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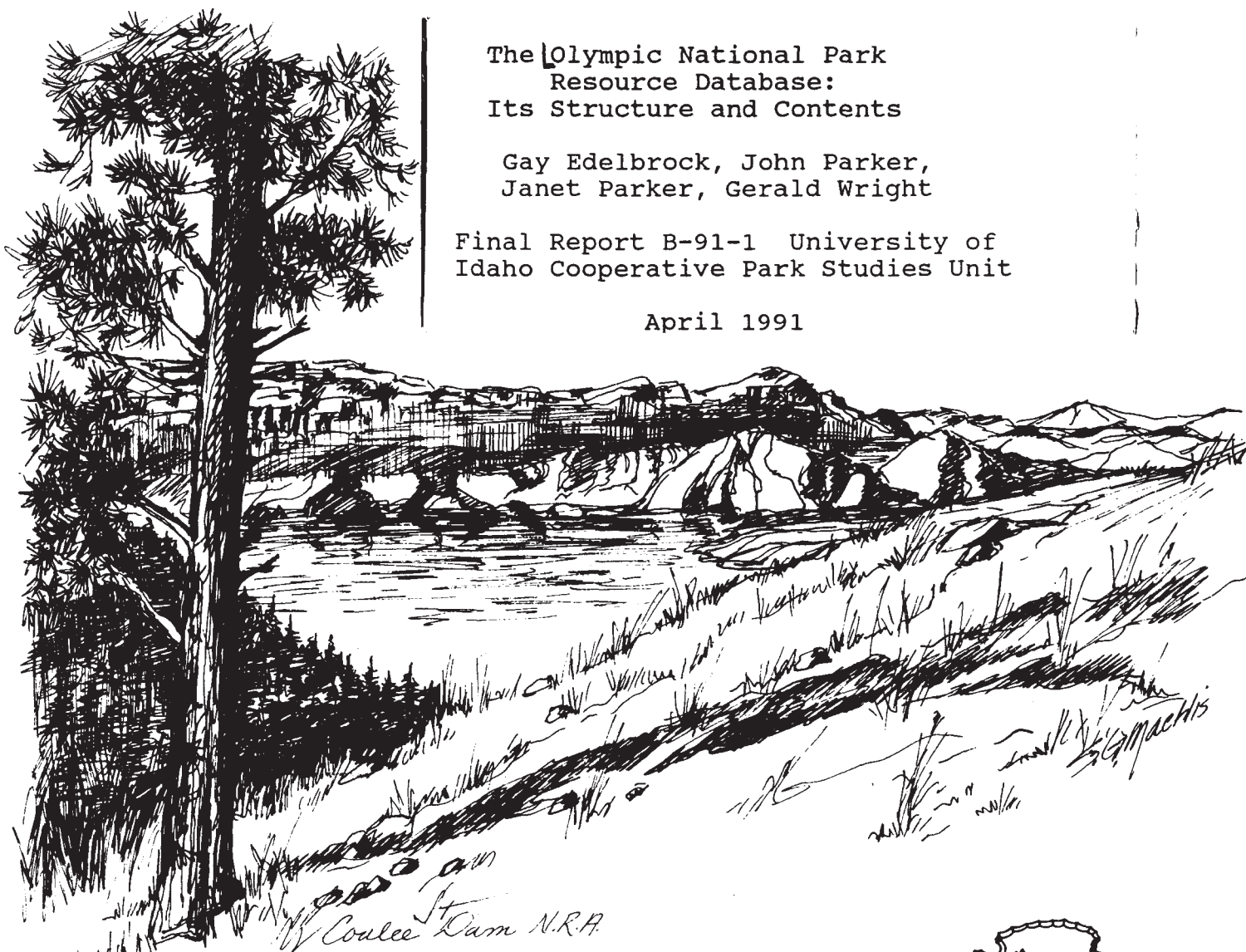
UNIVERSITY OF IDAHO

The Olympic National Park
Resource Database:
Its Structure and Contents

Gay Edelbrock, John Parker,
Janet Parker, Gerald Wright

Final Report B-91-1 University of
Idaho Cooperative Park Studies Unit

April 1991



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SUBAGREEMENT NO. 8

to

COOPERATIVE AGREEMENT NO. CA-9000-8-0005

Managing Resource Data in the Pacific Northwest Region
University of Idaho CPSU and NPS Pacific Northwest Region

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Abstract

This report describes the resource database compiled for Olympic National Park and vicinity in northwestern Washington. The database includes information beyond those specific studies which have taken place within the park boundary because of influence of activities on lands and waters adjacent to the park on the ecosystems and management concerns in the park. This database conforms in structure to all of the other resource databases compiled for Northwest Region Parks, and contains 44 fields of information structured in a dBASE III+ framework. The database contains 2,468 records, each representing an individual study, a subset of information such as a map collection or a data collection effort. The Olympic database is far and away the largest of any park database in the region. The report provides a brief analysis of the contents of the database, characterizing the type of resources studied, the nature of the studies undertaken, and the method in which the studies were published. The database is designed to be used with a set of menu-driven computer search programs called NRDS which have been specifically tailored to the OLYM database. These programs have been compiled using Clipper software.

Keywords: database, inventory, monitoring, national parks, computer, natural resources, cultural resources

Introduction

Managing the resources of parks properly is largely predicated on a park's ability to have access to and use information appropriate for the task. Most parks have more information on their resources than managers or research personnel commonly realize. However, if this information is poorly organized or otherwise not readily accessible, management cannot use it. Unfortunately information management in most parks is generally poor. This has resulted in redundant data collection efforts, inconsistent or ineffective monitoring programs, and sometimes costly environmental mistakes. This project originated because the above problems are all too common in our national parks. Support for this project was also a recognition that most parks lack the personnel or time needed to properly organize resource information.

The objective of this project was to systematically locate all of the research, monitoring, and inventory studies and surveys dealing with the natural and cultural resources that have taken place within and on lands and waters adjacent to Olympic National Park (OLYM) and summarize and store the key characteristics of these studies in resource databases accessible on IBM compatible microcomputers. Similar projects are being undertaken for all other parks in the Pacific Northwest Region. The Pacific Northwest Regional Office library and the three regional Cooperative Park Studies Units are to be repositories for the databases from all parks. This database is unique in that substantial information from lands and waters adjacent to

the park has been included. These locations are identified in the location field of the database. The reason for the inclusion of this information was that activities and research occurring on U.S. Forest Service, state DNR, and tribal lands surrounding the park often have a direct influence or bearing on activities or equivalent research in the park. Streams emanating from Olympic provide spawning and rearing habitat for several important species of anadromous fish.

The database uses Ashton-Tate dBASE III+ as the manager. Specific information in the database can be found by using standard dBASE commands or by using the computer program written specifically for such queries. This program called the "Natural Resource Data Search And Storage System (NRDS) (Hoffman and Wright 1989) consists of a series of "pop-up" menus which identify search parameters. The system is designed to selectively filter a user's inquiries regarding information in the database so that a particular search can be as broad or specific as desired. This program is customized for each park's database. A copy of the program is supplied with each copy of the park database. The program is compiled using Clipper software, and is thus in an executable form and does not require any specific software to use it.

This report describes the structure of the OLYM database, the coding used to abstract information, and the methods used to construct the database. The report also briefly summarizes the pertinent characteristics of the OLYM database including the kind of studies done in the park, the type of data collected, and a summary of how the various reports were published. Disks

containing the OLYM database are available from the University of Idaho CPSU, Olympic National Park, or the library at the Pacific Northwest Regional Office in Seattle, Washington.

The Olympic National Park Resource Database

Structure of the Database

The Olympic resource database contains 44 fields of information described in Table 1. Some of the fields contain literal information such as author, date the study took place, a brief description of the study, and its location in the park. One field is reserved for keywords which generically describe the study. Other information in the database is numerically or alphabetically coded. A complete description of each of the fields in the database is contained in the data entry guidelines found in Appendix I. This guide describes how and what kinds of information should be entered in each field, and thus should be followed when new information is added to the database.

Included in Table 1 is an indication if the information in the field is used in the computer program which searches the database, whether it is used to summarize information in the database (for example Tables 3 and 4 in this report), or whether it can be part of the output of the search programs. As noted, certain fields such as park watershed (WATERSHD) and administrative district (SUBDISTR) contain codes unique to the park in question. In Olympic, 19 watersheds and nine administrative subdistricts have been defined. The keyword list used in the database is found in Appendix II, the UTM list of

Table 1. Structure of the Resource Data Base

Field	Field Name	Field Type	Width	Used in Searches	Used in Summaries	Used in Output
1	STUD_NUM	character	9			
2	YEAR	character	4		X	X
3	AUTHOR	character	65	X		X
4	TITLE1	character	65	X		X
5	TITLE2	character	65	X		X
6	SOURCE	character	65			X
7	DAT_DESCRP	character	65			X
8	DAT_DESC2	character	65			X
9	KEYWORDS	character	65	X		X
10	CATEGORIES	character	17	X	X	X
11	ST_LEVEL	character	1			
12	STUDY_TYPE	character	2		X	
13	BEG_DATE	character	4			
14	END_DATE	character	4			
15	PROJ_STAT	character	1	X		X
16	SPRING	logical	1			
17	SUMMER	logical	1			
18	FALL	logical	1			
19	WINTER	logical	1			
20	LOCATION	character	65			
21	WATERSHD	character	90	X	X	X PARK
22	SUBDISTR	character	45	X	X	X SPECIFIC
23	MIN_E_UTM	character	4			
24	MIN_N_UTM	character	5			
25	MAX_E_UTM	character	4			
26	MAX_N_UTM	character	5			
27	MAX_ELEV	character	4			
28	MIN-ELEV	character	4			
29	BIOTICZONE	character	30	X	X	X PARK SP.
30	DATA_AVAIL	character	65			X
31	SCALE	character	9			
32	COMPUTER	character	1			
33	SOFTWARE	character	15			
34	DATA_TYPE	character	8			X
35	DISTRIBU	character	2			X
36	REPEATABLE	character	1			
37	F_STATUS	character	1	X		X
38	S_STATUS	character	1	X		X
39	P_STATUS	character	1	X		X
40	MG_CONCERN	character	20	X		X
41	RES_MAN_EL	character	40	X	X	PARK SP.
42	COMMENTS1	character	65			X
43	COMMENTS2	character	65			X
44	NOTES	Memo	10			

locations used in the database is found in Appendix III.

Methods used to Compile the Database

All of the authors working intermittently as university research associates compiled the information for the database working primarily at OLYM headquarters. Information was also gathered from area Forest Service Offices, the state of Washington Department of Natural Resources, and various agencies responsible for managing the fishery resources of the Olympic Peninsula and Puget Sound region.

A problem in the data entry phase of this type of project is deciding whether or not to include a specific type of information in the database. Our desire was to have the database as comprehensive as possible yet not have it cluttered with non-essential records. An itemization of the kinds of information typically encountered in a park like OLYM and the decision made on including them in the database is given in Table 2. Information was entered into the database using a project microcomputer.

Table 2. The kinds of information included in the OLYM Resource Database.

Type of Information	Decision to Include or Exclude
Research studies	included
Environmental statements & assessments	included
Resource management plans	included
Theses & dissertations	included
In-house reports	included
Unpublished reports by other agencies	included
Books	included when pertinent
Newspaper clippings	not included
Maps	grouped logically in memo field
Research proposals	generally omitted
NPS regional and annual science reports	not included
Architectural plans & drawings	not included
Oral histories & transcripts	included
Popular or general magazine articles	selectively included if pertinent
NPS master plans	included
Regional plans including park resources	included if significant to park
Interpretive material, e.g., brochures	not included
Documents on regulations	not included
Weather data, tables	included (one record per station)
Trail and field guides	combined in one record described in memo field
Slide and photo collections	combined in one record described in memo field
Separate photos & posters	not included
Memos on resource management topics	selectively included
Archival documents	grouped into a minimum number of records, described in memo field.
Computer printouts of data	included
Proceedings or abstracts	included if it is only known reference to a study.

Contents of the OLYM Database

The OLYM database contains a variety of information - evidence of the diversity of resources contained within the Park and on adjoining lands. At this time, 2,468 records, each representing an individual study, subset of information such as a map collection, or data collection effort are in the database.

An analysis of the information in this database reveals what kinds of research and resource management efforts have taken place in and around the park (Table 3.). Despite the varied plant communities of Olympic, including the famed rainforests of the western portion of the park, studies on terrestrial vertebrates (877) have dominated resource activities in the park. This is because of the very high number of studies devoted to two species, the mountain goat and Roosevelt elk. The former are considered to be an exotic species in the park and have been the subject of numerous studies on their impacts and methods to control or eliminate the animals. Roosevelt elk on the other hand are one of the resources that played an important role in the creation of the park. The status and habitat use of elk in the park and the impacts of activities around the park on this species have been the subject of numerous studies. Fishery resources and plants have not been slighted however, with all studies totaling 527, and 532 respectively, which is far higher than any other general category.

As with most parks in which databases have been constructed, we find that the great majority of studies receive little peer review being produced as reports by the NPS (766) or by other

Table 3. Summary of the major resources that have been investigated at OLYM and vicinity. (Note: Because of multiple coding, the total exceeds the number of studies in the database.)

<u>Resource Studied</u>	<u>Number of Studies</u>
1. Animals	
freshwater fish	110
terrestrial invertebrates	17
reptiles and amphibians	12
birds	263
mammals (general)	196
mountain goats	208
Roosevelt elk	207
	<u>1,103</u>
2. Plants	
general	296
low elevation rainforests	20
montane forests	90
alpine/subalpine communities	60
herbaceous/grasses	12
lichens/mosses/fungi	54
	<u>532</u>
3. Geologic Features	
general geology	48
glaciers	65
geologic processes	6
minerals	42
features and landforms	23
soils	37
ocean shoreline	162
	<u>383</u>
4. Hydrologic Features	
hydrologic general	199
water quality	24
rivers	102
lakes/springs	91
	<u>416</u>
5. Atmospheric Meteorological	
atmospheric general	17
air quality	34
climate, weather	42
wet, dry deposition	81
	<u>174</u>

6. Anthropogenic

visitor use	159
archaeologic	37
history - cultures/activities	135
history - exploration/discovery	42
history - structures	30
park management/administration	97
environmental assessments	354
	854

7. Ecological Processes

general	15
fire	63
succession	18
grazing/browsing	14
	110

8. Other

103

Table 4. Classification of the major kinds of studies and documents contained in the OLYM database.

<u>I. Type of Study or Document</u>	<u>Number</u>	<u>Percent</u>
Research	385	16
Monitoring	107	4
Checklist	121	5
Survey, Inventory, Resource Damage	813	33
Mitigation	407	16

Table 5. Method in which Studies were Published or Made Available.

	<u>Number</u>	<u>Percent</u>
Published in a scientific journal	165	7
Unpubl. NPS report	766	31
NPS science report	17	1
Non-NPS unpubl. govt. report	303	12
Unpubl. consulting & individual reports	413	17
Published as an M.S. or Ph.D. Thesis	65	3
Files of original data	259	10
NPS collection	108	4
NPS planning document	35	1
CPSU report	48	2
Book	53	2
Topical files	52	2
Popular journals	70	3
Proceedings	50	2
Unknown	65	3

government agencies (303). The proportion of theses and refereed scientific journal articles at Olympic are in similar proportion to what has been found in other northwest parks and monuments (Table 5).

The emphasis on resource inventory and on the establishment of long-term monitoring studies is low in proportion to the total effort in the database. These findings are consistent with those of other parks in the region.

One of the difficulties of doing a study such as this is knowing when one has identified all of the information that is available on a given park. In actuality this is impossible to know. We did however use several measures to assure the completeness of this product. As a first check we used existing park and regional bibliographies. We also used publications like the yearly regional science reports, research proposals, and newspaper clippings to alert us to studies we might not have encountered. The final test will be when this report is thoroughly reviewed by the park resource managers.

As with all parks, the OLYM database is dynamic. It can be considered complete only at the time of this writing. The addition of new records to the database needs to become a routine part of the park's resource management program. The maximum utility of this database lies only in its being kept up to date. Procedures to assure that the database will remain current are now being worked out with the librarian in the Pacific Northwest Regional Office. The Regional Office library will play a key role in this procedure.

Using the Database

The OLYM database is contained on three diskettes. Two high-density 3.5 inch disks have dBASE III+ database files respectively labeled OLYM and OLYM2, with 1,194 and 1,274 records respectively. Each disk has two files which have the extensions ".dbf and .dbt". The most efficient way to use the databases is to follow the installation procedure listed below.

1. Establish a subdirectory (e.g., \resdb) using the make directory (mk dir) command from DOS on one drive of your harddisk for the database files and search programs.
2. Copy the files from disk #1, OLYM.dbf and OLYM.dbt into this subdirectory.
3. Activate dBASE III+. Make OLYM the database in use; e.g., type "use OLYM". Add the records from disk 2 to this database using the "append from" command in dBASE; e.g., "append from OLYM2." After all of the records have been appended you will have a database consisting of 2,468 records.
4. The database can now be used, e.g., queried, edited, and updated directly in this form using the dBASE III+ command language.

An automated menu-driven search program designed specifically for the OLYM database is however available on disk three. This program called NRDS consists of a series of linked dBASE programs which allow one to easily query most fields in the database, and to obtain printed and screen summaries of that information, including a bibliography of records identified in a particular search. NRDS exists as a compiled executable file with the extension ".exe". It is compiled using the software called Clipper. It will therefore run independently of any software, and will run much faster than it would run, for example, in the dBASE III environment. NRDS should be copied on to the same subdirectory as the database files. It can be run directly from the "dos prompt" by typing NRDS and a return. A complete

description of the use of the non-park specific version of NRDS including some general suggestions for conducting searches is contained in the 1989 publication: "Users Manual for the National Park Natural Resource Database Search and Storage System" by Roger Hoffman and Gerry Wright, University of Idaho Cooperative Park Studies Unit Report B-89-3. This publication is also available from the CPSU.

Appendix I. RESOURCE MANAGEMENT DATABASE DATA ENTRY GUIDELINES

This appendix contains a list of current database fields and a brief discussion of how data are entered in each.

Study Number (9 characters) [STUD_NUM]

This is a unique identifier for each entry made. This number may or may not be the same as the record number assigned by the computer as each record is entered. The study number is important in keeping track of individual records, and in cross-referencing to other records. Enter the NPS four letter acronym for the park, followed by a hyphen and a four digit number. If more than one person is entering data for the same database, make sure the numbers each assigns are not overlapping.

Year (4 characters) [YEAR]

This field refers to the year the document was published or issued. In coding, enter nd if a date is not provided or is not clear.

Author (65 characters) [AUTHOR]

This field refers the authors of the publication, the individuals conducting the work, etc. Standard citation format is used in data entry. First author is entered last name first, followed by initials. If there are more authors than will fit in the field, omit the remaining authors. If an editor, indicate this with (ed.). If no author is indicated, enter Anon.

Title (2 fields 65 characters each) [TITLE1, TITLE2]

This field contains the complete title of the study, map, plan, book, etc. including punctuation. If a subtitle is given, precede it with a colon at the end of the title. Data entry follows standard citation format. For published books, capitalize words of the title (except for a, an, the, etc.). For journal articles, capitalize only the first word of the title. If the document is a particular edition or volume, indicate this also.

Source (65 characters) [SOURCE]

Source refers to publisher or agency issuing the document. In many cases, such as internal park documents, the source will not be obvious. Park Service reports should be referred to as such. Indicate if the document is an unpublished report. At the end, note the number of pages (e.g.414 p.).

Description (2 fields 65 characters each) [DAT_DESCRP, DAT_DESC2]

This field attempts to provide the best synopsis possible within the limited field of what the document contains. In entering information in this field, we have attempted to use precise language meaningful to those users who would likely be interested in the document. For example, in describing a geological study, we generally use the same geological terms as those in the paper. We also avoid making judgmental statements about the document.

For lengthy descriptions we have often used the Note Field described below to enter further details.

Keywords (65 characters) [KEYWORDS]

We have defined keywords as words, terms, or short phrases that are especially significant in a document, and that are useful in efficiently searching the database for studies on that particular subject. Keywords should be entered using lower case, except where they include a proper name (e.g. Douglas fir). Separate keywords within the field by a single space. Use no punctuation unless it is actually a part of the keyword word or phrase (e.g. C:N ratio).

A list of keywords used in the database and arranged alphabetically is given in Appendix II. Before assigning a new keyword, check this list. If there is already a keyword that is very closely related to the one you want to use, use the old one instead. The best keywords are highly specific, not broad or general.

Categories (1 field 17 characters) [CATEGORIES]

This field contains the numerical codes for resource categories that are defined in Appendix IA. They have been developed to be logical and hierarchical. Documents frequently are concerned with more than one subject area. In assigning category codes, identify the 1, 2, or 3 most important subjects of the document. Enter the appropriate code for each relevant resource category (in the format 06-10). Up to three categories can be entered. Separate codes by a space.

Study Level (2 characters) [ST_LEVEL]

The entry in this field is specific to a resource category and defines the disciplinary level of the study. It is generally only used in reference to biological information. The codes for this field are given below.

Study Level Codes:

- | | |
|-------------------|-----------------------------|
| 1. community | 2. population |
| 3. species | 4. individual |
| 5. physiological, | 6. genetic 7. chemical |

Study Type (2 characters) [STUDY_TYPE]

The code in this field describes the methods employed in creating the document; or the type of document it is. Some studies will specifically state that they are one or another of the study types. Determining the study type for other studies will take some intuition. In some cases defining the study type will be arbitrary. The codes used in this field are listed below.

1. Research - an original study, often including sections on methods/materials, results, analysis, conclusions.
2. Monitoring - data collected regularly, on a long-term basis.
3. Checklist - a study which involves making a more or less complete list of some particular resource in a given area.
4. Survey/inventory - generally a study involving general sampling of habitat or species or subject, i.e., an incomplete list or selective sampling.
5. A treatment or manipulation used as a mitigation measure.
6. A measure taken to protect a resource prior to impact.
7. Maps
8. Photographic collection
9. Illustrations
10. Records such as oral history tapes
11. Collections in the park
12. park field guides
13. Administrative report/study/memo
14. Planning and development report/study/proposal
15. History/exploration of the park
16. Prehistory, ethnography, archeology of the park
17. Promotional brochure/booklet for park facilities/services
- 18 Bibliography
19. Survey of resource damage
20. A numeric database

Beginning Date/Ending Date
(2 fields 4 char. each) [BEG_DATE, END_DATE]

Some studies involve data obtained over a limited span of time. We used this field to indicate the span of time covered by a collection of material being entered as a single record. If

specified in the document, enter the years. If not specified or not appropriate for the document, enter N/A.

Project Status (1 character) [PROJ_STAT]

The current status of the study. Codes are as follows:

1. Project proposed
2. Project on-going or recurring (i.e., monitoring)
3. Project suspended but not complete
4. Project completed
5. Project in-progress

Season (4 fields one logical character each)
[SPRING, SUMMER, FALL, WINTER]

Four logical fields (Fall, Spring, Winter and Summer) cover the season during which data were collected. Each is set by default at "False" so that one need only to enter a T where the season is appropriate. Enter a T in all fields for a study done year long.

Location (65 characters) [LOCATION]

Refers to the site the data was collected, or the area described in the document. Indicate whether the document is regional in scope or specific to the park, and whether the study concerns particular locations or a broad area.

Watershed (90 characters) [WATERSHD]

The entries in this field are specific to watersheds defined for each park. The watersheds are defined by four letter abbreviations. Enter as many watersheds as appropriate for the document, separating each by a space. If the document is not applicable leave field blank. If it applies parkwide, enter all.

Watersheds used in the OLYM database are:

BOGA	OZET
CALA	OCEA
DOSE	QUET
DUCK	QUIN
ELWH	SHOH
GREY	SKOK
HAMM	SOLE
HOH	
LYRE	

Subdistrict (45 characters) [SUBDISTR]

The entries in this field are specific to the ranger subdistricts defined for each park. Four letter abbreviations are used for each. If the document is not applicable to either field leave field blank. If it applies parkwide, enter all.

Subdistricts Used in the Database include:

Ozette, Mora, Kalaloch, Lake Crescent, Hoh River, Quinalt, Elwha, Hurricane, and Hoodsport.

Min/Max UTM's (4 fields 4 characters each)
[MIN_E_UTM, MIN_N_UTM, MAX_E_UTM, MAX_N_UTM]

The database uses UTM coordinates to refer to the precise location of a study area. This convention maintains consistency with NPS geographic information systems guidelines. UTM marks are provided on most recent USGS quad maps. A list of locations used in this database and their respective UTM coordinates and elevation is given in Appendix III. To maintain consistency, new entries for these locations should use these coordinates.

For small features and point locations, enter only maximum north and maximum east, leaving others blank. For larger defined geographic areas use the minimum and maximum coordinates to define a square or rectangle around the study. For rivers and streams, enter the mouth only as a point location. If the location is too broad, uncertain, involves various separate locations or if the study does not involve specific locations, enter N/A in the first field and leave others blank.

Max/Min Elevation (2 fields 4 characters each) [MAX_ELEV, MIN_ELEV]

For studies with specific locations, indicate elevation in meters if such information is provided in the document (or can be obtained from the location data using a map). Enter this information in the min_elev field. If a range of elevations are found in the study enter the minimum and maximum figures in both fields.

Biotic Zone (30 characters) [BIOTICZONE]

This field refers to the individual biotic zone(s) in a park that a study occurs in. These are entered as 2-letter codes separated by a space and include:

AL alpine	DE desert	SA subalpine
PE pelagic	BE beach	GR grassland
MO montane	LF lowland forest	IT intertidal
ST steppe	TU tundra	AQ freshwater aquatic

Additional codes can be defined as needed

Data Availability (65 characters) [DATA_AVAIL]

This field refers to where the source document can be found. Be as precise as space allows for the description in this field. If the document is in the park, indicate at what office or facility. If outside the park, indicate also what town, etc. The idea is to provide enough information for a user to be able to retrieve the document. If additional copies of a document are later found in other locations, add these to the previously entered record/s.

Scale (9 characters) [SCALE]

If mapped data are provided in the document, and a scale is given, enter in the form of 1:xxx,xxx. If more than one map is presented in the document and different scales are used, enter und. If a map is presented, but it is not possible to determine the scale, also enter und.

Computer and Software (2 fields 1 and 15 characters respectively) [COMPUTER, SOFTWARE]

Enter Y if a computerized data set is available. If known, specify the software package used (e.g. dBASE, SPSS). If computerized but the software is not specified in the document, enter und.

Data Type (50 characters) [DATA_TYPE]

Describes elements or the nature of the data in the report. For example, entries in this field might read "includes 3 tables or 4 maps or several photographs.

Distribution (2 characters) [DISTRIBU]

Indicates whether, and how, the data was distributed. Codes are divided into three main categories: in-house documents and reports, materials released to the public, and "other".

IN-HOUSE

- 01 NPS documents (memos, proposals)
- 02 NPS reports (completed work)
- 03 NPS collections (objects, specimens)
- 04 Non-NPS government agency sources
- 05 Non-governmental sources
- 06 Original data
- 07 Topical files (collections of misc. data on subject)

FOR PUBLIC DISTRIBUTION

- 09 Public, NPS pamphlets, brochures, handouts
- 10 Public, NPS publications (including EIS, EA, master plans)
- 11 Public, cooperating association publications (including books, pamph)
- 12 Public CPSU reports

- 13 Public, non-NPS government publications (e.g., USFS)
- 14 Public, non-governmental publications (e.g., commercial publishers, non-profit organizations, universities)
- 15 Public, thesis, dissertations
- 16 Public, professional (refereed) journals
- 17 Public, non-refereed, non-professional or popular journals

OTHER

- 20 Other (e.g., student papers, senior theses)

Repeatable (1 character) [REPEATABLE]

This field provides an estimate of how repeatable or easily a study can be duplicated. It is particularly pertinent to studies in which one can relocate the plots used. Codes are as follows, leave field blank if unknown.

Y = yes N = no M = marginally repeatable

Federal Status, State Status, Park Status
(3 fields, 1 character each)
[F_STATUS, S_STATUS, P_STATUS]

These fields refer to the status of a species respectively as either:

E	on the federal, state or park endangered list
T	on the federal, state or park threatened list
S	on the federal, state or park sensitive list
M	on the federal, state or park monitoring list

Mg-Concern (20 characters) [MG_CONCERN]

Species or situations which are of specific management concern to a park. These are 2-letter codes separated by a space and include the following:

EX	for exotic species	EN	for endemic species
HA	for harvested species	XT	for extinct species
MI	for migratory species	CP	for contaminated and/or
HS	for health and safety		polluted

Funding (2 fields 2 characters each) [FUNDING1, FUNDING2]

Refers to the source of funding for a study or project. Two fields are provided, each with space for a two-digit code. This information is generally placed in the database by park resource management personnel.

Resource Management Element (40 characters) [RES_MAN_EL]

These are project codes assigned by each park as needed in their management plans. The lists are not intended to be exhaustive lists of all resources - just resources for which there are management related research or activities planned. Codes for natural resource elements begin with the letter N- and a number. Cultural resource element codes have a C-, followed by a number. If no code is appropriate leave the field blank.

Serviss 1 and Serviss2 (2 fields 3 characters each) [SERV_ISS1, SERV_ISS2]

This field refers to codes for servicewide issues from the new resource management guidelines. This field is generally filled in by park personnel.

Comments (2 fields 65 characters each) [COMMENTS1, COMMENTS2]

Use this as a place to continue lengthy entries in other fields, or to provide additional important details about the document. If a continuation from another field, make this clear by ending the overflowing field with [see Comments], and starting the Comments field with, for example, [Title cont.].

Notes/Remarks (memo field) [NOTES]

This special field allows one to append to a record more extensive text than the record itself allows. A word processing file linked to that specific record is invoked by moving the cursor into the field labeled "notes", and pressing Ctrl-PgDn (Ctrl-Fn-PgDn on the portable). We have used this to list photographs, files, artifacts, maps, and other sets of materials that are too time and space consuming to enter as separate records. Save the Notes entry by pressing Ctrl-W, before returning to the main entry screen with Ctrl-PgUp.

Appendix IA. Codes for Resource Categories and Subcategories

Categories	Subcategories
01 ATMOSPHERIC METEOROLOGIC	00 general 01 atmospheric processes (photochemical oxidation, cloud formation, etc.) (Climate/Weather) 10 climate, weather (general) 11 wet deposition (acid ppt., snow chemistry, snow surveys, etc.) 12 dry deposition 13 temperature 14 wind 15 microclimate 29 other climate/weather-related (Air) 30 general 31 visibility 32 purity 99 other atmospheric/meteorologic related
02 GEOLOGIC	00 general 01 geologic processes (seismic events, glaciation, orogeny, volcanism, erosional processes, rockfall 10 minerals 30 rock types (incl. igneous, metamorphic sedimentary, and specific types of. 50 formations (anticlines, synclines,) 60 landforms & features (dunes, blowouts, moraines, cirques, canyons, caves, glaciers, islands, shorelines, floodplains) 80 soil 90 fossils 99 other geologic-related (mines, etc.)
03 HYDROLOGIC	00 general 01 hydrologic processes (flooding, currents, wave action, tides, etc) 10 ground water (Spring) 20 general 21 hot springs, thermal features 22 cold springs 30 streams, rivers 60 lakes, reservoirs 90 ocean 99 other hydrologic including water quality

04 BIOLOGIC	00 general
05 PLANTS, FUNGI, ALGAE	00 general (Non-vascular; fungi, rusts, lichens)
	01 general
	02 lichens
	03 bryophytes
	04 algae
	50 other non-vascular plants
	51 vascular: club mosses, ferns, conifers, flowering plants
06 ANIMALS	00 general
	01 prokaryotes/protists (Invertebrates)
	02 general
	03 brachiopods/mollusks
	04 insects
	19 other invertebrates (Vertebrates)
	20 general
	21 fish
	30 herps, amphibians (Birds)
	40 general
	41 raptors
	59 other birds (Mammals)
	60 general
	61 pinnipeds
	70 carnivores
	80 ungulates
	99 others: insectivores, bats, lagomorphs, rodents
07 BIOLOGIC PROCESSES	00 general
	01 competition
	02 herbivory
	03 parasitism
	04 predation
	05 succession
	06 symbiosis
	99 other; plant development, reproduction, animal use
08 ECOSYSTEM PROCESSES	00 general
	10 general
	11 fire
	12 nutrient/mineral cycling
	13 energy transfer
	14 gas exchange
	50 other ecosystem processes e.g., natural disturbance
	99 other ecosystem-related

09	ANTHROPOGENIC	00	general
		01	adjacent lands
		10	archaeologic
		20	boundary
		30	historical/cultural
			(Legislation/policy)
		40	general (CFR, NEPA, CAA, CWA, etc.)
		41	NPS-specific
		42	park-specific
		49	other legislation or policy
			(state regs, zoning)
		50	native cultures
			(NPS Management)
		60	planning documents (DCP, RMP, IP)
		61	EA's, EIS's, etc.
		62	administrative history
		63	legislative history
		64	IPM program
		69	other NPS management-related
			(Visitor Use)
		70	visitor use impact data
		71	use patterns
		72	visitor surveys
		79	other visitor-use related including
			mitigation of visitor impacts
		99	other anthropogenic-related
			including visitor guides, maps of
			trails and visitor facilities

¹ Note: "General" covers all or several categories or subcategories. "Other" covers a single specific subcategory not already listed.

Code entries in the field "Categories" in the database as follows: e.g., 01-03 02-05 etc. for as many categories and subcategories that apply.

Appendix II. Alphabetical Keyword List for the Olympic Database

A

abundance, Acer, acid rain, activities, activity,
administration, administration building, administrative,
administrative history, albedo, alder, Alnus, alpine,
aerial photograph, aerial reconnaissance, agaric, age,
age distribution, age structure, aggression, air, air quality,
amphibian, anadromous, animal, anion, anthropology, antler,
aphid, appraisal, aquatic, archaeological,
archaeological collection, archaeological site, archaeology,
architecture, artifact, assessment, association, atmospheric,
attitude, autobiography, avalanche,

B

backcountry, backcountry management, bald eagle,
balsam wooly aphid, bark beetle, barred owl, baseline, basemap,
bear, beaver, bedrock, beetle, behavior, bibliography,
bigleaf maple, biological collection, biology, biomass,
biosphere reserve, bird, bobcat, bog, botany, boundary,
breeding, bryophyte, building,

C

camping, campground, campsite, capture, carrying capacity, catch data, cation, census, cervid, Cervus, characteristic, checklist, chemistry, chinook, chipmunk, chlorine, climate, cloud, coastal, collection, colonization, community, community development, communities, competition, concession, condition, conductivity, conifer, contour, correspondence, cottonwood, cougar, count, cover, creel census, crystal, cultural, culture, cutthroat,

D

dating, debris, debris flow, decay, deer, deformation, demography, density, deposit, deposition, development, diatrophism, discharge, disease, dispersal, distribution, disturbance, diversity, Douglas fir, drainage, drilling, drought, duck,

E

eagle, ecology, economic, economic development, economic impact, ecosystem, elevation, elk, endangered, endemic, endemic species, energy, energetics, environment, environmental, environmental assessment, environmental control, environmental impact, epiphyte, erosion, escapement, ethnographic, ethnography, ethnological collection, Eutamias, excavation, exclosure, exhibit, exotic, exploration, extremes,

F

facility, fauna, feeding, feeding behavior, fern, Festuca, field guide, fieldwork, fir, fire, fire history, fire management, fish, fisher, fishery, fishing, flora, flood, flow, fluvial, food, forage, forage habits, Foraminifera, forest, forest floor, Forest Service, fossil, frost, fuel, fungi,

G

gas, genetics, geologic, geology, geological collection, geography, geomorphology, germination, glacier, glacier terminus, goat, grass, gravimetry, graywacke, grazing, grouse, growth,

H

habitat, habits, hare, harvest, hatchery, hazard, health, heavy metal, herbaceous, herbivory, hemlock, hibernation, historic, Historic Register, historic photograph collection, historic resource, historic structure, historical, historical collection, history, homesteader, hot spring, human impact, human impact inventory, humidity, hybridization, hydrology,

I

ice, ice flow, ice worm, identification, impact, Indian, industry, insect, insectivore, intertidal, interpretation, interpretative, interview, invasion, inventory, invertebrate, isotope,

J

K

key,

L

lake, lamprey, land appraisal, land status, land use,
landscape, landslide, legend, legislation, legislative,
legislative history, lichen, life cycle, life zone, lightning,
limnology, lithology, litter, lion, liverwort, loon, Lupinus,
lynx,

M

mammal, management, manganese, map, marine, marmot,
mass balance, mass budget, master plan, meadow, measurement,
memoir, metamorphic, microenvironment, microfossil, Microtus,
migration, mine, mineral, mineral deposit, mining, mining
claim, minnow, modeling, mole, moisture, monitoring, montane,
morphology, mortality, moss, mountain, mountain goat,
mountain lion, mountain passes, mountain sheep, mountaineering,
movement, mudflow, mudminnow, museum, myth,

N

National Register, Native American, natural areas,
natural history, natural resources, nest, niche, nitrate,
nitrogen, nitrogen fixation, nursing, nutrient, nutrition,

O

observation, occurrence, oil, old-growth, Olympic marmot,
Ophiobolus, oral history, Oreamos, origin, overstory, owl,
oxygen, ozone,

P

paleomagnetism, paleontological collection, palynology,
park establishment, particulate, pattern, Peromyscus, pest,
petroleum pipeline, petrology, pH, PHeacomys, phenology,
photograph, physical, physiography, physiology, planning,
plant, Pleistocene, plot, policy, pollen, pollution,
population, prairie, precipitation, predator, prehistoric,
prehistory, preservation, production, productivity,
Pseudotsuga,

Q

R

raccoon, radio carbon dating, radio collar, radio-telemetry,
rain, rain forest, rainbow, range, rare, reconnaissance,
recording, recreation, red alder, regeneration, rehabilitation,
reproduction, reptile, research, reserve, reservoir,
resilience, resource, restoration, revegetation, river,
river drainage, river terrace, river valley, road, rock,
rodent, runoff,

S

salmon, salmonid, salt, sampling, seashore, sedge, sediment, seedling, seismic, sensitive, settlement, sex, scenery, Scapanus, sculpin, shelter, siltstone, silver fir, silver trout, sitka spruce, skull, small mammal, slide, snow, snow depth, snowbank, snowfall, snowmelt, social, social behavior, socioeconomic, sociological, sockeye, sodium, soil, soil chemistry, solar radiation, Spagnum, spawning, species, spectrographic, spring, spotted owl, spruce, stage, statistics, steelhead, stocking, stomach contents, stratigraphy, stream, streamflow, structure, study skin, subalpine, succession, sulfate, survey, Synthyris,

T

tagging, taxonomy, tectonic, telemetry, temperature, terminus, terrace, territory, terrestrial, thermal, thermal ice drill, thickness, threatened, thrush, timber, timber salvage, timberline, tool, topography, Townsend's mole, toxin, trace element, trail, trail history, trampling, transportation, trapping, tree, trout,

U

use, utility,

V

valley, vegetation, vegetation survey, vegetation zone,
visibility, visitor, visitor attitude, visitor impact,
visitor use, volcanic, vole

W

warbler, water, water access, water chemistry, water quality,
watershed, weaning, weather, whitehead, wildflower, wildlife,
wilderness, wilderness management, wind, windblown,
winter range, wood, World Heritage Park,

X

x-ray diffraction,

Y

Z

zone,

Appendix III. List of UTM'S and Elevations used in the Olympic Database.

Location	Min E	Max E	Min N	Max N	Elev (m)
OLYM parkwide	3710	4910	52590	53480	
Black (Mud) Glacier	4452	4480	52945	52962	
Blue Glacier	4475	4491	52940	52975	1200-2400
Blue Mountain	4806		53110		1831
Cape Alava	3715		53358		
Coastal parts of OLYM	3710	4000	52680	53480	
Deer Park	4805		53105		
Eagle Point (on Hurricane Ridge)	4695		53095		
Elk Mountain	4720	4760	53070	53090	
Elwha Ranger Station	4562		53179		
Enchanted Valley	4700	4740	52790	52830	
Glaciers, OLYM park-wide	4430	4910	52820	53070	
High mountain area (OLYM)	4240	4910	52690	53480	
Hoh fire	4400	4440	53026	53055	290-1540
Hoh Rain Forest (OLYM)	4230	4430	52962	53033	
Hoh Ranger Station	4302		53011		
Hoh River	3930	4540	52875	53030	
Hoh River, mouth	3922			52898	
Hoh River valley	3930	4550	52840	53040	
Humes Ranch (Elwha)	4592		53105		
Hurricane Ridge	4650	4760	53070	53130	
Kalaloch cliff site	3975		52770		3-35
Klahhane Ridge	4650	4678	53150	53160	
Klahhane Ridge, south slope	4655	4690	53145	53160	

Location	Min E	Max E	Min N	Max N	Elev (m)
Lake Crescent	4310	4450	53220	53270	
Lake Crescent Lodge	4405		53226		183
Lake Mills(center)	4550		53150		
Lake Mills	4545	4560	53130	53165	
Mt. Angeles	4652		53157		1968
Mt. Olympus (peak)	4467		52942		2429
Mt. Olympus Nat. Mon., (1937 boundaries)	4475	4485	52872	52895	
OLYM headquarters	4678		53275		
Olympic Hot Springs	4485		53138		629
Olympic Mtns. research station (UW)	4480		52965		2025
Olympic Nat. Forest	4000		52370	53358	
Ozette homestead site	3740		53355		24-49
Ozette Lake	3755	3810	53215	53342	
Ozette Lake, center	3780		53275		
Ozette village archaeological site	3715		53358		
Pioneer Mem. V.C.	4682		53273		
Queets Corridor	4035	4312	52658	52888	
Rivers & streams, western half of OLYM	3710	4550	52590	53480	
Sol Duc Hot Springs	4356		53130		501
South Fork, Hoh River, mouth	4235		52965		
South Fork valley, Hoh River	4240	4410	52900	52965	
Toleak Point	3845		52988		
White Rock village archaeological site	3729		53327		

LIST OF OLYM WATERSHED AND RANGER SUBDISTRICT ABBREVIATIONS

Revised 7/26/88

Watershed	Abbreviation
Bogachiel	Boga
Calawah	Cala
Dosewallips	Dose
Duckabush	Duck
Elwha	Elwh
Greywolf, Dungeness	Grey
Hamma Hamma	Hamm
Hoh, main fork	MHoh
Hoh, south fork	SHoh
Hoko-Ozette	HoOz
Lyre	Lyre
Morse Creeks	Mors
Ocean Creeks	Ocea
Skokomish	Skok
Soleduck	Sole
Strait Creeks	Stra
Queets	Quee
Quinault	Quin

Ranger Subdistrict	Abbreviation
Elwha	Elwh
Hoh	Hoh
Hoodspout	Hood
Hurricane	Hurr
Kalaloch	Kala
Mora	Mora
Ozette	Ozet
Quinault	Quin
Soleduck	Sole

LIST OF OLYM WATERSHEDS AND RANGER SUBDISTRICTS
FOR SELECTED LOCATIONS
Revised 7/26/88

Location	Watershed	Ranger Subdistrict
OLYM parkwide	all	all
Ahlstrom's prairie	Hoko-Ozette	Ozette
Black (Mud) Glacier		Hoh
Blue Glacier	Hoh, main fork	Hoh
Blue Mountain	Morse Creeks	Hurricane
Cape Alava	Hoko-Ozette	Ozette
Coastal parts of OLYM	Hoko-Ozette & Ocean Creeks	Ozette, Mora, Kalaloch
Deer Park	Morse Creeks	Hurricane
Deer Ridge	Morse Creeks	Hurricane
Eagle Point (on Hurricane Ridge)	Morse Creeks	Hurricane
Elk Mountain	Morse Creeks	Hurricane
Elwha Ranger Station	Elwha	Elwha
Enchanted Valley	Quinault	Quinault
Fairholm	Lyre	Soleduck
Glaciers, OLYM park- wide	Various	Hoh, Hoodsport, Elwha, Kalaloch, Quinault
High mountain area (OLYM)	Various	Hoh, Elwha, Hoodsport, Kalaloch, Quinault
Hoh fire	Hoh, main fork	Hoh
Hoh Rain Forest (OLYM)	Hoh, main fork	Hoh
Hoh Ranger Station	Hoh, main fork	Hoh
Hoh River	Hoh, main fork	Hoh
Hoh River, mouth	Hoh, main fork	Hoh
Hoh River valley	Hoh, main fork	Hoh
Humes Ranch (Elwha)	Elwha	Elwha

Location	Watershed	Ranger Subdistrict
Hurricane Ridge	Morse Creeks	Hurricane
Kalaloch cliff site	Ocean Creeks	Kalaloch
Klahhane Ridge	Morse Creeks	Hurricane
Klahhane Ridge, south slope	Morse Creeks	Hurricane
Lake Crescent	Lyre	Soleduck
Lake Crescent Lodge	Lyre	Soleduck
Lake Mills(center)	Elwha	Elwha
Lake Mills	Elwha	Elwha
Mt. Olympus (peak)	Hoh, main fork	Hoh
Mt. Angeles	Strait Creeks	Hurricane
OLYM headquarters	Strait Creeks	Hurricane
Olympic Hot Springs	Hoh, main fork	Hoh
Olympic Mtns. research station (UW)	Hoh, main fork	Hoh
Olympic Nat. Forest		
Ozette Lake	Hoko-Ozette	Ozette
Ozette Lake, center	Hoko-Ozette	Ozette
Ozette village archaeological site	Hoko-Ozette	Ozette
Pioneer Mem. V.C.	Strait Creeks	Hurricane
Point of Arches	Hoko-Ozette	Ozette
Queets Corridor	Queets	Kalaloch
Roose's prairie	Hoko-Ozette	Ozette
Rivers & streams, western half of OLYM	Various	Elwha, Hurricane, Hoodsport, Quinault
Sand Point	Hoko-Ozette	Ozette

Location	Watershed	Ranger Subdistrict
South Fork, Hoh River, mouth	Hoh, south fork	Hoh
South Fork valley, Hoh River	Hoh, south fork	Hoh
Staircase R.S.	Skokomish	Soleduck
Toleak Point	Ocean Creeks	Mora
White Rock village archaeological site	Hoko-Ozette	Ozette

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural and cultural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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