# Study Guide for How to Acquire, Evaluate, and Use Evidence

**Objectives of this Module**

1. Explain what is the information standard for ESA consultations and what it means.
2. Explain why good information is valuable to the consultation.
3. Set up a search strategy.
4. Conduct an information search using various tools and document the results.
5. Compare and weigh conflicting evidence.
6. Verify compliance with ESA standards.

### Introduction

Best available information, best science, and sound science are terms consultation biologists hear frequently. But what exactly do these phrases mean, and how do they influence the consultation process? Collecting, analyzing, and using information appropriately is necessary for successful consultation. In fact, the *1994 Interagency Cooperative Policy on Information Standards Under the ESA* (59 FR 34271) requires biologists to evaluate *all* scientific and other information that will be used to prepare biological opinions, incidental take statements, and biological assessments. The standard states, “Any information used by the Services to implement the Act is reliable, credible, and represents the best scientific and commercial data available.” The importance of good evidence is also highlighted in the Interagency Consultation Handbook. In the “Introduction to Section 7 Consultation,” the philosophy guiding section 7 work (pg 1-2) includes the following:

- The biology comes first. Know the facts; state the case; and provide supporting documentation.
- Base the determination of jeopardy/no jeopardy on a careful analysis of the best available scientific and commercial data.

In order to successfully complete consultation using the best available information, consulting biologists must know how to search for information, retrieve it, and use it properly once it’s obtained. Biologists must also be able to compare conflicting data and determine the appropriate evidence to use. The administrative record of a good consultation should contain documentation of the process the consulting biologist went through to obtain the evidence, including a clear explanation of the evaluation of evidence that supports or does not support a position.

### Why Do We Need Good Information?

We use information throughout the consultation process. Information provides the foundation for the analyses and decisions we make during consultation, culminating with the concurrence or jeopardy/adverse modification determination. We use the best available data to establish the status of the species and the base condition, and to get a better understanding of the proposed action. We use evidence to establish the action area and to ascertain how, where, and to what extent the species will be exposed to the action within the action area. Finally, we need good information to determine how the species is likely to respond to stressors from the proposed action and to establish what we think this means for the conservation of the species.

While we are completing these various steps in the consultation, using the best available information ensures that we are minimizing error. If we use poor or out-of-date information, we increase the chances that we are making incorrect decisions with potentially dangerous consequences for listed species. For example, if we don't have a good idea of what the species status is (perhaps because we have been recycling the same status and environmental baseline sections in our opinions for the past five years?), we may falsely conclude that a project will not reduce the species likelihood of surviving and recovering in the wild when, in fact, it will. Or, if we don't fully understand how a species may respond to changes in microclimate, we may erroneously determine a small change in ambient temperature will adversely affect the species when, in fact, it will not.

Errors such as this latter example are called Type I errors. Statistically, *Type I error* occurs when a true hypothesis is rejected. Think of a Type I error as a *false alarm*. In consultation terms, we commit a Type I error when we incorrectly conclude that an effect did occur when in fact, it did not. The other type of error is a *Type II error*. A Type II error occurs when a false hypothesis is accepted. A good way to think of Type II error is as a *failed alarm*. The first example above is a Type II error, where we falsely conclude that an effect won't happen when in fact, it will.

In consultation, it is particularly important to minimize the likelihood of Type II error. This often puts us at odds with the scientific community, where the focus is often on minimizing Type I errors, such as minimizing false detections. This is perfectly understandable, given the goals of most research. For example, determining a drug was efficacious when it actually isn't would have serious consequences for the patients who took the drug. For this reason, scientists will often set the risk standard very low. In contrast, under the ESA, Federal agencies have an obligation to insure that actions are not likely to jeopardize the continued existence of listed species or destroy or adversely modify critical habitat. To give the benefit of the doubt to the species, we must be more concerned about the failed alarm than the false alarm. The cost of incorrectly concluding that there isn't an effect is much higher than the cost of incorrectly concluding that there is an effect. If we commit a Type II error, we may erroneously conclude a proposed action is not likely to adversely affect listed resources, jeopardize the continued existence of a species, or adversely modify critical habitat when, in fact, the action is likely to result in one of these. One way we can minimize the likelihood of Type II error is to make sure we are using the best available data in our consultations.

### ***What Is the Best Scientific and Commercial Data?***

This term is perhaps more easily defined by what it *isn't*. Consulting biologists receive and use evidence from a wide variety of sources in order to complete consultations. Some of this information is peer reviewed and published in professional journals. Often, though, the information is anecdotal, personal comments, from gray literature, etc. In order to be considered the best scientific and commercial data, it has to be creditable. But it does not necessarily have to be peer reviewed, published, most recent, or even specific to the facts of the consultation (e.g., information about a surrogate species may be the best available).

The data covered by the "best available" standard includes:

- Data on the biology and ecology of the listed resources covered by the consultation
- Data on the behavior of listed species
- Data on the biology, ecology, and behavior of similar species
- Data on the dynamics of populations (e.g., declining or small populations)
- Data on the interaction between species and habitats
- Data on the types of stressors that may result from an activity
- Data on the response of individuals to certain stressors

Note that the criteria for the standard are expansive. The best data for your consultation may go beyond data on the particular listed resource in a particular place.

It may seem obvious, but in order to be the "best available," evidence needs to be, well, *available*. This means that the information has to be accessible during the consultation period. A study that won't be completed for six more months is not available for a consultation that will be completed next month. Of course, at times, it is appropriate to suspend consultation until a study can be completed, but this should be the exception, not the rule. Congress intended the term "best *available*" to allow the Services to issue biological opinions even when inadequate information is available, so as to not unduly impede proposed actions (H.R. Conf. Rept. 697, 96th Cong, 2d Session (1979)). In a typical consultation, a good rule to use is the evidence must be available before the end of the 90-day consultation period. If it's not available in final form, "draft" may be the best available.

Note the statute does not say "best possible." Flaws in methodology or bias will not necessarily place some evidence outside of the "best scientific and commercial data available," if it's the only data available. A study with a small sample size, for example, may be the only information you have. The DC Circuit Court reinforced this standard in 2001 (Building Industry Assn of Sup. Cal. V. Norton). In an appeal that challenged the FWS' listing of vernal pool fairy shrimp in California, the Court reminded the appellants that the FWS must utilize the "best scientific … data available," not the best scientific data possible. The plaintiffs had argued that a study relied on heavily by the FWS to make the final listing decision was flawed. The Court responded that, even if the report was imperfect, in the absence of any superior evidence, "occasional imperfections do not violate [the statute]."

This is not to say that you must accept all evidence that is provided to you or that you find in your searches. We still need to look for the "best" among the options that are "available." If you are fortunate to have multiple pieces of evidence, you can consider the source, methodology, statistical rigor, and other measures to determine whether a piece of evidence is suited to your purposes, as long as you make sure you are giving the benefit of the doubt to the listed resource while assessing the evidence. You can and should exclude poorly constructed studies, evidence from questionable sources, or imprecise evidence if there are superior data available. You will need to document your rationale for excluding any evidence you find. More on this issue in, "What to do with the information," below.

To be the "best available," evidence also needs to be in a useable format. The "best" data may be in a huge database tracking a population for the past 15 years, but if there is no reasonable way for the consulting biologist, Action Agency, or applicant to access that information (e.g., it's housed on a university campus on the other side of the country), it's not necessarily available to the Services to use in consultation. This also pertains to huge files. The Services are not obligated to spend 80 days of the 90-day consultation period deep in the bowels of some government building, searching through dusty file cabinets. However, there are no hard and fast rules pertaining to how much effort the Services must expend to obtain evidence. A reasonable effort, well documented with explanation as to why certain evidence was not collected, should be adequate.

That being said there may be ways to obtain that information through teamwork. As mentioned in the Analytical Approach module, the consultation should be a joint effort between the Action Agency, the applicant if there is one, and the Service or Services. Nothing in the regulations or policy says that the consulting biologist must bear the burden of doing the literature searches, tracking down the databases, or haunting the bowels of the afore-mentioned government building all by his or herself. In fact, it is the Action Agency's responsibility to provide the Services with the best information. If the Action Agency and/or applicant is actively involved in the consultation, the scope of "best available data" may broaden substantially.

**How to Find Information**

There are numerous tools out there to help the consultation biologist find the best information. Thanks to the wonders of the Internet, many of the tools can be accessed from the office. Both FWS and NOAA biologists have access to a range of databases through their respective agency libraries (see below). Other sources include Agricola (http://www.nal.usda.gov/ag98), Ingenta (www.ingenta.com), Web of Science (http://isi5.newisiknowledge.com), and Scirus (www.scirus.com). Internet search engines such as Google, Yahoo, or Lycos can be used, but you will need to carefully review the evidence you gather from such searches; just because it's on the Web, doesn't mean it's true!

Newspapers, general interest periodicals, and other "popular press" resources may also have some information. They can sometimes be helpful if you are trying to get information about whether certain effects are reasonably certain to occur. For example, an interview with a developer in the local paper where he describes his plans for full build-out of his property once the state highway is widened can give you some evidence of the extent of indirect effects caused by the highway widening project. In general, though, these resources will be less relevant to our consultations.

Many online sources will help the biologist conduct a search and some may even provide abstracts. Most do not provide copies of the documents. Your local college or university library is your best bet for obtaining copies. If you don't live in a college town, check the community library. Many have inter-library loan programs.

There are also many journals that now publish electronically. FWS employees now have access to many of these via the NCTC Library website:

http://library.fws.gov/litsearch

NOAA Fisheries employees can also access journals electronically through the NOAA Central Library website:

http://www.lib.noaa.gov/docs/journals/journals.html

There are also resources available through other agencies. Many Federal agencies such as the Forest Service and EPA have extensive library catalogs. These agencies also often publish full text versions of their internal technical reports online, or you can send away for copies for free or minimal cost.

Be aware that there may be a fee associated with obtaining copies of documents from a library, especially if you have to use the inter-library loan program. These costs are usually minimal and should be absorbed by your office. For FWS employees, the NCTC library (see website address, above) provides a literature search service, including access to several Cambridge Scientific Abstracts databases such as Aquatic Sciences and Fisheries Abstracts (AFSA) and Biological Sciences. AFSA provides access to over 5,000 sources for journal articles, magazine articles, and conference proceedings from 1971 to the present covering the aquatic sciences. Biological Sciences includes abstracts and citations on zoology and ecology from over 6,000 serials, as well as conference proceedings, technical reports, and monographs from 1982 to the present. Consulting biologists can conduct evidence searches using these resources and then view and download selected articles from the online journals database. For articles not accessible online, the librarians at NCTC will retrieve and ship up to 10 articles per two-week period. The library can be accessed from any FWS computer hooked to the Servicewide Area Network. If your office uses a commercial Internet Service Provider, you will have to register a user name and password with the library. Details on how to do this are provided at the website.

For NOAA employees, the NOAA Central Library (see website address, above) provides access to the Library of Congress' FirstSearch database and Cambridge Abstracts Aquatic Sciences and Fisheries Abstracts, along with several other databases. The FirstSearch database, which is available to all NOAA employees, is a comprehensive database that includes 36 other databases like Agricola, ArticleFirst, BasicBiosis, Conference First, Dissertation Abstracts, ECO, Medline, and Toxline databases. ArticleFirst indexes about 12,000 printed sources published since 1990. BasicBiosis indexes 350 sources specific to the physical and biological sciences.

If these or other comparable resources are not available to you, get the Action Agency and applicant involved in the evidence search! If they are conducting the literature searches for the consultation, they can help bear the burden of the time and expense. Of course, even if you do have all the resources at hand, you should still try to get the Action Agency and applicant involved in the consultation, as discussed previously in the Analytical Approach module.

Also remember internal sources – listing packages, recovery plans, older biological opinions, and NEPA documents are often good sources of information.

**What to Search For?**

All of these resources aren't going to do you much good if you don't know how to extract the information from them. In order to **efficiently** obtain the best scientific and commercial data available, you must set up a *search strategy*. Searching for information to assist in your consultation involves more than tracking down the basic information about the species current and historical range, current population numbers, and life history. In order to conduct a viable consultation, you will also need information that will help you establish the status of the species and critical habitat, determine possible routes of exposure, and ascertain possible response mechanisms. The evidence you will need will probably include the following:

- Evidence of reproduction, numbers, and distribution of the species;
- Threats, limiting factors, and conservation needs of the species or habitat;
- Population structure;
- Habitat conditions and interactions between the species and its habitat;
- Types of exposure stressors that occur from a component of the proposed action;
- The duration, timing, or frequency of the exposure stressor;
- Evidence on the species' life cycle and proximity to the stressor;
- Evidence about how certain life stages may respond from exposure to the stressors.

Searching for evidence should not be a one-time deal early on in the consultation. As you progress through the consultation, you may need to revisit your sources to gather more evidence. For example, in the early stages of consultation, or even before consultation is initiated, you should be looking for information about the status of the species and critical habitat. As mentioned in the "Diagnosing Status" module, you should know the history, know the literature, and be able to articulate the status to the Action Agency and applicant. As you learn more about the action and are able to deconstruct the action into its constituent parts, you (or the Action Agency/applicant), will be able to conduct more focused searches on specific actions, routes of exposure, or species' responses, which will result in a larger amount of relevant information. For example, if your proposed action is a housing development, deconstructing the action will help you determine the components of the development and you can focus your search on those components, resulting in more relevant results. Rather than searching for "development," you can look for information on "response of wild birds from exposure to domestic cats", or "amount of pesticides in storm water runoff from residential development."

**Setting Up a Search Strategy**

A search strategy is simply a plan for how you are going to look for evidence. A little bit of pre-planning before you visit the library, either in person or online, will save you time and result in you obtaining a larger amount of *relevant* information, rather than just a large amount of information. Steps to follow when setting up a search strategy include:

1. Formulate a search question. Think about what you need to find out. Are you looking for information about the status of the species or habitat, the base condition within the action area, the possible response of the species to a stressor? You need to ask your question in a way that will further your ability to conduct your analysis and not just get you generic information about the species. Try to put your question in neutral terms to prevent bias. For example,

asking about only negative responses will not provide you with evidence showing the whole scope of possible responses.

Examples:
- o “What is the population structure for the bull trout in the Columbia River DPS? (status)
- o “How might bull trout respond to timber harvest in riparian areas?” (response)
- o “How far downstream is sediment suspended in the water column? (exposure)

2. Identify the key concepts of the search question. These will be your key words. There may be multiple key words from your question that you pair together when actually conducting a search. For example, a search may consist of “bull trout” and “population structure” connected with Boolean terms (e.g., AND, OR, NOT).

3. Determine the scope of your search. Identify the databases you plan on using, how far back in time you plan on searching, and any other restrictions you will place on your search.

4. Prepare a search profile.

   - List the search terms – keywords – you plan on using.
   - List any synonyms, alternate spelling (e.g., English vs. American spelling), or different endings (e.g., singular or plural spellings, adjectives). You can truncate keywords to capture the different endings.
   - Sort all the keywords into categories such as species or habitat, action or effect, modifiers, and Boolean terms. For example, if the question you are asking is, “how are coho salmon likely to respond to the removal of large woody debris from streams?” some sample search terms could be:

Table 1: Search keywords

| Keywords | Paired w/ Keywords: | Modified by: |
|---|---|---|
| Large woody debris, coarse organic particles, coarse woody debris, woody debris, organic debris | Coho, coho salmon, silver salmon, Onchorhynchus kisutch, O. kisutch | Effect, response, impact, change, induce |

5. Conduct your search, using various combinations of key words you’ve identified. During your search, you can string together terms from each column. A search would look like this:

KW=((woody debris) OR (organic debris)) AND KW=((coho) AND TI=((response)

Notice that this search string includes different field codes – keywords (KW) and title words (TI). You can run searches using different field codes in order to obtain more results. The advanced search function associated with the various online databases will walk you through much of this process.

6. Review the results. Is it retrieving the information you need? The search string above resulted in four records in the ASFA database. Modify your search if necessary. If your results are too large, add additional keywords or use more specific key words. If your search produced too few results, check your spelling, try other synonyms or more general terms, try truncating the key words, or add more keywords using the Boolean “OR”. For example, if we wanted to broaden our search on the effects of large woody debris on coho salmon, we could replace the term “coho” with a more general “salmon” (truncated), and add more modifiers:

KW=((woody debris) or (organic debris)) and KW=salmon* and TI=(response or effect or change)

This search string resulted in 10 hits (seven that were useful).

7. Use your results as a springboard for other searches (sometimes called “snowballing”). Review the records from your first search. Use the keywords, author, or references from those documents to run additional searches. Just don’t go crazy with the snowballing; set time limits, and keep your original question in mind, otherwise you could end up with a lot of interesting, but ultimately irrelevant information.

**Documenting the Search**

Once you have completed your search, you should document it for the administrative record. This involves more than simply including a print out of your search results in the record. You need to:

- Show what you searched for
- Show what you found and didn’t find
- Show what you rejected, and explain why
- Summarize the results of the evidence you found
- Summarize what you concluded from this evidence

By providing this information, you demonstrate to the reader that the evidence used in your consultation was the best available.

One concise way to document is by creating a search report. A search report describes the process you went through to obtain evidence to answer a particular question. In it, you describe where you searched (e.g., the databases you accessed), the keywords you used, how you modified them, and the results obtained from the search. If you further restricted your results based on the study methodology (more on this below), you can describe these inclusion criteria in the search report. If you looked at species other than the ones you are consulting on, you can identify the species you included and why they are relevant. The report should also include a summary of the key points from the documents you obtained, and your conclusions based on this evidence. Finally, the report should include the list of references. An example of a search report is provided as Attachment 1.

One advantage of creating search reports is that other consulting biologists can use them. Once the original hard work is done, you just need to periodically update the record with any new information, using the same search strategy. This assures that you are always using the best available data and will save time in future consultations.

**What to Do With the Information**

Once you have collected all this evidence, you’ll need to critically evaluate each piece of evidence to determine the degree to which you can use the study or data in your analyses. Some study designs will be more robust than others. Evaluating the evidence involves looking at the methodology used to gather and evaluate the data, the scope, timing, and audience for the information, the statistical rigor of the sampling, and the amount of uncertainty. Did the researcher control for confounding effects (or other stimuli that could have caused the responses the study identified)? What was the sample size? Also, you will need to consider the relevance to what you are considering in your analyses. Are there similarities between the conditions in the study and the stressor you are considering in your analysis? If so, how much? A study that controlled the potential responses an organism has to the stimuli may not provide a full picture of how the organism would respond in a natural situation. This is often a problem with laboratory studies in artificial environments.

The resource from which you obtained the evidence can also help you evaluate its value for your analyses. Did the study come from a peer-reviewed scholarly journal or a popular scientific magazine? Did you find the study on an internet site? Does the evidence come from a primary, secondary, or tertiary source? Is it gray literature? If the source of the information was a factor in deciding whether to use it in your analyses, note how you restricted your search in the search report. For example, if you restricted your search to primary and secondary sources only, these inclusion factors should be identified in your search report. The source of the data should not necessarily automatically exclude a piece of evidence, but you should take it into consideration when contemplating the weight you will be assigning to it in your analyses. Attachment 2 provides a couple ways to rank information sources.

What do you do if there are conflicting data? Again, critically evaluate each piece of evidence. Does one provide more statistical sensitivity than the other? Is there more uncertainty? What was the sample size? If you're fortunate enough to have found a large amount of evidence, is there a preponderance of evidence for one result over another? For example, 20 studies that provide evidence that a particular bird species abandons its nest when humans walk within visual distance of the nest site will *generally* outweigh the one study that showed no visual response of the bird to human presence. On the other hand, the preponderance of evidence should not be the only factor you consider. That single study may have a lot more scientific rigor than the 20 other reports.

When assessing the evidence, beware of your own biases. Providing the benefit of the doubt to the species may not always mesh with your personal belief system. For example, you, personally, may not like timber harvesting, but thinning might actually provide the open canopy needed by smooth coneflower (*Echinacea laevigata*), an early successional species that can be threatened by too much shade. It would be arbitrary to exclude the studies that found selective thinning resulted in the canopy levels favored by the coneflower in your consultation on a BLM timber sale. To be fair and equitable in selecting information, establish up front your inclusion criteria and level of uncertainty you're willing to accept. This will help prevent your biases from influencing decision and minimize the amount of time you spend dithering over reports.

Of course, all else being equal, when there is conflicting information it comes down to giving the benefit of the doubt to the species. Remember, in consultations, we are trying to minimize the likelihood of Type II errors (falsely concluding no effect when in fact, there will be an effect). We may accept a study with a higher level of uncertainty in order to err on the side of the species. This mandate may put us at odds with the scientific community and with some of the action agencies who may have stricter literature exclusion policies. Remember, we are looking to use the best available data, which does not necessarily require the best possible. At the same time, don't take the "err on the side of the species" mantra too far. Our decisions, including our decisions about which piece of evidence to use in an analysis, must be reasonable. *All else being equal,* we should consider the benefit of the doubt to the species, but if one piece of evidence is clearly superior to another, you should use the evidence that is more scientifically credible. Document your decision, including the criteria you used to include results, in your search record.

## **I Don't Have Enough Data!**

Sometimes, it seems like this is the official cry of the consulting biologist. In a perfect world, we would be able to find multiple highly rigorous, peer-reviewed studies that clearly demonstrate the action before us will cause the species to respond in exactly this way. In the real world, we may be lucky if we have a few personal communications from old-timers who remember the species disappearing soon after a similar project came into the area. Often we have a few studies on the status of the species, but no information about how that species may respond to any of a variety of stressors. For example, there has been little, if any, research conducted on the responses of crustaceans to chemical stressors in the aquatic system, yet increasingly, we are entering into consultations on the effects of various chemicals on listed crustaceans. What do you do when you don't have enough information?

First, try throwing your net wider. Look at other species; the most closely related at first, then perhaps less close if you still come up short. Look at similar situations or related responses. Can you make inferences from these other sources? You might not know the feeding habits of woodland caribou (*Rangifer tarandus caribou*), but can you use the results of research on the feeding habits of reindeer (*Rangifer tarandus*) in Finland? Perhaps both species have a similar diet; therefore you may be able to use evidence about the reindeer's diet, particularly any research on how reindeer food consumption altered in response to a stressor, to draw conclusions about how woodland caribou would respond to the same stressor. Is there another species with a similar life history profile, even if it isn't in the same family? You may be able to make a reasonable assumption that your particular species will respond in the same way as the surrogate species. In your search report, document what you looked for and explain why you expanded your search to include these other species.

If, even after this effort, you find yourself conducting a consultation with little or no data, you have a few choices. First, you can suspend consultation until the data are gathered. This only works if (a) there are significant gains to be made by conducting new research, (b) there is someone willing to pay for the new research, (c) the Action Agency and applicant are willing to wait, and most importantly (d) the delay would not irreparably harm the species (for example, in a consultation on a dam relicensing or another ongoing action). Second, you can work with the Action Agency and applicant to develop an adaptive management action. This would involve completing the consultation now under certain restrictive parameters, with agreement that it would be revisited after further information is obtained. Finally, you can proceed with the consultation, making reasonable assumptions about the species and its response to the proposed action.

**Key legal decisions:**

Connor v. Burford, 848 F.2d 1441 (9th Cir, 1988) – Biological opinions should be based on the best scientific and commercial data available. In making effects determinations, the Services cannot ignore available biological information.

Defenders of Wildlife v. Babbitt, 958 F. Supp. 670, 680 (D. D.C. 1997) – the "best scientific and commercial data available" is not a standard of absolute certainty.

Arizona Cattle Growers Association v. US Fish and Wildlife Service, 273 F.3d 1229 (9th Cir. 2001) – mere speculation as to the potential for harm is insufficient. The evidence used by the Services must demonstrate that a species is or could be in the area, and that there is a causal link between the action and the species.

Marsh v. ONRC 490 US 360, 368 (1989) – The Services have discretion to rely upon the reasonable opinions of their own qualified experts. Mere disagreement with the Service's findings does not render its decision arbitrary and capricious (Also similar in NM Cattle Growers Assoc. v NMFS, Connor v. Andrus)

Building Industry Assn of Sup. Cal. V. Norton, 247 F.3d 1241, 1246-1267 (D.C. Cir. 2001) – The Service must utilize the best scientific … data available, not the best scientific data possible.

Bennett, et al., v. Michael Spear, et al., 520 U.S. 154 (1997) - The purpose of the requirement that each agency "use the best scientific and commercial data" available is to ensure that the ESA not be implemented haphazardly, on the basis of speculation or surmise …"

***Statute, regulations, policy, and guidance:***

ESA, §7(a)(2)
50 CFR 402.12 and 402.14.
H.R. Conference Report 96-697 (1979) – "best available" was meant to allow the Services to issue biological opinions even when inadequate information is available.

Interagency Consultation Handbook, pg 1-6
Interagency Cooperative Policy on Information Standards Under the Endangered Species Act (59 FR 34271)
Interagency Cooperative Policy for Peer Review in Endangered Species Activities (59 FR 34270).
P.L 106-554 §515 – "Information Quality Act"
FWS Information Quality Guidelines
NOAA Information Quality Guidelines, September 30, 2002

**Additional resources:**

Berkman, Robert I. Find It Fast: How to Uncover Expert Information on Any Subject. Harper Resource, 5th ed. 2000.

Booth, Wayne C., J.M. Williams, G.G. Colomb. The Craft of Research (Chicago Guides to Writing, Editing, and Publishing). Univ of Chicago Press, 2rd ed. 2003.