

## FINDING THE INFORMATION YOU NEED A Guide for Conducting Literature Searches

### Databases – Where to Look<sup>i</sup>

These databases are widely available and can be useful in finding biological resources. You may have access to additional databases through your university's library.

**Web of Science Core Collection.** Contains articles from multiple scientific disciplines.

**Aquatic Sciences & Fisheries Abstracts.** Contains material in multiple formats (journal articles, conference proceedings, books, reports) from the fields of aquaculture, aquatic sciences, and fisheries. ASFA has a thesaurus which allows you to search with controlled terms, and also an “explode” feature – allowing you to search for a broad thesaurus term and all its related terms.

**Zoological Record.** Contains material in multiple formats (journal articles, books, meetings, reviews) from the fields of animal biology and ecology. This database also uses a thesaurus, which allows you to search with a controlled list of search terms.

**Your university's library search (e.g. Summon).** Returns a variety of material available in the library.

**Google Scholar.** Contains multiple formats from multiple disciplines. This database has fewer options to customize your search – see the specific section in this document for additional information. Google Scholar also searches through the full text of articles, unlike other databases which are unable to do this.

**Taxonomic and biodiversity databases.** NCBI Taxonomy, Integrated Taxonomic Information System (ITIS), Encyclopedia of Life, and E-Flora BC are useful resources.

You could also try **BIOSIS Previews, BioOne, PubMed, Fisheries & Oceans Canada Library**, etc.

### Search Terms – What Words to Use

**Search for a species in multiple ways.** Consider including both the common and scientific names for a wider breadth of results. Also, try searching at different taxonomic levels.

**Use the terminology found in other sources.** If you have already found some material relevant to your search, consider using the terminology from the keywords section or from the rest of the text.

**Explore controlled vocabulary lists.** Some databases, like Zoological Record, will have a thesaurus of keywords. Consider looking through these lists to find relevant search terms.

**Use synonyms.** This will help you include related terms in your search.

**Use quotation marks around multi-word terms.** Quotation marks allow you to search for small phrases as a single unit.

## Search Operators – How to Be Precise (With Examples)<sup>ii</sup>

Use search operators in any combination to refine your search. These guidelines are specific to Web of Science and Zoological Record, but other databases will be very similar (except Google Scholar).

**AND.** Use the AND operator to find search results that contain all the terms you specify. For example, *algae AND bamfield AND temperature*.

**OR.** Use the OR operator to find search results that include any one of the terms you specify. For example, *kelp OR seaweed*.

**NOT.** Use the NOT operator to find search results that exclude a term. For example, *pacific NOT atlantic*.

**NEAR/x.** Use the NEAR/x operator to specify how close together two search terms must be. The 'x' value represents the maximum number of words that can separate the two terms. For example, *disease NEAR/2 salmon* would find "salmon with disease" and "disease pathology in salmon," but not "disease that affects freshwater salmon."

**Parentheses.** Search operators have an order of precedence, similar to "BEDMAS" and the mathematical order of operations. The search operators are processed in the following order:

- 1) NEAR/x
- 2) NOT
- 3) AND
- 4) OR

Use parentheses in your search to override this order (again, similar to BEDMAS). For example, in the search *(algae OR seaweed) AND bamfield*, the OR operator gets processed first.

**Quotation marks.** Use quotation marks to search for a phrase exactly as you specify. For example *"natural selection"* or *"pile perch fishing."*

**Asterisks.** Use an asterisk to represent any number of characters (zero to many) following the root of a word. For example, searching for *evol\** would return "evolution" and "evolve"; searching for *oyster\** would return both the singular and plural of the word.

## Too Few Results? – How to Broaden Your Search

**Use broadening operators, synonyms, and related terms.** The OR and asterisk search operators will include more items in your search results. Use these operators to include more keywords in your search.

**Search at a higher taxonomic level.** Consider searching at the genus or family level.

**Use a multidisciplinary database.** Google Scholar and Web of Science may produce a wider breadth of results.

**Find resources in other ways.** Use the reference lists and "cited by" lists for relevant articles.

## Too Many Results? – How to Narrow Your Search

**Filter your results.** Refine your search to only include a certain format (e.g. articles only), journal, date range, etc.

**Use narrowing operators.** The AND, NOT, NEAR/x, and quotation mark search operators will generate fewer results.

**Search at a lower taxonomic level.** Use the species or sub-species name.

**Sort in order of relevance.** Consider sorting your results by date or by number of times cited. This may move the more relevant results to the top of the list - if you are looking for recent or influential articles.

**Use a more specific database.** Discipline-specific databases (Zoological Record, ASFA, etc.) may produce fewer and more relevant results.

**Search within the title field.** Searching for terms within the title may generate results that directly relate to your topic.

## Tracking Resources– How to Save Your Results

Keeping track of the resources you are using is important, and can be overwhelming when you are reading lots of material. Here are a few ideas to make this easier.

**Use a citation manager.** Citation managers allow you to save article information, store PDFs, and produce reference lists in various citation styles. Some are free (e.g. Zotero, Mendeley), and others may be offered for free through your university.

**Create a “saved list” in the database.** Many databases give you the ability to add items to a saved list of resources throughout your search (called a “Marked List” in Web of Science). You can email, print, or save the list to a citation manager when you are done searching.

**Save results in Google Scholar.** If you are using Google Scholar and signed into your Google account, you can save results to “My Library.”

## Still Stuck? – Additional Ideas

**Consult the Subject Guides from university library websites.** These guides may suggest useful places to look for information.

**Ask a librarian (or student librarian)!** Part of our job is helping students with their research, and we are always happy to do so.

## Searching with Google Scholar – Specific Tips<sup>iii</sup>

Google Scholar is notably different from other databases, and therefore deserves its own section.

**Know what is available through your university.** When using Google Scholar, consider going to Settings -> Library Links and entering your university. This way, you will be provided with a direct link to access any material available through your university.

**Save your results.** If you are signed into your Google account, you can save results to “My Library.”

**Use quotation marks.** Google Scholar supports the use of quotation marks to search for phrases.

**Use the OR operator.** Use the OR operator similarly to how you would in other databases. Within Google Scholar, the words immediately to the left and right of the OR operator are recognized. For example, searching for *natural selection OR evolution* in Google Scholar would return results equivalent to *natural AND (selection OR evolution)* in other databases.

**Use “-” in place of the NOT operator.** The NOT operator is not recognized by Google Scholar. However, using “-” in front of terms you wish to exclude has the same effect. For example, *fish -salmon* will exclude fish related results pertaining to salmon, and is equivalent to *fish NOT salmon* in other databases.

**Use “intitle:” to search for terms in article titles.** Google Scholar normally searches the full text of articles, but using “intitle:” finds terms specifically in the article title. This feature only looks for terms exactly as you provide them. For example, *intitle:bivalves* would return articles with the term “bivalves” in the title, but not with “bivalve” in the title.

As another example, searching for *intitle:geoduck intitle:growth temperature* would return results with both “geoduck” and “growth” in the article title, and with “temperature” being found anywhere in the article.

**Avoid using parentheses.** Parentheses are not supported by Google Scholar.

**Avoid using asterisks.** Google Scholar automatically finds related terms with different endings, so this is unnecessary. However, one exception is when the term is surrounded by quotation marks – this looks for the phrase exactly as you specified.

**Avoid using the AND operator.** The AND operator is implied when searching for multiple terms with Google Scholar. However, this is sometimes referred to as a “soft AND,” since all the terms you specify are not guaranteed to appear in search results. For example, *green algae bamfield* in Google Scholar is similar to *green AND algae AND bamfield* in other databases.

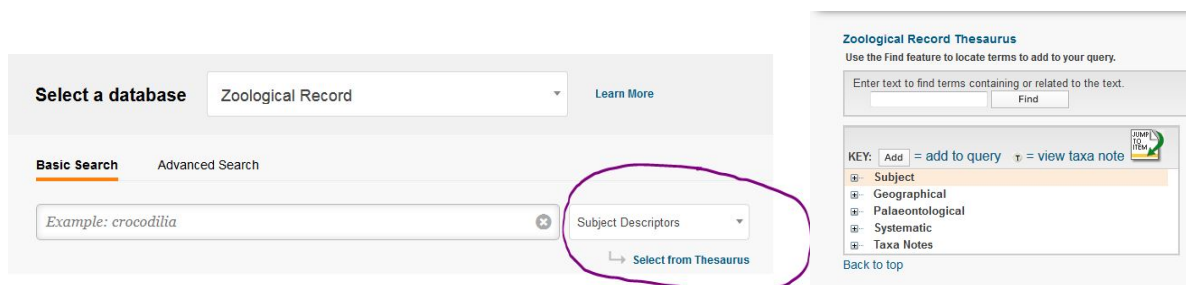
**Consider using other databases for complicated searches.** Because of the unpredictability of Google’s search algorithm and the lack of search operator options, more complicated searches may be better suited for other databases like Web of Science Core Collection.

## Using a Thesaurus – How to Find Related Terms

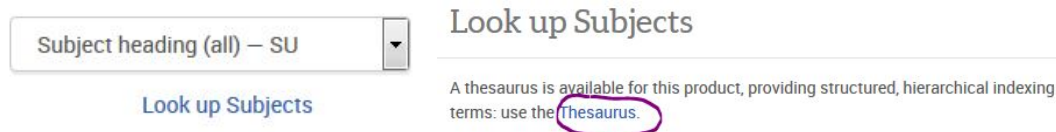
Zoological Record, ASFA, and many other databases have a thesaurus feature which can help you find related keywords.

**Find out how to access the thesaurus.** Finding the thesaurus will be different depending on which database you use.

- 1) In the Zoological Record database, select “Subject Descriptors” from a drop-down menu on the basic search page. Underneath, choose “Select from Thesaurus,” which will bring you to the thesaurus window. This process can be seen in the images below. (Screen captures from Web of Knowledge)<sup>iv</sup>.



- 2) In the ASFA database, select “Subject heading” from a drop-down menu on the advanced search page. Underneath, choose “Look up Subjects,” which will bring you to a new window. Here, click on the word “Thesaurus” at the top of the window. This process can be seen in the images below. (Screen captures from ProQuest)<sup>v</sup>.



**Look for broader terms, narrower terms, and related terms.** Terms in a thesaurus are linked to each other if they are part of a hierarchical relationship. For example, *blue* is a type of *colour*, so *blue* is a narrower term of *colour*. Inversely, *colour* is a broader term of *blue*. Find terms that are as general or as specific as you require for your search.

Additionally, thesauri can help you find synonyms for your keywords through what are called related terms.

**Know the specific features of the thesaurus you are using.**

- 1) Zoological Record has its terms grouped into the categories such as Subject, Geographical, and Systemic. “Plus boxes” allow you to view narrower terms. Selecting a broader term does not automatically include all the narrower terms below it in your search – you will have to manually add these narrower terms if you wish to include them.
- 2) In ASFA, click on a term to view its broader and narrower terms. Clicking the box immediately to the right of the term will show you its related terms. By checking the “explode” box, you can include the terms you selected - plus all the narrower terms underneath - in your search.

## References

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<sup>i</sup> “Key databases in Natural Sciences & Resource Management” handout, provided by UBC Library

<sup>ii</sup> Web of Science. (2009). Search operators. Retrieved from

[https://images.webofknowledge.com/WOK46P9/help/WOS/ht\\_operators.html](https://images.webofknowledge.com/WOK46P9/help/WOS/ht_operators.html)

<sup>iii</sup> Tay, Aaron. (2015, October 23). 6 common misconceptions when doing advanced Google searching. Retrieved from <http://musingsaboutlibrarianship.blogspot.ca/2015/10/6-common-misconceptions-when-doing.html>

<sup>iv</sup> Web of Knowledge. Retrieved from <http://www.webofknowledge.com>

<sup>v</sup> ProQuest. Retrieved from <http://www.proquest.com/>