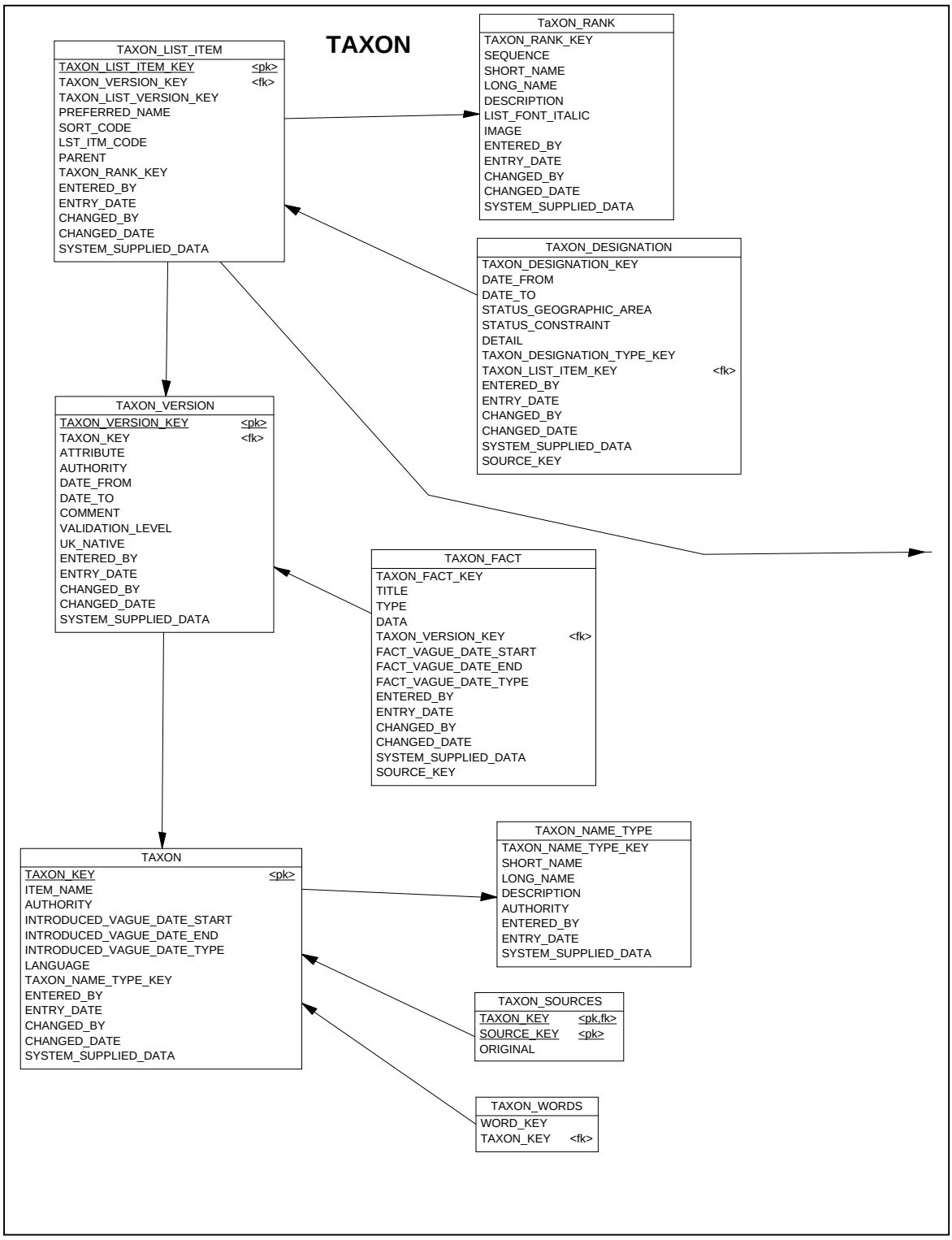
A4.12 Biotope Dictionary



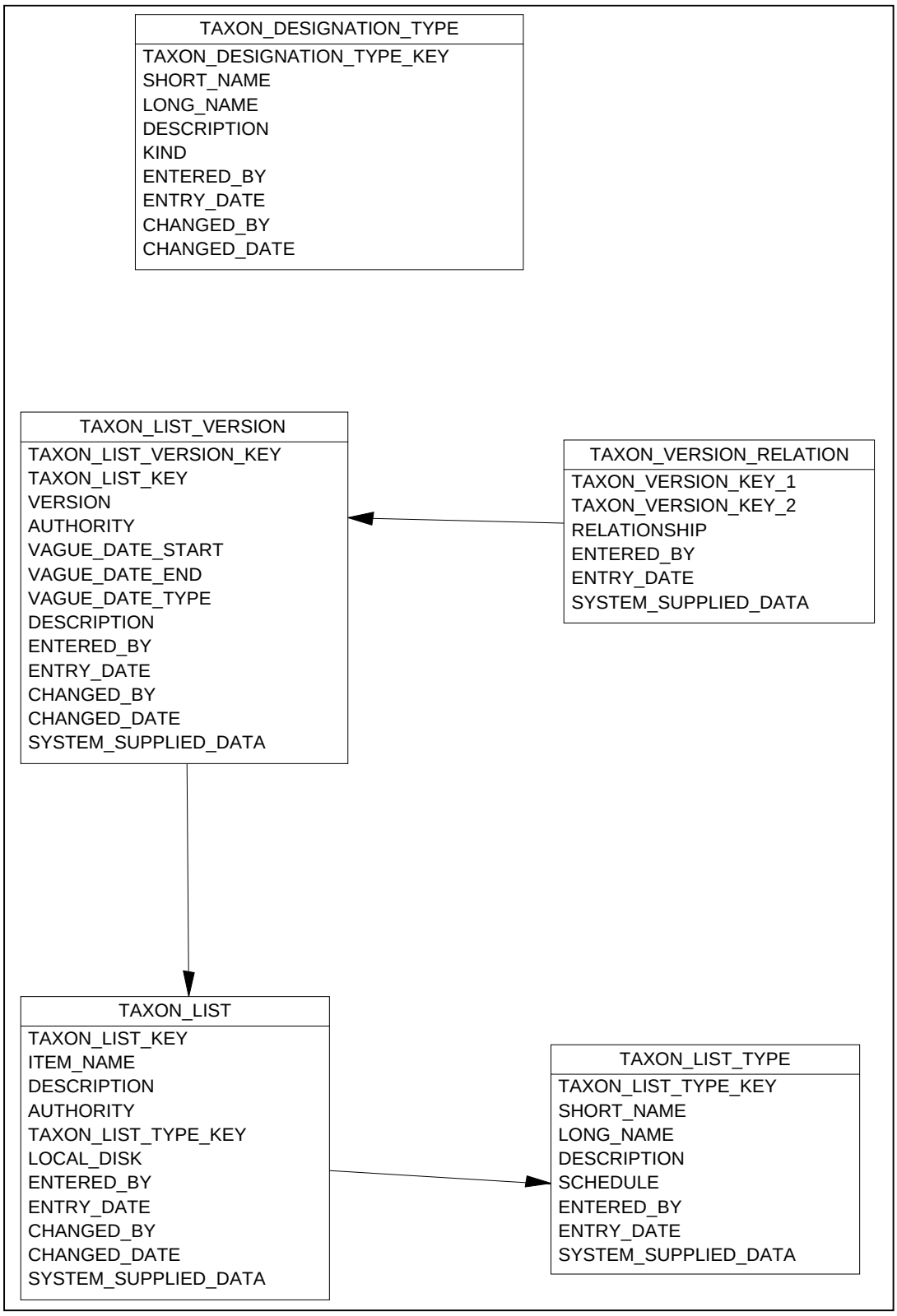
A4.13 Lookup Tables & Taxon Dictionary - Part



A4.14 Taxon Dictionary - Part



A4.15 Taxon Dictionary - Part



Annex 5: List of Tables and Fields in Recorder 2000

This annex lists the tables and fields used in the Recorder 2000 application. The Recorder 2000 database is based on the NBN logical model described in this paper and is very close to the example physical model published on the NBN website. The principal differences are application specific linked to optimisation of the Microsoft Access database or related to the function of forms and reporting programs. In the list below each table is referred to a module from the logical model where appropriate.

Table Name	Field Name	Type	Width
ADDRESS	**Contact Module**: Address table for people and organisations.		
	ADDRESS_KEY	Text	16
	ADDRESS_1	Text	40
	ADDRESS_2	Text	40
	ADDRESS_3	Text	30
	ADDRESS_4	Text	30
	ADDRESS_COUNTRY	Text	30
	ADDRESS_POSTCODE	Text	10
	FROM_VAGUE_DATE_START	Date/Time	8
	FROM_VAGUE_DATE_END	Date/Time	8
	FROM_VAGUE_DATE_TYPE	Text	2
	TO_VAGUE_DATE_START	Date/Time	8
	TO_VAGUE_DATE_END	Date/Time	8
	TO_VAGUE_DATE_TYPE	Text	2
	COMMENT	Memo	-
	PREFERRED	Yes/No	1
	WORK_ADDRESS	Yes/No	1
	NAME_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
ADMIN_AREA	**Admin. Dictionary:** Detail table for administrative and geographic areas		
	ADMIN_AREA_KEY	Text	16
	ITEM_NAME	Text	60
	ADMIN_TYPE_KEY	Text	16
	PARENT	Text	16
	SHORT_CODE	Text	10
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Text	50
	SYSTEM_SUPPLIED_DATA	Yes/No	1

ADMIN_AREA_SOURCES	**Admin. Dictionary:** Table for linking an administrative area to a source		
	SOURCE_LINK_KEY	Text	16
	ADMIN_AREA_KEY	Text	16
	SOURCE_KEY	Text	16
	ORIGINAL	Yes/No	1
ADMIN_BOUNDARY	**Admin. Dictionary:** Table holding basic details of an administraive boundary and a pointer to a file holding the boundary data		
	ADMIN_BOUNDARY_KEY	Text	16
	DATE_FROM	Date/Time	8
	DATE_TO	Date/Time	8
	MAP_FILE	Text	255
	OBJECT_ID	Number (Integer)	2
	AUTHORITY	Text	50
	ADMIN_AREA_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
ADMIN_RELATION	**Admin. Dictionary:** Relates administrative areas e.g. districts within a county		
	ADMIN_RELATION_KEY	Text	16
	ADMIN_AREA_KEY_1	Text	16
	ADMIN_AREA_KEY_2	Text	16
	RELATION_1_TO_2	Text	20
	RELATION_2_TO_1	Text	20
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
ADMIN_TYPE	**Admin. Dictionary:** List of administrative and geographic area types e.g. English County 1974		
	ADMIN_TYPE_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	AUTHORITY	Text	100
	DATE_FROM	Date/Time	8
	DATE_TO	Date/Time	8
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1

BIOTOPE	**Biotope Dictionary:** List of habitat/biotope names with original codes		
	BIOTOPE_KEY	Text	16
	SHORT_TERM	Text	60
	FULL_TERM	Text	200
	TERM_CURRENT	Yes/No	1
	ORIGINAL_CODE	Text	20
	TERM_STATUS	Text	10
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
BIOTOPE_CLASSIFICATION	**Biotope Dictionary:** List of habitat/biotope classifications		
	BIOTOPE_CLASSIFICATION_KEY	Text	16
	LONG_NAME	Text	200
	SHORT_NAME	Text	50
	COMMISSIONED_BY	Text	60
	CREATED_BY	Text	60
	CREATED_VAGUE_DATE_START	Date/Time	8
	CREATED_VAGUE_DATE_END	Date/Time	8
	CREATED_VAGUE_DATE_TYPE	Text	2
	OBJECTIVES	Memo	-
	DESIGNATION_ACRONYM	Text	20
	BT_CL_TYPE_KEY	Text	16
	ENTRY_DATE	Date/Time	8
	ENTERED_BY	Text	16
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
BIOTOPE_CLASSIFICATION_TYPE	**Biotope Dictionary:** Habitat classification type		
	BT_CL_TYPE_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
BIOTOPE_CLASSIFICATION _VERSION	**Biotope Dictionary:** Version number and dates for habitat/biotope classifications (some lists may be revised many times)		
	BT_CL_VERSION_KEY	Text	16
	REVISION_NUMBER	Number (Integer)	2

	REVISION_DATE	Date/Time	8
	BIOTOPE_CLASSIFICATION_KEY	Text	16
	VERSION_IS_AMENDMENT	Yes/No	1
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
BIOTOPE_DESIGNATION	**Biotope Dictionary:** Links a habitat/biotope in a list to a statutory or non-statutory conservation designation		
	BIOTOPE_DESIGNATION_KEY	Text	16
	DATE_FROM	Date/Time	8
	DATE_TO	Date/Time	8
	STATUS_CONSTRAINT	Memo	-
	STATUS_GEOGRAPHIC_AREA	Memo	-
	DESCRIPTION	Memo	-
	BIOTOPE_LIST_ITEM_KEY	Text	16
	BIOTOPE_DESIGNATION_TYPE_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
	SOURCE_KEY	Text	16
BIOTOPE_DESIGNATION_TYPE	**Biotope Dictionary:** Type of statutory or non-statutory designations for habitats/biotopes		
	BIOTOPE_DESIGNATION_TYPE_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	CONTROLLING_AUTHORITY	Text	50
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_DATE	Date/Time	8
	CHANGED_BY	Text	16
	SYSTEM_SUPPLIED_DATA	Yes/No	1
BIOTOPE_DETERMINATION	**Survey Module - Biotope Occurrences:** Table for storing determinations of a habitat or biotope linked to a biotope occurrence record		
	BIOTOPE_DETERMINATION_KEY	Text	16
	BIOTOPE_LIST_ITEM_KEY	Text	16
	BIOTOPE_OCCURRENCE_KEY	Text	16
	VAGUE_DATE_START	Date/Time	8
	VAGUE_DATE_END	Date/Time	8
	VAGUE_DATE_TYPE	Text	2
	COMMENT	Memo	-
	PREFERRED	Yes/No	1
	DETERMINER	Text	16

	DETERMINATION_TYPE_KEY	Text	16
	DETERMINER_ROLE_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SOURCE_KEY	Text	16
BIOTOPE_FACT	**Biotope Dictionary:** Table holding facts relating to a habitat/biotope in the BIOTOPE table. Facts are stored as an HTML string which is displayed in an HTML window on the biotope dictionary form.		
	BIOTOPE_FACT_KEY	Text	16
	BIOTOPE_KEY	Text	16
	TYPE	Text	1
	DATA	Memo	-
	FACT_VAGUE_DATE_START	Date/Time	8
	FACT_VAGUE_DATE_END	Date/Time	8
	FACT_VAGUE_DATE_TYPE	Text	2
	TITLE	Text	50
	ENTRY_DATE	Date/Time	8
	ENTERED_BY	Text	16
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
	SOURCE_KEY	Text	16
BIOTOPE_LIST_ITEM	**Biotope Dictionary:** Links individual biotopes to a biotope list version. Includes a sort key for non-alphabetic sorting (i.e. to match original list order)		
	BIOTOPE_LIST_ITEM_KEY	Text	16
	SORT_CODE	Number (Integer)	2
	BIOTOPE_KEY	Text	16
	PARENT	Text	16
	BT_CL_VERSION_KEY	Text	16
	BT_CL_VERSION_TO	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
BIOTOPE_OCCURRENCE	**Survey Module - Biotope Occurrences:** Details of a biotope record linked to a sample		
	BIOTOPE_OCCURRENCE_KEY	Text	16
	COMMENT	Memo	-
	DIGITISED	Yes/No	1
	VERIFIED	Number (Byte)	1
	CHECKED	Yes/No	1
	CHECKED_BY	Text	16
	CHECKED_DATE	Date/Time	8

	SURVEYORS_REF	Text	30
	SAMPLE_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_DATE	Date/Time	8
	CHANGED_BY	Text	16
BIOTOPE_OCCURRENCE_DATA	**Survey Module - Biotope Occurrences:** Measurements linked to a biotope record (e.g. area of habitat or height of sward)		
	BIOTOPE_OCCURRENCE_DATA_KEY	Text	16
	BIOTOPE_OCCURRENCE_KEY	Text	16
	DATA	Text	10
	QUALIFIER	Text	20
	ACCURACY	Text	10
	MEASUREMENT_UNIT_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
BIOTOPE_OCCURRENCE_SOURCES	**Survey Module - Biotope Occurrences:** link to references etc. for biotope records		
	SOURCE_LINK_KEY	Text	16
	BIOTOPE_OCCURRENCE_KEY	Text	16
	SOURCE_KEY	Text	16
	ORIGINAL	Yes/No	1
BIOTOPE_RELATION	**Biotope Dictinary** Table to link habitats to theirequivalents inother classifications		
	BIOTOPE_RELATION_KEY	Text	16
	BIOTOPE_LIST_ITEM_KEY	Text	16
	COMMENT	Memo	-
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
BIOTOPE_RELATION_ADMIN_AREA	**Biotope Dictionary** links habitat equivalentsto geographic or administrative aeas for which they are valid.		
	ADMIN_AREA_KEY	Text	16
	BIOTOPE_RELATION_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1

BIOTOPE_RELATION_JOIN	**Biotope Dictionary** List of habitats that are equivalent to a single habitat in Habitats relations. (e.g. 1 Birks & Ratcliffe habitat might map to 3 NVC habitas in different percentages.)		
	BIOTOPE_RELATION_KEY	Text	16
	BIOTOPE_LIST_ITEM_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
BIOTOPE_SOURCES	**Biotope Dictionary** Table to link references to Biotope names		
	SOURCE_LINK_KEY	Text	16
	BIOTOPE_KEY	Text	16
	SOURCE_KEY	Text	16
	ORIGINAL	Yes/No	1
COMMUNICATION	**Contacts Module**: Record of communications with and between people and/or organisations		
	COMMUNICATION_KEY	Text	16
	CONTENT	Memo	-
	FILE_REF	Text	20
	NAME_KEY_1	Text	16
	NAME_KEY_2	Text	16
	COMMUNICATION_TYPE	Text	20
	VAGUE_DATE_START	Date/Time	8
	VAGUE_DATE_END	Date/Time	8
	VAGUE_DATE_TYPE	Text	2
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
CONTACT_NUMBER	**Contacts Module**: Communications numbers (telephone, email, fax etc.) for people and/or organisations		
	CONTACT_NUMBER_KEY	Text	16
	PREFIX	Text	10
	NUMBER	Text	30
	PREFERRED	Yes/No	1
	CONSTRAINTS	Memo	-
	NAME_KEY	Text	16
	CONTACT_NUMBER_TYPE	Text	20
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
CROSSTAB_FIELDS	Recorder 2000 implementation specific table		
	USABLE_FIELD_KEY	Text	16

	MEASUREMENT_UNIT_KEY	Text	16
DAMAGE_OCCURRENCE	**Location Module – Feature sub-module**: Record of damage to a feature		
	DAMAGE_OCCURRENCE_KEY	Text	16
	COMMENT	Memo	-
	VAGUE_DATE_START	Date/Time	8
	VAGUE_DATE_END	Date/Time	8
	VAGUE_DATE_TYPE	Text	2
	LOCATION_FEATURE_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
DETERMINATION_TYPE	**Survey Module – Taxon Occurrence**: Lookup table for type of redetermination applied to a taxon record (e.g. confirmation, correction, revision etc.)		
	DETERMINATION_TYPE_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
DETERMINER_ROLE	**Survey Module – Taxon Occurrence**: Lookup table for type of authority applying a redetermination to a taxon.		
	DETERMINER_ROLE_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	VALIDATION_COMPETENCY	Number (Byte)	1
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
DTD_FRAGMENT	Recorder 2000 implementation specific table related to data transfer		
	ADDIN_CLSID	Text	50
	TEXT	Memo	-
GRID_SQUARE	**Location Module**: List of grid square associated with a site used for text based validation and geographic sorting		

	GRID_SQUARE_KEY	Text	16
	SPATIAL_REF	Text	20
	LOCATION_KEY	Text	16
	SPATIAL_REF_SYSTEM	Text	4
	SPATIAL_REF_QUALIFIER	Text	20
	SIZE	Number (Long)	4
	LAT	Number (Double)	8
	LONG	Number (Double)	8
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
INDIVIDUAL	**Contacts Module**: subtype table of Name with attributes specific to individuals		
	NAME_KEY	Text	16
	TITLE	Text	4
	FORENAME	Text	20
	INITIALS	Text	8
	HONORIFICS	Text	20
	SURNAME	Text	30
	COMMENT	Memo	-
	BORN_VAGUE_DATE_START	Date/Time	8
	BORN_VAGUE_DATE_END	Date/Time	8
	BORN_VAGUE_DATE_TYPE	Text	2
	DIED_VAGUE_DATE_START	Date/Time	8
	DIED_VAGUE_DATE_END	Date/Time	8
	DIED_VAGUE_DATE_TYPE	Text	2
	PERSON_FLOREAT	Text	12
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
JOURNAL	**References Module**: Lookup table (user editable) with list of periodicals and journals		
	JOURNAL_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
LAND_PARCEL	**Location Module**: Land parcels identified by parcel codes linked to a site		
	LAND_PARCEL_KEY	Text	16

	LOCATION_KEY	Text	16
	LAND_PARCEL_NUMBER	Text	20
	LAND_PARCEL_MAP_SHEET	Text	30
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
LAST_KEY	Recorder 2000 application specific table keeps track of keys used in tables		
	TABLE_NAME	Text	30
	LAST_KEY_TEXT	Text	8
LOCATION	**Location Module:** Table holding basic site details		
	LOCATION_KEY	Text	16
	DESCRIPTION	Memo	-
	PARENT_KEY	Text	16
	SPATIAL_REF	Text	20
	SPATIAL_REF_SYSTEM	Text	4
	LAT	Number (Double)	8
	LONG	Number (Double)	8
	LOCATION_TYPE_KEY	Text	16
	FILE_CODE	Text	20
	SPATIAL_REF_QUALIFIER	Text	20
	APPROACH	Memo	-
	RESTRICTION	Memo	-
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
LOCATION_ADMIN_AREAS	**Location Module**: List of administrative and geographic areas associated with a site. Used for text based retrieval and sorting.		
	LOCATION_ADMIN_AREAS_KEY	Text	16
	ADMIN_AREA_KEY	Text	16
	LOCATION_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
LOCATION_BOUNDARY	**Location Module**: Details of boundaries linked to a site with pointers to actual digitised boundaries for use in map module or GIS		
	LOCATION_BOUNDARY_KEY	Text	16
	LOCATION_KEY	Text	16
	FROM_VAGUE_DATE_START	Date/Time	8
	FROM_VAGUE_DATE_END	Date/Time	8
	FROM_VAGUE_DATE_TYPE	Text	2

	TO_VAGUE_DATE_START	Date/Time	8
	TO_VAGUE_DATE_END	Date/Time	8
	TO_VAGUE_DATE_TYPE	Text	2
	VERSION	Number (Integer)	2
	MAP_FILE	Text	50
	OBJECT_ID	Number (Integer)	2
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
LOCATION_DATA	**Location Module:** Measurements associated with a site e.g. area, altitude, slope etc.		
	LOCATION_DATA_KEY	Text	16
	DATA	Text	10
	QUALIFIER	Text	20
	ACCURACY	Text	10
	LOCATION_KEY	Text	16
	MEASUREMENT_UNIT_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
LOCATION_DESIGNATION	**Location Module**: Protected status linked to a site (e.g. SSSI, SAC, LNR etc.)		
	DESIGNATION_KEY	Text	16
	LOCATION_KEY	Text	16
	SITE_STATUS_KEY	Text	16
	REF_CODE	Text	20
	AUTHORITY	Text	16
	DATE_FROM	Date/Time	8
	DATE_TO	Date/Time	8
	COMMENT	Memo	-
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
LOCATION_FEATURE	**Location Module** – Feature submodel: Any feature of interest (e.g. biological, physical or historical) linked to a site about which descriptions may be stored or management aims set together with monitoring records.		
	LOCATION_FEATURE_KEY	Text	16
	ITEM_NAME	Text	60
	COMMENT	Memo	-
	LOCATION_KEY	Text	16

	FEATURE_GRADING_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
LOCATION_FEATURE_GRADING	**Location Module** – Feature submodel: Formal or informal gradings or classification codes that might be applied to a location feature (e.g. educational use potential for a geological feature)		
	FEATURE_GRADING_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	LOCATION_FEATURE_TYPE_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
LOCATION_FEATURE_SOURCES	**Location Module** – Feature submodel: link to references		
	SOURCE_LINK_KEY	Text	16
	LOCATION_FEATURE_KEY	Text	16
	SOURCE_KEY	Text	16
	ORIGINAL	Yes/No	1
LOCATION_FEATURE_TYPE	**Location Module** – Feature submodel: User editable lookup table for grouping types of feature (e.g. biological, geological, hydrological, historical etc.)		
	LOCATION_FEATURE_TYPE_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
LOCATION_NAME	**Location Module** – A site may have many names applied to it (e.g. historical names and current alternative names):		
	LOCATION_NAME_KEY	Text	16
	ITEM_NAME	Text	100
	PREFERRED	Yes/No	1
	LOCATION_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16

	CHANGED_DATE	Date/Time	8
LOCATION_RELATION	**Location Module** – A site may be related to any number of other sites either in a site-subsite relationship or through some other linkage (e.g. a site cluster)		
	LOCATION_RELATION_KEY	Text	16
	LOCATION_KEY_1	Text	16
	LOCATION_KEY_2	Text	16
	RELATIONSHIP	Text	50
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
LOCATION_SOURCES	**Location Module** – Links a site to references, documents and images		
	SOURCE_LINK_KEY	Text	16
	LOCATION_KEY	Text	16
	SOURCE_KEY	Text	50
	ORIGINAL	Yes/No	1
LOCATION_TYPE	**Location Module** – user editable lookup table for classifying sites (e.g recognised list of survey sites, butterfly monitoring sites etc.)		
	LOCATION_TYPE_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Text	200
	AUTHORITY	Text	100
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
LOCATION_USE	**Location Module** – enables the recording of uses and potential uses for sites (e.g. motorbike scrambling or potential reserve)		
	LOCATION_USE_KEY	Text	16
	LOCATION_KEY	Text	16
	LOCATION_USE	Text	30
	POTENTIAL	Memo	-
	FROM_VAGUE_DATE_START	Date/Time	8
	FROM_VAGUE_DATE_END	Date/Time	8
	FROM_VAGUE_DATE_TYPE	Text	2
	TO_VAGUE_DATE_START	Date/Time	8
	TO_VAGUE_DATE_END	Date/Time	8
	TO_VAGUE_DATE_TYPE	Text	2
	COMMENT	Memo	-

	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
MANAGEMENT_AIM	**Location Module** – Feature submodel: Allow user to link management aims to a feature (e.g. maintain level of population or control scrub invasion)		
	MANAGEMENT_AIM_KEY	Text	16
	LOCATION_FEATURE_KEY	Text	16
	ITEM_NAME	Text	50
	DESCRIPTION	Memo	-
	AUTHORITY	Text	16
	NEXT_APPRAISAL_DATE	Text	50
	AGREEMENT_DATE	Date/Time	8
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
MAP_SHEET	**Location Module**: Reference to maps which include the site – used in Recorder 2000 map module		
	MAP_SHEET_KEY	Text	16
	USER_ID	Text	16
	SHEET_NAME	Text	20
	FILE_NAME	Text	255
	SHEET_TYPE	Number (Byte)	1
	SW_SPATIAL_REF	Text	20
	NE_SPATIAL_REF	Text	20
	SPATIAL_REF_SYSTEM	Text	4
	SW_LAT	Number (Double)	8
	SW_LONG	Number (Double)	8
	NE_LAT	Number (Double)	8
	NE_LONG	Number (Double)	8
	NE_SPATIAL_REF_QUALIFIER	Text	20
	SW_SPATIAL_REF_QUALIFIER	Text	20
	CUT_IN_SCALE	Text	15
	CUT_OUT_SCALE	Text	15
	SHEET_DISPLAYED	Yes/No	1
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	NEW_DATA	Yes/No	1
	MODIFIED_DATA	Yes/No	1
	DATASET_SHEET_NAME	Text	50
	REMOVE_SHEET	Yes/No	1
	DATASET_SHEET_FILENAME	Text	255
MEASUREMENT_TYPE	Lookup table for classifying measurement units		

	MEASUREMENT_TYPE_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Text	50
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
MEASUREMENT_UNIT	Lookup table for units used in measurements (e.g. hectares, feet etc.)		
	MEASUREMENT_UNIT_KEY	Text	16
	SHORT_NAME	Text	40
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	DATA_TYPE	Text	1
	MEASUREMENT_TYPE_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
NAME	**Contacts Module**: central table of the contacts module, holds name and basic details of people and organisations.		
	NAME_KEY	Text	16
	ORGANISATION	Yes/No	1
	COMMENT	Memo	-
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
NAME_RELATION	**Contacts Module**: allows the recording of links between names such as people with organisations (e.g. recorders associated with a survey, staff of an LRC etc.)		
	NAME_RELATION_KEY	Text	16
	NAME_KEY_1	Text	16
	NAME_KEY_2	Text	16
	COMMENT	Memo	-
	FROM_VAGUE_DATE_START	Date/Time	8
	FROM_VAGUE_DATE_END	Date/Time	8
	FROM_VAGUE_DATE_TYPE	Text	2
	TO_VAGUE_DATE_START	Date/Time	8
	TO_VAGUE_DATE_END	Date/Time	8
	TO_VAGUE_DATE_TYPE	Text	2
	ROLE	Text	30

	NAME_CODE	Text	15
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
NAME_SOURCES	**Contacts Module**: links name details to references or other sources		
	SOURCE_LINK_KEY	Text	16
	NAME_KEY	Text	16
	SOURCE_KEY	Text	16
	ORIGINAL	Yes/No	1
ORGANISATION	**Contacts Module**: subtype table of Name which holds details of organisations and similar groups (e.g. survey projects)		
	NAME_KEY	Text	16
	FULL_NAME	Text	60
	ACRONYM	Text	10
	FOUNDED_VAGUE_DATE_START	Date/Time	8
	FOUNDED_VAGUE_DATE_END	Date/Time	8
	FOUNDED_VAGUE_DATE_TYPE	Text	2
	ENDED_VAGUE_DATE_START	Date/Time	8
	ENDED_VAGUE_DATE_END	Date/Time	8
	ENDED_VAGUE_DATE_TYPE	Text	2
	COMMENT	Memo	-
	ORGANISATION_TYPE_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
ORGANISATION_TYPE	**Contacts Module:** lookup table for classifying organisation types (e.g. LRCs, Surveys etc.)		
	ORGANISATION_TYPE_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
POTENTIAL_THREAT	**Location Module** – Feature submodule: allows the recording of perceived threats associated with a location feature. It can include statutory lists of 'potentially damaging operations (PDOs).		
	POTENTIAL_THREAT_KEY	Text	16
	COMMENT	Memo	-

	THREAT	Text	60
	THREAT_TYPE_KEY	Text	16
	LOCATION_FEATURE_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
PREFERRED_LINKS	Recorder 2000 application specific table used in report program		
	TABLE_NAME	Text	50
	PREFERRED_FIELD	Text	50
RECORD_TYPE	**Survey Module**: Lookup table providing list of record types (e.g. field record, bone, trapped etc.)		
	RECORD_TYPE_KEY	Text	16
	SHORT_NAME	Text	40
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
RECORDER_ROLE	**Survey Module**: Table linked to survey event recorder listing the roles of individuals participating in the event (e.g. surveyor, entomologist etc.)		
	RECORDER_ROLE_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
REFERENCE	**Reference Module** (part f Source Module): Details of published and manuscript references.		
	SOURCE_KEY	Text	16
	YEAR_VAGUE_DATE_START	Date/Time	8
	YEAR_VAGUE_DATE_END	Date/Time	8
	YEAR_VAGUE_DATE_TYPE	Text	2
	FULL_REFERENCE	Memo	-
	TITLE	Memo	-
	VOLUME	Number (Integer)	2
	PART	Number (Integer)	2
	NUMBER	Number (Integer)	2
	PAGES	Text	20

	SUPPLEMENT	Text	50
	EDITION	Text	10
	SYMPOSIUM_TITLE	Text	50
	PUBLISHER	Text	50
	PLACE_OF_PUBLICATION	Text	50
	REFERENCE_TYPE	Text	25
	JOURNAL_KEY	Text	16
	ORIGINAL_FILE	Memo	-
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
REFERENCE_AUTHOR	**Reference Module** : Table linked to Reference for storing reference author names. References may have several authors.		
	AUTHOR_KEY	Text	16
	INITIALS	Text	8
	ITEM_NAME	Text	50
	SOURCE_KEY	Text	16
	SORT_ORDER	Number (Integer)	2
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
REFERENCE_EDITOR	**Reference Module** : Table linked to Reference for storing reference editor names. References may have several editors.		
	EDITOR_KEY	Text	16
	INITIALS	Text	8
	ITEM_NAME	Text	50
	SOURCE_KEY	Text	16
	SORT_ORDER	Number (Integer)	2
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
REFERENCE_NUMBER	**Reference Module** : Table linked to Reference for storing reference classification numbers References may have several numbers.		
	NUMBER_KEY	Text	16
	NUMBER	Text	20
	SOURCE_KEY	Text	16
	REFERENCE_NUMBER_TYPE	Text	20
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8

RELATIONSHIP_TYPE	**Survey Module:** User editable lookup table listing possible relationships between species for taxon occurrence relation records (e.g. parasite, predator etc.)		
	RELATIONSHIP_TYPE_KEY	Text	16
	SHORT_NAME	Text	40
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
SAMPLE	**Survey Module:** Table holding details that link a set of observations within a single survey event. E.g. one of a set of quadrats taken on a site in one day.		
	SAMPLE_KEY	Text	16
	SAMPLE_REFERENCE	Text	15
	VAGUE_DATE_START	Date/Time	8
	VAGUE_DATE_END	Date/Time	8
	VAGUE_DATE_TYPE	Text	2
	SPATIAL_REF	Text	20
	SPATIAL_REF_SYSTEM	Text	4
	LAT	Number (Double)	8
	LONG	Number (Double)	8
	DURATION	Text	20
	TIME	Date/Time	8
	OUTSTANDING_CARD	Number (Byte)	1
	SPATIAL_REF_QUALIFIER	Text	20
	SAMPLE_TYPE_KEY	Text	16
	LOCATION_KEY	Text	16
	SURVEY_EVENT_KEY	Text	16
	COMMENT	Memo	-
	RECORDERS	Text	255
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
SAMPLE_DATA	**Survey Module:** Table linking measurements to a sample (e.g. area of sample, soil PH etc.)		
	SAMPLE_DATA_KEY	Text	16
	DATA	Text	10
	QUALIFIER	Text	20
	ACCURACY	Text	10
	MEASUREMENT_UNIT_KEY	Text	16
	SAMPLE_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8

	CHANGED_DATE	Date/Time	8
	CHANGED_BY	Text	16
SAMPLE_RECORDER	**Survey Module:** The actual recorder or recorders of a sample selected from the list in survey event recorders.		
	SAMPLE_KEY	Text	16
	SE_RECORDER_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
SAMPLE_RELATION	**Survey Module:** Samples can be related in various ways e.g. as points on a transect, as traps in a trap line, or repeated samples from a fixed quadrat.		
	SAMPLE_RELATION_KEY	Text	16
	SAMPLE_KEY_1	Text	16
	SAMPLE_KEY_2	Text	16
	DESCRIPTION	Text	16
	POSITION_NUMBER	Number (Integer)	2
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
SAMPLE_SOURCES	**Survey Module:** Links a sample to references and other sources		
	SOURCE_LINK_KEY	Text	16
	SAMPLE_KEY	Text	16
	SOURCE_KEY	Text	16
	ORIGINAL	Yes/No	1
SAMPLE_TYPE	**Survey Module:** User editable lookup table listing sample types e.g. Pitfall trap, Field Observation etc.		
	SAMPLE_TYPE_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	IMAGE	OLE Object	-
	RECORDING_CARD	Text	255
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
SITE_STATUS	**Location Module:** User editable lookup table listing designation status types for linking to sites (e.g. Ancient Monument, RIGS,LNR etc.)		
	SITE_STATUS_KEY	Text	16
	SHORT_NAME	Text	40
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-

	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
SOURCE	**Source Module**: Holds pointers to various types of source (e.g. references, documents, images etc,)		
	SOURCE_KEY	Text	16
	INTERNAL	Yes/No	1
SOURCE_FILE	**Source Module**: Holds a pointer to a disk file used as a source (e.g. a wordprocessor document) that can be linked to a record and displayed by the application.		
	SOURCE_KEY	Text	16
	FILE_NAME	Text	255
SPECIAL_XML_ELEMENT	Recorder 2000 application specific table used in data exchange (import/export)		
	NAME	Text	50
	TYPE	Text	1
	DATA	Memo	-
SPECIMEN	**Survey Module:** Specimen sub-module. In Recorder 2000 specimens can be linked to taxon occurrences – e.g. contents of a pitfall trap awaiting identification, voucher specimens of critical species etc.		
	SPECIMEN_KEY	Text	16
	NUMBER	Text	10
	ACCESSION_VAGUE_DATE_START	Date/Time	8
	ACCESSION_VAGUE_DATE_END	Date/Time	8
	ACCESSION_VAGUE_DATE_TYPE	Text	2
	COMMENT	Memo	-
	TAXON_OCCURRENCE_KEY	Text	16
	SPECIMEN_TYPE_KEY	Text	16
	LOCATION	Text	100
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
SPECIMEN_TYPE	**Survey Module:** Specimen sub-module. User editable lookup table listing specimen types e.g. bird pellet, nest, mounted skin etc.		
	SPECIMEN_TYPE_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8

	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
SUBSTRATE	**Survey Module:** User editable lookup table linked to taxon occurrence listing substrate types e.g. leaf litter, soil etc.		
	SUBSTRATE_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
SURVEY	**Survey Module:** A key table in the survey module, which links together all events and samples that have a common organisation, purpose and method. Surveys may be general (e.g. my life bird list) or specific (e.g. Flora of Avon Project).		
	SURVEY_KEY	Text	16
	ITEM_NAME	Text	100
	DESCRIPTION	Memo	-
	FROM_VAGUE_DATE_START	Date/Time	8
	FROM_VAGUE_DATE_END	Date/Time	8
	FROM_VAGUE_DATE_TYPE	Text	2
	TO_VAGUE_DATE_START	Date/Time	8
	TO_VAGUE_DATE_END	Date/Time	8
	TO_VAGUE_DATE_TYPE	Text	2
	SW_SPATIAL_REF	Text	20
	NE_SPATIAL_REF	Text	20
	SPATIAL_REF_SYSTEM	Text	4
	SW_LAT	Number (Double)	8
	SW_LONG	Number (Double)	8
	NE_LAT	Number (Double)	8
	NE_LONG	Number (Double)	8
	GEOGRAPHIC_COVERAGE	Memo	-
	PERIODICITY	Text	16
	NE_SPATIAL_REF_QUALIFIER	Text	20
	SW_SPATIAL_REF_QUALIFIER	Text	20
	RUN_BY	Text	16
	SURVEY_STATUS_KEY	Text	16
	SURVEY_MEDIA_KEY	Text	16
	SURVEY_TYPE_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8

SURVEY_EVENT	**Survey Module:** Surveys are broken into Survey Events that link observations made at a set place and time by specific recorders. A survey event may be a visit to a single site on a single day or it could be made from a record card representing one season's records from a tetrad in a distribution survey.		
	SURVEY_EVENT_KEY	Text	16
	SURVEY_EVENT_WEATHER	Text	200
	SPATIAL_REF	Text	20
	SPATIAL_REF_SYSTEM	Text	4
	LAT	Number (Double)	8
	LONG	Number (Double)	8
	SPATIAL_REF_QUALIFIER	Text	20
	VAGUE_DATE_START	Date/Time	8
	VAGUE_DATE_END	Date/Time	8
	VAGUE_DATE_TYPE	Text	2
	LOCATION_KEY	Text	16
	SURVEY_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_DATE	Date/Time	8
	CHANGED_BY	Text	16
	COMMENT	Memo	-
SURVEY_EVENT_RECORDER	**Survey Module:** The list of recorders associated with an individual srvey event.		
	SE_RECORDER_KEY	Text	16
	NAME_KEY	Text	16
	SURVEY_EVENT_KEY	Text	16
	RECORDER_ROLE_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
SURVEY_EVENT_SOURCES	**Survey Module:** Links the Survey Event to references or other sources.		
	SOURCE_LINK_KEY	Text	16
	SURVEY_EVENT_KEY	Text	16
	SOURCE_KEY	Text	16
	ORIGINAL	Yes/No	1
SURVEY_MEDIA	**Survey Module:** User editable lookup table linked to Survey. Includes notebooks, publications, computerised and paper records. Used particularly when importing survey data from an existing source e.g. copies of a scheme organisers records.		
	SURVEY_MEDIA_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-

	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
SURVEY_SOURCES	**Survey Module:** Links a Survey record to references or other sources.		
	SOURCE_LINK_KEY	Text	16
	SURVEY_KEY	Text	16
	SOURCE_KEY	Text	16
	ORIGINAL	Yes/No	1
SURVEY_STATUS	**Survey Module:** User editable lookup table listing Survey status e.g. In Progress, Published, Completed etc.		
	SURVEY_STATUS_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
SURVEY_TYPE	**Survey Module:** Lookup table listing types of Survey (e.g. Phase I, Phase II, Monitoring etc.)		
	SURVEY_TYPE_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
TAXON	**Taxon Dictionary**: Key table in the Taxon Dictionary holds all name and name combinations that appear in included check lists and other species lists		
	TAXON_KEY	Text	16
	ITEM_NAME	Text	60
	AUTHORITY	Text	65
	INTRODUCED_VAGUE_DATE_START	Date/Time	8
	INTRODUCED_VAGUE_DATE_END	Date/Time	8
	INTRODUCED_VAGUE_DATE_TYPE	Text	2
	LANGUAGE	Text	2
	TAXON_NAME_TYPE_KEY	Text	16
	ABBREVIATION	Text	5

	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
TAXON_BIOTOPE_ASSOCIATION	**Taxon Dictionary**: Used to record the links between species or other taxa and their known habitats. (links to taxon version)		
	ASSOCIATION_KEY	Text	16
	ASSOCIATION	Text	50
	STRENGTH	Text	10
	GEOGRAPHIC_CONTEXT	Text	100
	BIOTOPE_KEY	Text	16
	TAXON_VERSION_KEY	Text	50
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
	SOURCE_KEY	Text	16
TAXON_DESIGNATION	**Taxon Dictionary**: Used to record the various statutory and informal designations and their constraints applied to individual taxa in various lists (e.g. if the list is a EC Directive Schedule the taxon might be protected in some areas only or have some other contraint applied to it)		
	TAXON_DESIGNATION_KEY	Text	16
	DATE_FROM	Date/Time	8
	DATE_TO	Date/Time	8
	STATUS_GEOGRAPHIC_AREA	Text	100
	STATUS_CONSTRAINT	Text	100
	DETAIL	Memo	-
	TAXON_DESIGNATION_TYPE_KEY	Text	16
	TAXON_LIST_ITEM_KEY	Text	16
	STATUS_EXCLUSION	Yes/No	1
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
	SOURCE_KEY	Text	16
TAXON_DESIGNATION_TYPE	**Taxon Dictionary**: Lookup table that lists all the designations that appear in various legislative schedules and informal designation lists. (e.g. Red Data Books use RDB1, RDB2 etc.)		
	TAXON_DESIGNATION_TYPE_KEY	Text	16

	SHORT_NAME	Text	40
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	KIND	Text	20
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
TAXON_DETERMINATION	**Survey Module** – Taxon Occurrence: Allows any observation to be linked to one or more taxonomic determinations. This allows the original record and given name to remain unchanged whilst recording later corrections or changes in opinion.		
	TAXON_DETERMINATION_KEY	Text	16
	TAXON_LIST_ITEM_KEY	Text	16
	TAXON_OCCURRENCE_KEY	Text	16
	VAGUE_DATE_START	Date/Time	8
	VAGUE_DATE_END	Date/Time	8
	VAGUE_DATE_TYPE	Text	2
	COMMENT	Memo	-
	PREFERRED	Yes/No	1
	DETERMINER	Text	16
	DETERMINATION_TYPE_KEY	Text	16
	DETERMINER_ROLE_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SOURCE_KEY	Text	16
TAXON_FACT	**Taxon Dictionary**: Allows the recording of descriptions and other data related to a taxon for display in the taxon dictionary viewer.		
	TAXON_FACT_KEY	Text	16
	TITLE	Text	50
	TYPE	Text	1
	DATA	Memo	-
	TAXON_VERSION_KEY	Text	50
	FACT_VAGUE_DATE_START	Date/Time	8
	FACT_VAGUE_DATE_END	Date/Time	8
	FACT_VAGUE_DATE_TYPE	Text	2
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
	SOURCE_KEY	Text	16
TAXON_LIST	**Taxon Dictionary**: Table holding basic details of various taxon lists. A taxon list is any collection of taxon names used for recording, statutory protection		

	or other purposes. Taxon lists include formal taxonomic checklists, species lists from important identification publications, legislative schedules etc. Recorder 2000 keeps track of whethera list is available on the users hard disk or not.		
	TAXON_LIST_KEY	Text	16
	ITEM_NAME	Text	200
	DESCRIPTION	Memo	-
	AUTHORITY	Text	50
	TAXON_LIST_TYPE_KEY	Text	16
	LOCAL_DISK	Yes/No	1
	UPDATE_MECHANISM	Text	150
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
TAXON_LIST_ITEM	**Taxon Dictionary**: The taxon list item table keeps the lists of taxon version names that occur in any taxon list versions. Taxon determinations in the Survey module rfer to taxon list items rather than directly to taxon names because this allows users to track the source of the name used (i.e. what checklist).		
	TAXON_LIST_ITEM_KEY	Text	16
	TAXON_VERSION_KEY	Text	50
	TAXON_LIST_VERSION_KEY	Text	16
	TAXON_LIST_VERSION_TO	Text	16
	PREFERRED_NAME	Text	16
	SORT_CODE	Number (Long)	4
	LST_ITM_CODE	Text	50
	PARENT	Text	16
	TAXON_RANK_KEY	Text	16
	CODE_SOURCE	Text	50
	NOTE	Text	50
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
TAXON_LIST_TYPE	**Taxon Dictionary**: Lookup table used to classify taxon lists e.g. BRC checklists, British Legislation etc.		
	TAXON_LIST_TYPE_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	SCHEDULE	Yes/No	1
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1

TAXON_LIST_VERSION	**Taxon Dictionary**: Table used to track the amendments and modifications made to various lists e.g. revisions of checklists or amendments to legilative schedules.		
	TAXON_LIST_VERSION_KEY	Text	16
	TAXON_LIST_KEY	Text	16
	VERSION	Number (Long)	4
	AUTHORITY	Text	50
	VAGUE_DATE_START	Date/Time	8
	VAGUE_DATE_END	Date/Time	8
	VAGUE_DATE_TYPE	Text	2
	DESCRIPTION	Memo	-
	VERSION_IS_AMENDMENT	Yes/No	1
	QUALITY	Memo	-
	SOURCE_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
TAXON_NAME_TYPE	**Taxon Dictionary**: Lookup table used for classifying taxon names (e.g. Formal or Common names)		
	TAXON_NAME_TYPE_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	AUTHORITY	Text	50
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
TAXON_OCCURRENCE	**Survey Module**: Table holding the species (or other taxa) records linked to an individual sample e.g. plant records from a quadrat, invertebrates from a pitfall trap or list of birds seen on a visit to a site. Note that the absence of a species can also be recorded.		
	TAXON_OCCURRENCE_KEY	Text	16
	COMMENT	Memo	-
	ZERO_ABUNDANCE	Yes/No	1
	CONFIDENTIAL	Yes/No	1
	VERIFIED	Number (Byte)	1
	CHECKED	Yes/No	1
	CHECKED_BY	Text	16
	CHECKED_DATE	Date/Time	8
	SURVEYORS_REF	Text	30
	PROVENANCE	Text	16
	SAMPLE_KEY	Text	16
	SUBSTRATE_KEY	Text	16
	RECORD_TYPE_KEY	Text	16

	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
TAXON_OCCURRENCE_DATA	**Survey Module**: Table holding measurements linked to taxon occurrences (records). Measurements can include any quantifiable observation but most frequently are counts (e.g. 5 males, 3 females etc.)		
	TAXON_OCCURRENCE_DATA_KEY	Text	16
	TAXON_OCCURRENCE_KEY	Text	16
	DATA	Text	10
	QUALIFIER	Text	20
	ACCURACY	Text	10
	MEASUREMENT_UNIT_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
TAXON_OCCURRENCE_RELATION	**Survey Module:** Table recording the links between observed taxa. Uses a lookup table listing possible relationships between species (e.g. parasite, predator etc.)		
	TAXON_OCCURRENCE_RELATION_KEY	Text	16
	COMMENT	Memo	-
	TAXON_OCCURRENCE_KEY_1	Text	16
	TAXON_OCCURRENCE_KEY_2	Text	16
	RELATIONSHIP_TYPE_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
TAXON_OCCURRENCE_SOURCES	**Survey Module:** Links taxon observation records to references and other sources		
	SOURCE_LINK_KEY	Text	16
	TAXON_OCCURRENCE_KEY	Text	16
	SOURCE_KEY	Text	16
	ORIGINAL	Yes/No	1
TAXON_RANK	**Taxon Dictionary**: Lookup table listing ranks used in various taxonomic classifications. Ranks are applied to taxon list items. The table holds details of how to format and display the name in the Recorder 2000 Taxon Dictionary Viewer.		
	TAXON_RANK_KEY	Text	16
	SEQUENCE	Number (Integer)	2
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	LIST_FONT_ITALIC	Yes/No	1

	IMAGE	OLE Object	-
	DISPLAY_IN_DETAILS	Yes/No	1
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
TAXON_SOURCES	**Taxon Dictionary**: Links taxon names to a reference or other source		
	SOURCE_LINK_KEY	Text	16
	TAXON_KEY	Text	16
	SOURCE_KEY	Text	16
	ORIGINAL	Yes/No	1
TAXON_TAXON_ASSOCIATION	**Taxon Dictionary**: Records the association between taxa . Can include biological links such as symbionts, fungi on hosts and also geographic links.		
	ASSOCIATION_KEY	Text	16
	TAXON_VERSION_KEY_1	Text	16
	TAXON_VERSION_KEY_2	Text	16
	ASSOCIATION	Text	50
	GEOGRAPHIC_CONTEXT	Text	100
	COMMENT	Text	50
	VAGUE_DATE_START	Date/Time	8
	VAGUE_DATE_END	Date/Time	8
	VAGUE_DATE_TYPE	Text	2
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
TAXON_VERSION	**Taxon Dictionary**: Table listing the known versions of any individual taxon name. A taxon name may be used in more than one context depending on the checklist in use or taxonomic revision.		
	TAXON_VERSION_KEY	Text	16
	TAXON_KEY	Text	16
	ATTRIBUTE	Text	10
	AUTHORITY	Text	40
	DATE_FROM	Date/Time	8
	DATE_TO	Date/Time	8
	COMMENT	Memo	-
	VALIDATION_LEVEL	Number (Integer)	2
	UK_NATIVE	Yes/No	1
	QUALITY	Text	50
	SOURCE_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16

	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
TAXON_VERSION_RELATION	**Taxon Dictionary**: Links taxon version names together in order to trace links between names e.g. where a taxon is split into two or more names.		
	TAXON_VERSION_RELATION_KEY	Text	16
	TAXON_VERSION_KEY_1	Text	16
	TAXON_VERSION_KEY_2	Text	16
	RELATIONSHIP	Text	50
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
TENURE	**Location Module**: Records of the ownership or tenure history of any site		
	TENURE_KEY	Text	16
	FROM_VAGUE_DATE_START	Date/Time	8
	FROM_VAGUE_DATE_END	Date/Time	8
	FROM_VAGUE_DATE_TYPE	Text	2
	TO_VAGUE_DATE_START	Date/Time	8
	TO_VAGUE_DATE_END	Date/Time	8
	TO_VAGUE_DATE_TYPE	Text	2
	OWNED_BY	Text	16
	TENURE_TYPE_KEY	Text	16
	LOCATION_KEY	Text	16
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_DATE	Date/Time	8
	CHANGED_BY	Text	16
TENURE_TYPE	**Location Module**: Lookup table of ownership or tenure terms used by Tenure table.		
	TENURE_TYPE_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
TERM_LIST	Recorder 2000 lookup table of term lists and where stored		
	TABLE	Text	30
	KEY_FIELD	Text	30
	DESCRIPTION	Text	50

	SYSTEM_SUPPLIED_DATA	Yes/No	1
	ADDITIONAL_FIELDS	Yes/No	1
	LINKED_TABLE	Text	30
	LINK_KEY	Text	30
THREAT_TYPE	**Location Module** – Feature sub-module: Lookup table for entries into Potential Threat table linked to Features.		
	THREAT_TYPE_KEY	Text	16
	SHORT_NAME	Text	20
	LONG_NAME	Text	100
	DESCRIPTION	Memo	-
	ENTERED_BY	Text	16
	ENTRY_DATE	Date/Time	8
	CHANGED_BY	Text	16
	CHANGED_DATE	Date/Time	8
	SYSTEM_SUPPLIED_DATA	Yes/No	1
USABLE_FIELD	Recorder 2000 application specific table linked to Reports Program		
	USABLE_FIELD_KEY	Text	16
	TABLE_NAME	Text	30
	FIELD_NAME	Text	30
	FIELD_DESCRIPTION	Text	70
	FIELD_TYPE	Text	50
	APPLY_TO	Text	1
	SELECTABLE	Yes/No	1
	SORTABLE	Yes/No	1
	FILTERABLE	Yes/No	1
	CROSSTAB	Yes/No	1
	CALCULATION_SQL	Memo	-
USABLE_TABLE	Recorder 2000 application specific table linked to Reports Program. Stores SQL fragments.		
	USABLE_TABLE_KEY	Text	16
	TABLE_NAME	Text	30
	LINK_TABLE	Text	30
	LINK	Text	255
	ADDITIONAL_LINK	Text	255
	APPLY_TO	Text	1
USER	Recorder 2000 application specific table listing registerd users of the current installed copy with encrypted passwords and access security level.		
	NAME_KEY	Text	16
	PASSWORD	Text	20
	SECURITY_LEVEL	Number (Byte)	1

Unique List of Fields

Field Name	Type	Width

ABBREVIATION	Text	5
ACCESSION_VAGUE_DATE_END	Date/Time	8
ACCESSION_VAGUE_DATE_START	Date/Time	8
ACCESSION_VAGUE_DATE_TYPE	Text	2
ACCURACY	Text	10
ACRONYM	Text	10
ADDIN_CLSID	Text	50
ADDITIONAL_FIELDS	Yes/No	1
ADDITIONAL_LINK	Text	255
ADDRESS_1	Text	40
ADDRESS_2	Text	40
ADDRESS_3	Text	30
ADDRESS_4	Text	30
ADDRESS_COUNTRY	Text	30
ADDRESS_KEY	Text	16
ADDRESS_POSTCODE	Text	10
ADMIN_AREA_KEY	Text	16
ADMIN_AREA_KEY_1	Text	16
ADMIN_AREA_KEY_2	Text	16
ADMIN_BOUNDARY_KEY	Text	16
ADMIN_RELATION_KEY	Text	16
ADMIN_TYPE_KEY	Text	16
AGREEMENT_DATE	Date/Time	8
APPLY_TO	Text	1
APPROACH	Memo	-
ASSOCIATION	Text	50
ASSOCIATION_KEY	Text	16
ATTRIBUTE	Text	10
AUTHOR_KEY	Text	16
AUTHORITY	Text	100
AUTHORITY	Text	16
AUTHORITY	Text	40
AUTHORITY	Text	50
AUTHORITY	Text	65
BIOTOPE_CLASSIFICATION_KEY	Text	16
BIOTOPE_DESIGNATION_KEY	Text	16
BIOTOPE_DESIGNATION_TYPE_KEY	Text	16
BIOTOPE_DETERMINATION_KEY	Text	16
BIOTOPE_FACT_KEY	Text	16
BIOTOPE_KEY	Text	16
BIOTOPE_LIST_ITEM_KEY	Text	16
BIOTOPE_OCCURRENCE_DATA_KEY	Text	16
BIOTOPE_OCCURRENCE_KEY	Text	16
BIOTOPE_RELATION_KEY	Text	16
BORN_VAGUE_DATE_END	Date/Time	8
BORN_VAGUE_DATE_START	Date/Time	8
BORN_VAGUE_DATE_TYPE	Text	2

BT_CL_TYPE_KEY	Text	16
BT_CL_VERSION_KEY	Text	16
BT_CL_VERSION_TO	Text	16
CALCULATION_SQL	Memo	-
CHANGED_BY	Text	16
CHANGED_DATE	Date/Time	8
CHANGED_DATE	Text	50
CHECKED	Yes/No	1
CHECKED_BY	Text	16
CHECKED_DATE	Date/Time	8
CODE_SOURCE	Text	50
COMMENT	Memo	-
COMMENT	Text	50
COMMISSIONED_BY	Text	60
COMMUNICATION_KEY	Text	16
COMMUNICATION_TYPE	Text	20
CONFIDENTIAL	Yes/No	1
CONSTRAINTS	Memo	-
CONTACT_NUMBER_KEY	Text	16
CONTACT_NUMBER_TYPE	Text	20
CONTENT	Memo	-
CONTROLLING_AUTHORITY	Text	50
CREATED_BY	Text	60
CREATED_VAGUE_DATE_END	Date/Time	8
CREATED_VAGUE_DATE_START	Date/Time	8
CREATED_VAGUE_DATE_TYPE	Text	2
CROSSTAB	Yes/No	1
CUT_IN_SCALE	Text	15
CUT_OUT_SCALE	Text	15
DAMAGE_OCCURRENCE_KEY	Text	16
DATA	Memo	-
DATA	Text	10
DATA_TYPE	Text	1
DATASET_SHEET_FILENAME	Text	255
DATASET_SHEET_NAME	Text	50
DATE_FROM	Date/Time	8
DATE_TO	Date/Time	8
DESCRIPTION	Memo	-
DESCRIPTION	Text	16
DESCRIPTION	Text	200
DESCRIPTION	Text	50
DESIGNATION_ACRONYM	Text	20
DESIGNATION_KEY	Text	16
DETAIL	Memo	-
DETERMINATION_TYPE_KEY	Text	16
DETERMINER	Text	16
DETERMINER_ROLE_KEY	Text	16

DIED_VAGUE_DATE_END	Date/Time	8
DIED_VAGUE_DATE_START	Date/Time	8
DIED_VAGUE_DATE_TYPE	Text	2
DIGITISED	Yes/No	1
DISPLAY_IN_DETAILS	Yes/No	1
DURATION	Text	20
EDITION	Text	10
EDITOR_KEY	Text	16
ENDED_VAGUE_DATE_END	Date/Time	8
ENDED_VAGUE_DATE_START	Date/Time	8
ENDED_VAGUE_DATE_TYPE	Text	2
ENTERED_BY	Text	16
ENTRY_DATE	Date/Time	8
FACT_VAGUE_DATE_END	Date/Time	8
FACT_VAGUE_DATE_START	Date/Time	8
FACT_VAGUE_DATE_TYPE	Text	2
FEATURE_GRADING_KEY	Text	16
FIELD_DESCRIPTION	Text	70
FIELD_NAME	Text	30
FIELD_TYPE	Text	50
FILE_CODE	Text	20
FILE_NAME	Text	255
FILE_REF	Text	20
FILTERABLE	Yes/No	1
FORENAME	Text	20
FOUNDED_VAGUE_DATE_END	Date/Time	8
FOUNDED_VAGUE_DATE_START	Date/Time	8
FOUNDED_VAGUE_DATE_TYPE	Text	2
FROM_VAGUE_DATE_END	Date/Time	8
FROM_VAGUE_DATE_START	Date/Time	8
FROM_VAGUE_DATE_TYPE	Text	2
FULL_NAME	Text	60
FULL_REFERENCE	Memo	-
FULL_TERM	Text	200
GEOGRAPHIC_CONTEXT	Text	100
GEOGRAPHIC_COVERAGE	Memo	-
GRID_SQUARE_KEY	Text	16
HONORIFICS	Text	20
IMAGE	OLE Object	-
INITIALS	Text	8
INTERNAL	Yes/No	1
INTRODUCED_VAGUE_DATE_END	Date/Time	8
INTRODUCED_VAGUE_DATE_START	Date/Time	8
INTRODUCED_VAGUE_DATE_TYPE	Text	2
ITEM_NAME	Text	100
ITEM_NAME	Text	200
ITEM_NAME	Text	50

ITEM_NAME	Text	60
JOURNAL_KEY	Text	16
KEY_FIELD	Text	30
KIND	Text	20
LAND_PARCEL_KEY	Text	16
LAND_PARCEL_MAP_SHEET	Text	30
LAND_PARCEL_NUMBER	Text	20
LANGUAGE	Text	2
LAST_KEY_TEXT	Text	8
LAT	Number (Double)	8
LINK	Text	255
LINK_KEY	Text	30
LINK_TABLE	Text	30
LINKED_TABLE	Text	30
LIST_FONT_ITALIC	Yes/No	1
LOCAL_DISK	Yes/No	1
LOCATION	Text	100
LOCATION_ADMIN_AREAS_KEY	Text	16
LOCATION_BOUNDARY_KEY	Text	16
LOCATION_DATA_KEY	Text	16
LOCATION_FEATURE_KEY	Text	16
LOCATION_FEATURE_TYPE_KEY	Text	16
LOCATION_KEY	Text	16
LOCATION_KEY_1	Text	16
LOCATION_KEY_2	Text	16
LOCATION_NAME_KEY	Text	16
LOCATION_RELATION_KEY	Text	16
LOCATION_TYPE_KEY	Text	16
LOCATION_USE	Text	30
LOCATION_USE_KEY	Text	16
LONG	Number (Double)	8
LONG_NAME	Text	100
LONG_NAME	Text	200
LST_ITM_CODE	Text	50
MANAGEMENT_AIM_KEY	Text	16
MAP_FILE	Text	255
MAP_FILE	Text	50
MAP_SHEET_KEY	Text	16
MEASUREMENT_TYPE_KEY	Text	16
MEASUREMENT_UNIT_KEY	Text	16
MODIFIED_DATA	Yes/No	1
NAME	Text	50
NAME_CODE	Text	15
NAME_KEY	Text	16
NAME_KEY_1	Text	16
NAME_KEY_2	Text	16
NAME_RELATION_KEY	Text	16

NE_LAT	Number (Double)	8
NE_LONG	Number (Double)	8
NE_SPATIAL_REF	Text	20
NE_SPATIAL_REF_QUALIFIER	Text	20
NEW_DATA	Yes/No	1
NEXT_APPRAISAL_DATE	Text	50
NOTE	Text	50
NUMBER	Number (Integer)	2
NUMBER	Text	10
NUMBER	Text	20
NUMBER	Text	30
NUMBER_KEY	Text	16
OBJECT_ID	Number (Integer)	2
OBJECTIVES	Memo	-
ORGANISATION	Yes/No	1
ORGANISATION_TYPE_KEY	Text	16
ORIGINAL	Yes/No	1
ORIGINAL_CODE	Text	20
ORIGINAL_FILE	Memo	-
OUTSTANDING_CARD	Number (Byte)	1
OWNED_BY	Text	16
PAGES	Text	20
PARENT	Text	16
PARENT_KEY	Text	16
PART	Number (Integer)	2
PASSWORD	Text	20
PERIODICITY	Text	16
PERSON_FLOREAT	Text	12
PLACE_OF_PUBLICATION	Text	50
POSITION_NUMBER	Number (Integer)	2
POTENTIAL	Memo	-
POTENTIAL_THREAT_KEY	Text	16
PREFERRED	Yes/No	1
PREFERRED_FIELD	Text	50
PREFERRED_NAME	Text	16
PREFIX	Text	10
PROVENANCE	Text	16
PUBLISHER	Text	50
QUALIFIER	Text	20
QUALITY	Memo	-
QUALITY	Text	50
RECORD_TYPE_KEY	Text	16
RECORDER_ROLE_KEY	Text	16
RECORDERS	Text	255
RECORDING_CARD	Text	255
REF_CODE	Text	20
REFERENCE_NUMBER_TYPE	Text	20

REFERENCE_TYPE	Text	25
RELATION_1_TO_2	Text	20
RELATION_2_TO_1	Text	20
RELATIONSHIP	Text	50
RELATIONSHIP_TYPE_KEY	Text	16
REMOVE_SHEET	Yes/No	1
RESTRICTION	Memo	-
REVISION_DATE	Date/Time	8
REVISION_NUMBER	Number (Integer)	2
ROLE	Text	30
RUN_BY	Text	16
SAMPLE_DATA_KEY	Text	16
SAMPLE_KEY	Text	16
SAMPLE_KEY_1	Text	16
SAMPLE_KEY_2	Text	16
SAMPLE_REFERENCE	Text	15
SAMPLE_RELATION_KEY	Text	16
SAMPLE_TYPE_KEY	Text	16
SCHEDULE	Yes/No	1
SE_RECORDER_KEY	Text	16
SECURITY_LEVEL	Number (Byte)	1
SELECTABLE	Yes/No	1
SEQUENCE	Number (Integer)	2
SHEET_DISPLAYED	Yes/No	1
SHEET_NAME	Text	20
SHEET_TYPE	Number (Byte)	1
SHORT_CODE	Text	10
SHORT_NAME	Text	20
SHORT_NAME	Text	40
SHORT_NAME	Text	50
SHORT_TERM	Text	60
SITE_STATUS_KEY	Text	16
SIZE	Number (Long)	4
SORT_CODE	Number (Integer)	2
SORT_CODE	Number (Long)	4
SORT_ORDER	Number (Integer)	2
SORTABLE	Yes/No	1
SOURCE_KEY	Text	16
SOURCE_KEY	Text	50
SOURCE_LINK_KEY	Text	16
SPATIAL_REF	Text	20
SPATIAL_REF_QUALIFIER	Text	20
SPATIAL_REF_SYSTEM	Text	4
SPECIMEN_KEY	Text	16
SPECIMEN_TYPE_KEY	Text	16
STATUS_CONSTRAINT	Memo	-
STATUS_CONSTRAINT	Text	100

STATUS_EXCLUSION	Yes/No	1
STATUS_GEOGRAPHIC_AREA	Memo	-
STATUS_GEOGRAPHIC_AREA	Text	100
STRENGTH	Text	10
SUBSTRATE_KEY	Text	16
SUPPLEMENT	Text	50
SURNAME	Text	30
SURVEY_EVENT_KEY	Text	16
SURVEY_EVENT_WEATHER	Text	200
SURVEY_KEY	Text	16
SURVEY_MEDIA_KEY	Text	16
SURVEY_STATUS_KEY	Text	16
SURVEY_TYPE_KEY	Text	16
SURVEYORS_REF	Text	30
SW_LAT	Number (Double)	8
SW_LONG	Number (Double)	8
SW_SPATIAL_REF	Text	20
SW_SPATIAL_REF_QUALIFIER	Text	20
SYMPOSIUM_TITLE	Text	50
SYSTEM_SUPPLIED_DATA	Yes/No	1
TABLE	Text	30
TABLE_NAME	Text	30
TABLE_NAME	Text	50
TAXON_DESIGNATION_KEY	Text	16
TAXON_DESIGNATION_TYPE_KEY	Text	16
TAXON_DETERMINATION_KEY	Text	16
TAXON_FACT_KEY	Text	16
TAXON_KEY	Text	16
TAXON_LIST_ITEM_KEY	Text	16
TAXON_LIST_KEY	Text	16
TAXON_LIST_TYPE_KEY	Text	16
TAXON_LIST_VERSION_KEY	Text	16
TAXON_LIST_VERSION_TO	Text	16
TAXON_NAME_TYPE_KEY	Text	16
TAXON_OCCURRENCE_DATA_KEY	Text	16
TAXON_OCCURRENCE_KEY	Text	16
TAXON_OCCURRENCE_KEY_1	Text	16
TAXON_OCCURRENCE_KEY_2	Text	16
TAXON_OCCURRENCE_RELATION_KEY	Text	16
TAXON_RANK_KEY	Text	16
TAXON_VERSION_KEY	Text	16
TAXON_VERSION_KEY	Text	50
TAXON_VERSION_KEY_1	Text	16
TAXON_VERSION_KEY_2	Text	16
TAXON_VERSION_RELATION_KEY	Text	16
TENURE_KEY	Text	16
TENURE_TYPE_KEY	Text	16

TERM_CURRENT	Yes/No	1
TERM_STATUS	Text	10
TEXT	Memo	-
THREAT	Text	60
THREAT_TYPE_KEY	Text	16
TIME	Date/Time	8
TITLE	Memo	-
TITLE	Text	4
TITLE	Text	50
TO_VAGUE_DATE_END	Date/Time	8
TO_VAGUE_DATE_START	Date/Time	8
TO_VAGUE_DATE_TYPE	Text	2
TYPE	Text	1
UK_NATIVE	Yes/No	1
UPDATE_MECHANISM	Text	150
USABLE_FIELD_KEY	Text	16
USABLE_TABLE_KEY	Text	16
USER_ID	Text	16
VAGUE_DATE_END	Date/Time	8
VAGUE_DATE_START	Date/Time	8
VAGUE_DATE_TYPE	Text	2
VALIDATION_COMPETENCY	Number (Byte)	1
VALIDATION_LEVEL	Number (Integer)	2
VERIFIED	Number (Byte)	1
VERSION	Number (Integer)	2
VERSION	Number (Long)	4
VERSION_IS_AMENDMENT	Yes/No	1
VOLUME	Number (Integer)	2
WORK_ADDRESS	Yes/No	1
YEAR_VAGUE_DATE_END	Date/Time	8
YEAR_VAGUE_DATE_START	Date/Time	8
YEAR_VAGUE_DATE_TYPE	Text	2
ZERO_ABUNDANCE	Yes/No	1