The Effects Pathway: Describing the Listed Species & Critical Habitat

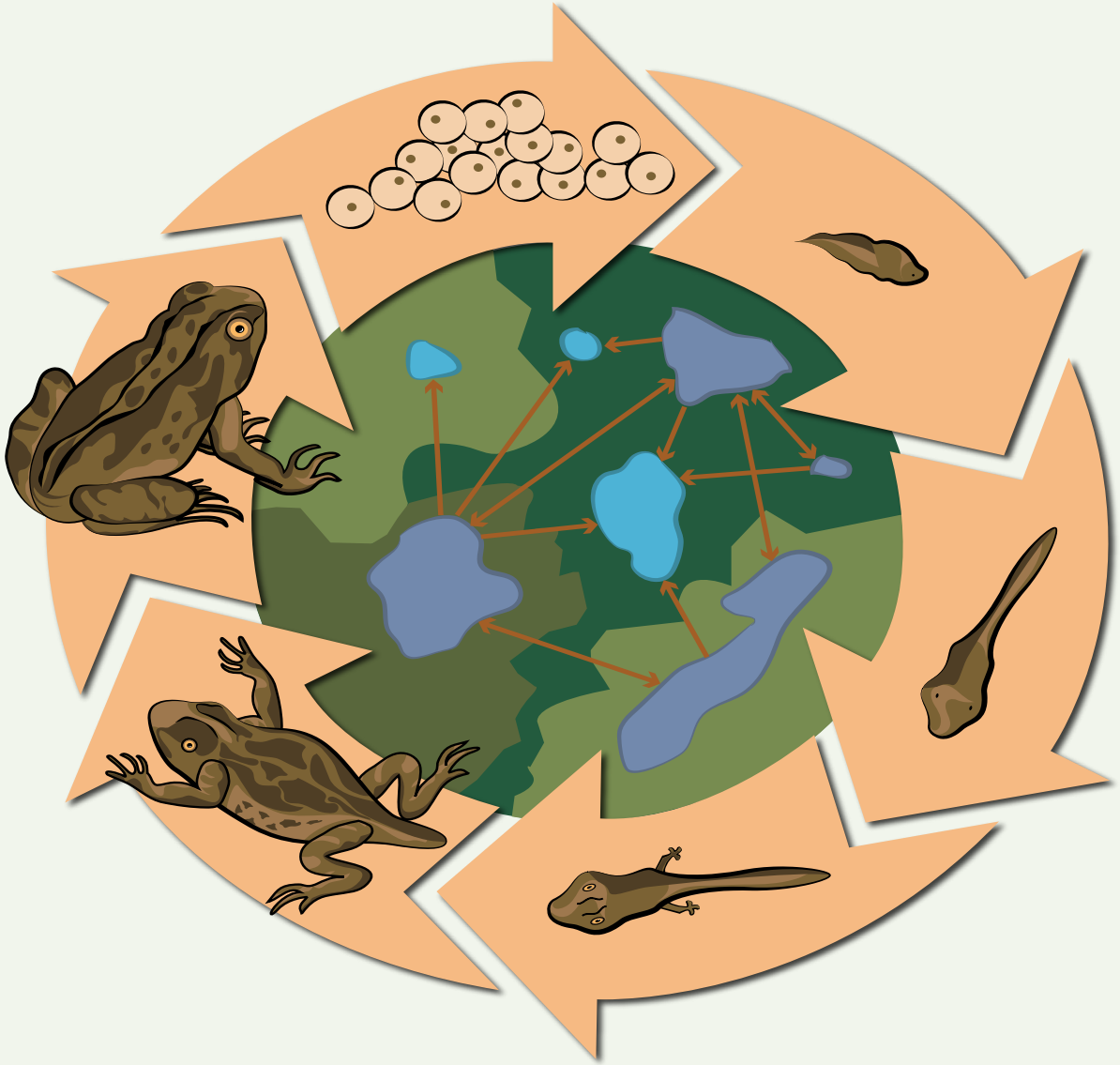

IMAGE: KRISTIN SIMANEK, USFWS

What Goes in Your BA?

Deconstructing the Biology

Developing the Environmental Baseline

Deconstructing the Critical Habitat

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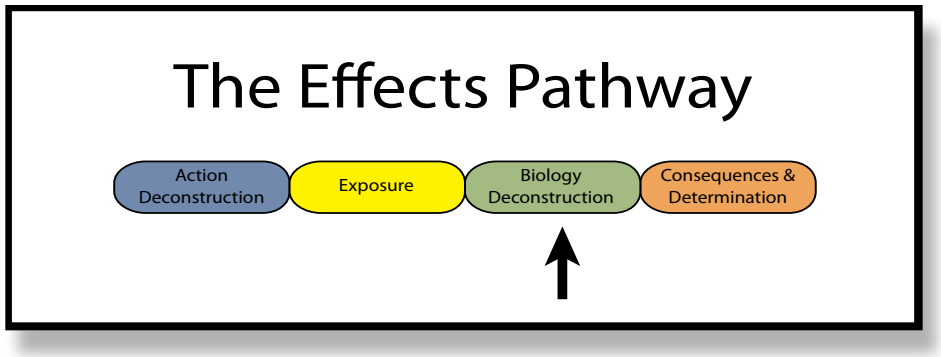
DESCRIBING THE LISTED SPECIES

After you have described the action, the next step is to describe the listed species and critical habitat.

One of the components required to initiate consultation is “A description of any listed species or critical habitat that may be affected by the action”. (50 CFR 402.14)

If you want to learn more about the rules and regulations related to the Biological Assessment, check out this document. It compares the contents of Biological Assessments, Biological Evaluations, and Biological Opinions, and shares some of the requirements of each.

<<-- DOWNLOAD DOCUMENT -->>



The “Biology Deconstruction” step in the Effects Pathway involves focusing on the biology of the listed resources, as appropriate to the Action at hand. Notice that we skipped a box (Exposure) in the Effects Pathway. That is because we need to understand more about the biology of the listed resource BEFORE we can figure out how the species is exposed to the different stressors caused by the action.

WHAT GOES IN YOUR BA?

In your Biological Assessment (BA) the section on the description of the species and/or critical habitat needs to include the following content:

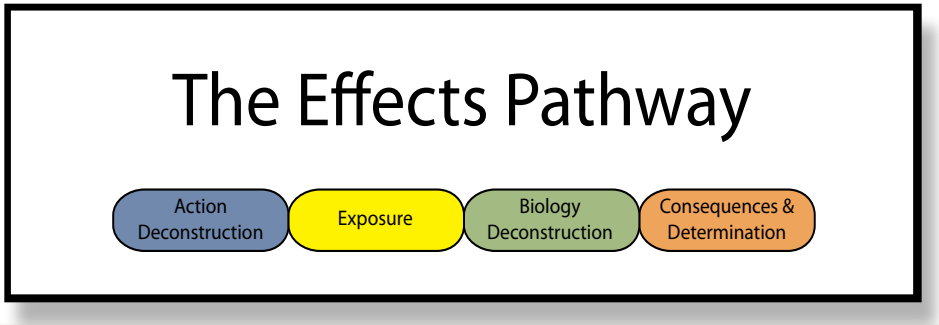
- Description of the species and its resource needs
- Detailed description of the environmental baseline in the action area including:
  - » Species information (survey protocols used, by whom, etc.)
  - » Maps of the project area and species at an appropriate scale
  - » Photographs keyed to locations labeled on the project map
- Description of designated or proposed Critical Habitat including the relationship of Critical Habitat in the project area to local populations

HOW DO YOU START?

First, you deconstruct the biology. Then you develop the environmental baseline. And lastly, you deconstruct the critical habitat. This is done to eventually help you accomplish two things:

1. assess exposure (time and space overlap) and
2. determine if a change in the environment is likely to have an effect on individuals or critical habitat.

Doing a good job on the biology will lead to a more effective Exposure and Consequences analysis as you complete your Effects Pathway.

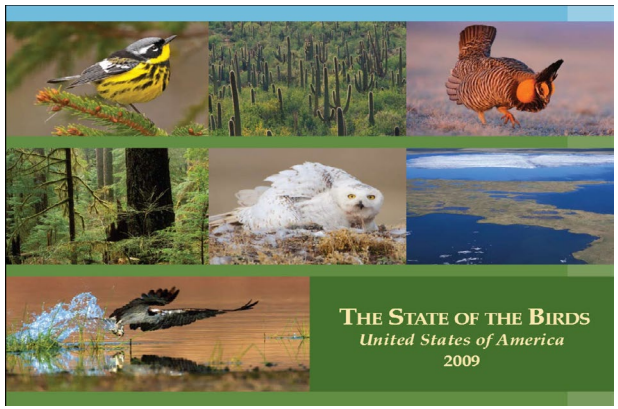


SO WHERE DO YOU FIND THE INFORMATION YOU WILL NEED?

There are a number of different sources for you to gather your information from as you work your way through the biology. Think of what you are doing as being a research project. Don't forget the usual suspects:

- expert opinion (usually researchers working on projects, may be contract work)
- literature (peer-reviewed literature)
- relevant environmental reports (many sources, including contract work)
- recent publications (numerous sources)
- journal articles
- academics
- gray literature (unpublished reports)

PHOTO: COURTESY PIXABAY.COM



CREDIT: USFWS DIGITAL LIBRARY

You may also want to consider agency data (they often can cite unpublished data), different technical reports, Heritage Programs/Databases (e.g., many state Heritage Databases are available on-line) and any pertinent State Resource Agencies (Departments of Fish and Game, Natural Resources, Water Resources, Environmental Quality, etc.). Again, be careful with data that you solely gather from web sites; it may not be specific enough or credible, depending upon the sources you use.

Other Resources such as the Federal Register (*www.federalregister.gov*) publishes proposed and final rules for listing packages, recovery plans, critical habitat designations and notices of availability of Environmental Impact Statements, FWS/NOAA Five Year Reviews, etc. If you've ever created a species list in IPaC, you may have noticed the links to some of these documents. There are links to all of the Federal Register notices there.

A great place to start is at the Threatened and Endangered Species System (TESS) page, which has overviews on the species and links to important documents for species under FWS jurisdiction.

<<-- CLICK HERE TO ACCESS TESS -->>

For species under NOAA jurisdiction, you should go to

<<-- CLICK HERE TO ACCESS NOAA -->>

If you've never been in IPaC, check out the site and give it a try. There's even a short video that will show you how to do that. Click on the image below to view it.

1

STEP 1 - DECONSTRUCT THE BIOLOGY

Deconstruct the species biology by life stage.

1. List and Describe the Life Stages of the Species
2. Describe the resource needs and special circumstances required for each life stage
3. Identify the resource function of each resource or circumstance

2

STEP 2 - DEVELOP THE ENVIRONMENTAL BASELINE

After deconstructing the biology, you will have a framework in place to start thinking about the environmental baseline in your Action Area – what the species HAS.

1. Get Your Status Data
2. Develop the TREND

3

STEP 3 – DECONSTRUCT THE CRITICAL HABITAT

Deconstruct the critical habitat by physical and biological features (PBFs).

1. List the PBFs
2. Identify if each PBF is present in the Action Area
3. Identify current condition of each PBF in the Action Area

Resource Functions of the Resources or Circumstances Needed by the Species

Each resource need or special circumstance DOES something to help the species complete its life cycle. Identifying that function of the resource or circumstance will help you later in your analyis, especially as you try to figure out how to offset resources that could be lost.

For example, if an insect prey item is lost due to vegetation removal, it is important to know that the species' FEEDING is affected. Then you can design measures to complesate for the loss of prey.

For Animals – Breeding Feeding Sheltering Migration (BFSM)

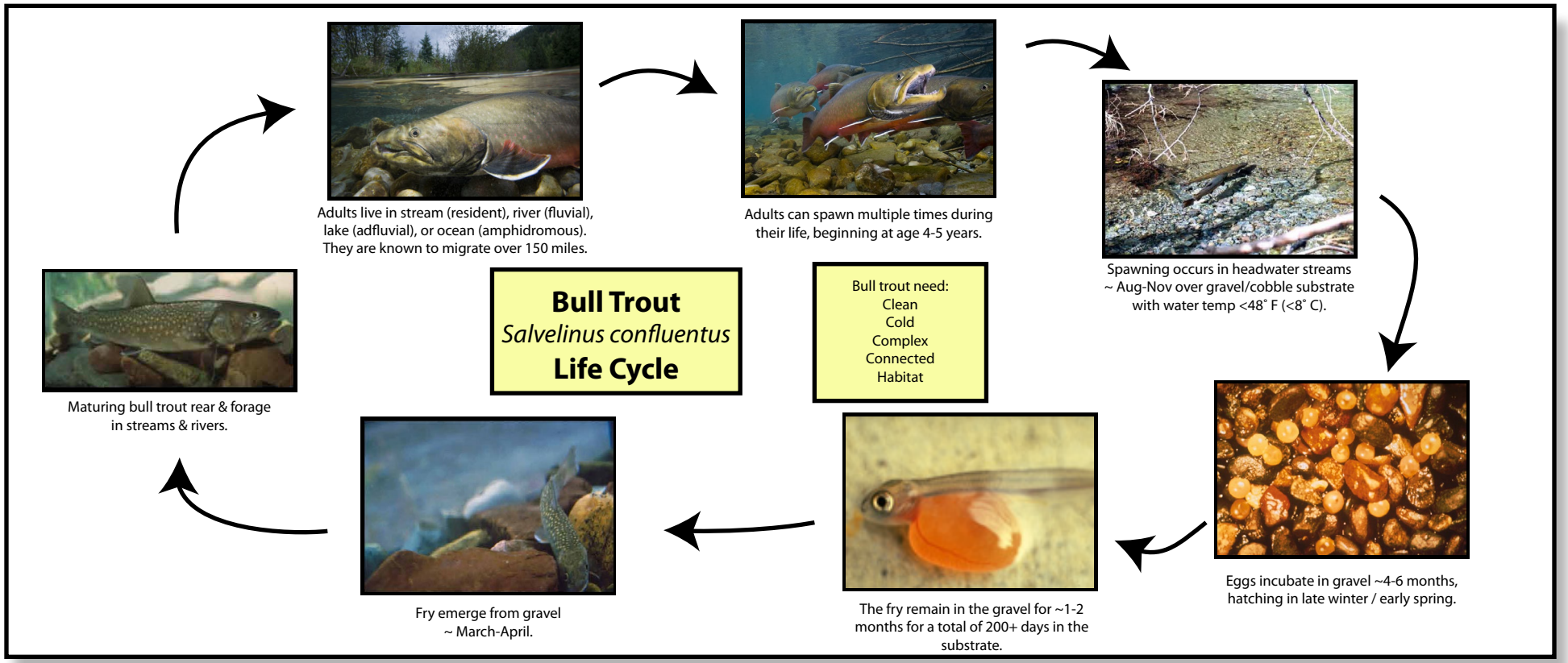
For Plants – Habitat Reproduction Nutrition (HRN)

DECONSTRUCT THE BIOLOGY

STEP 1-1: IDENTIFY THE LIFE STAGES OF THE SPECIES

Start by “deconstructing” the species biology, by life stage.

A Life Cycle conceptual model (similar to this one of the bull trout) is helpful to ensure that all life stages are included in the narrative.



GRAPHIC: BIANCA STREIF, USFWS

The bull trout example shows some of the type of information you want. Using that example, your life stage list would be:

Eggs --> Fry --> Juvenile --> Adult.

If the species experiences an annual cycle of events, it may be helpful to create a table that depicts that sequence. For example, a frog species may look like something like this:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Year 1			Egg development									
				Larval development/aquatic foraging								
							Metamorphosis					
							Terrestrial foraging, dispersal					
								Migration to hibernacula				
	Hibernation										Hibernation	
Sub-adults				Emergence								
				Migration and foraging								
						(some aestivation?)						
								Migration to hibernacula				
	Hibernation										Hibernation	
Adults			Emergence/migration to natal breeding sites									
			Egg deposition									
						(some aestivation?)						
				Migration and foraging								
								Migration to hibernacula				
	Hibernation										Hibernation	

Here is a tool that can help you organize the thought process. It is a Word document where you can layout your Biology Deconstruction.

<<-- GET THE FORM -->>

At this point, you can now start to fill in the first column by only listing each of the life stages for your species of concern.

Deconstructing the Biology - Worksheet

Directions:

1) Define the life stages of the species.
2) Describe the resource needs and requirements/special circumstances needed for INDIVIDUALS to carry out their life cycles.
3) Identify the resource function for each resource or circumstance;
   B – Breeding, **F** – Feeding, **S** – Sheltering, or **M** – Migration for animals
   H – Habitat, **R** – Reproduction, or **N** – Nutrition for plants.

Resources and/or circumstances needed for INDIVIDUALS to complete each life stage	B/F/S/M or H/R/N?
SPECIES: California Red-Legged Frog	
Stage 1 – Eggs	
Stage 2 – Larvae	
Stage 3 – Juveniles	
Stage 4 - Adults	

STEP 1-2: DESCRIBE THE RESOURCE NEEDS AND SPECIAL CIRCUMSTANCES

For all of the life stages you just listed, you will be describing the resources or circumstances that the species needs to complete its life functions as part of your Biological Assessment. Completing this step will give you the first draft of the biology section of your BA.

Start this step by detailing the species biology by life stage (where applicable), including:

- Longevity - How long at each stage? (i.e., timing and age to maturity)
- Age Distribution - What are the demographics of the species in your area? (i.e., relative numbers and gender ratios, etc.)
- Reproductive Strategy - How does it find a mate, are special habitat conditions required, etc.? (i.e., full moon, individuals greater than 3 years of age, etc.)

PHOTO: JOEL SARTORE

- Nutritional Needs (prey, etc.) - What does it eat and how does it acquire it? (i.e., insect prey, 8 hours of sunlight every day, etc.)
- Predators - What predators and/ or competitors impact the current population? (i.e., what eats this species, requires the same niche, etc.)
- Disease Factors - Are there environmental conditions that could facilitate diseases that the species is susceptible to? (i.e., chytrid fungus, etc.)
- Habitat Conditions for Sheltering - What are the species territory or home range needs? (i.e., thickets, gopher holes, vegetative riparian corridors, high acidic soils, 600 acres of old growth timber, dry open prairie, etc.)
- Migration - are there specific routes and seasonal windows? (i.e., riparian corridor, ephemeral streams, etc.)

PHOTO: ALICIA LANGTON, USFWS

- Species Sensitivities and Tolerance Ranges to environmental characteristics. What temperature, precipitation, soil chemistry, etc. is ideal for this species? (i.e., 5-8 degrees C for egg deposition, soil pH 8-9, etc.)

Focus on what is of importance to the effects analysis and avoid information that will simply distract the reader. Use things like “how it nests on the outside branches of a low growing tree in May through July” vs. “it nests in trees”. The color of its eyes or how many tail feathers it has is probably not important to an effects analysis.

Being vague about the important details is equally risky because there will be gaps in your analysis.

PHOTO: NAPPADAL PAOTHONG, USFWS

Unknowns (i.e. data gaps, disagreements among experts, or uncertainty in terminology) should be made explicit.

Working with the biology that you have just detailed, highlight every resource and circumstance the species needs. You then add these to the table you began working on earlier and finish filling in the first column. Here is a small sample of what it might look like. When you complete it, there will be many more entries than this example shows.

PHOTO: USFWS IMAGE ARCHIVES

Deconstructing the Biology - Worksheet

Directions:

1) Define the life stages of the species.
2) Describe the resource needs and requirements/special circumstances needed for INDIVIDUALS to carry out their life cycles.
3) Identify the resource function for each resource or circumstance;
   B – Breeding, **F** – Feeding, **S** – Sheltering, or **M** – Migration for animals
   H – Habitat, **R** – Reproduction, or **N** – Nutrition for plants.

Resources and/or circumstances needed for INDIVIDUALS to complete each life stage	B/F/S/M or H/R/N?
SPECIES: California Red-Legged Frog	
Stage 1 – Eggs	
- Below surface vegetation	
- Water temperature 6-7 degrees C	
Stage 2 – Larvae	
- Algae, diatoms, detritus	
- Natural stream channels	
Stage 3 – Juveniles	
- Food sources available throughout day and night	
- Moist and cool vegetated areas	
Stage 4 - Adults	
- Large rainfall events in late winter/spring	
- Salinity <4.5 parts/thousand	
- Aquatic habitat with dense vegetative cover	

Here are a few examples of Species' life history traits that make them vulnerable to anthropogenic activities.

Kangaroo rats have large auditory bullae, and they communicate by drumming their feet. You should consider if assessing a proposed action with noise-producing activity, such as underground blasting, oil exploring "thumper trucks," etc. would affect the species ability to communicate danger.

PHOTO: TAMARA NUNES, USFWS

PHOTO: MARK PICARD, USDOT

Reptiles and amphibians may be attracted to paved roads for thermal value. New road construction could be a source of mortality resulting from crushing.

Birds and bats are attracted to communication towers and windmills. Birds use them as perches and they may be in a bat species feeding or travel corridor. This could result in mortality.

STEP 1-3: IDENTIFY THE RESOURCE FUNCTION

For each resource or circumstance that you have listed in step 2, make sure and identify it's resource function as BFSM or HRN.

Resource Functions:

For Animals – Breeding Feeding Sheltering Migration (BFSM)

For Plants – Habitat Reproduction Nutrition (HRN)

This step should be straightforward yet it's real important to have in the Effects Pathway. If it's a resource function that is lost because of your action, then it will need to be replaced somehow, generally through avoidance, minimization, or mitigation measures.

This example gives you a general idea of how the resource functions are identified for each resource and/or circumstance. This example is not complete, but it gives you an idea of what your deconstruction should begin to look like.

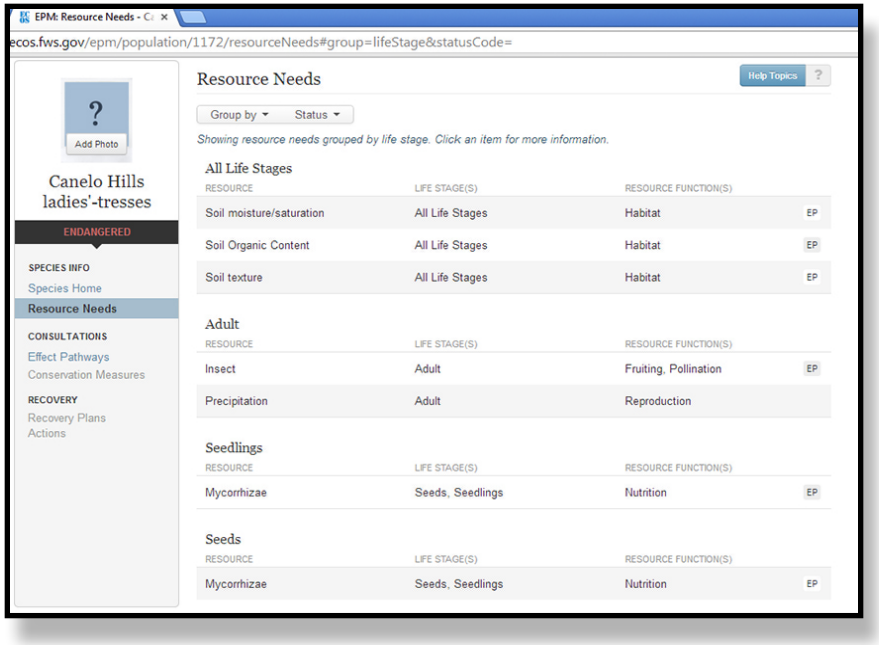
Deconstructing the Biology - Worksheet

Directions:

1) Define the life stages of the species.
2) Describe the resource needs and requirements/special circumstances needed for INDIVIDUALS to carry out their life cycles.
3) Identify the conservation function for each resource or circumstance;
   B – Breeding, **F** – Feeding, **S** – Sheltering, or **M** – Migration for animals
   H – Habitat, **R** – Reproduction, or **N** – Nutrition for plants.

Resources and/or circumstances needed for INDIVIDUALS to complete each life stage	B/F/S/M or H/R/N?
SPECIES: Bull Trout	
Eggs	
- Headwater streams, gravel/cobble substrate with water temp <48 degrees F	S
- Low amounts of silt	S
- Clean spawning and rearing gravel	S
Fry	
- Gravel/cobble substrate	S
- Stream channel substrates	S
- Aquatic insects	F
Juveniles	
- Stream / river – cold clear water, below 55°	S
- Zooplankton and zoobenthos	F
- Aquatic insects	F
- Tributary streams with connected waterways	M
- Woody debris and rubble substrate	S
Adults	
- Stream / river / lake – cold clear water, below 55°	SM
- Cover; snags, cut banks, large logs	S
- Interconnected waterways	BM
- Small fish, eggs, and fry	F
- Stable streams / flow with ruffles and deep pools	S
- Small amphibians, mammals, birds	F

Here is another example of an actual biology deconstruction for a plant from the Effects Pathway Manager in ECOS. Note the format is different from the form we have been using, but the content remains the same. Resource functions HRN have been broken down into more details.



Again, there is NOT just one way to do this. You need to do what is appropriate for your particular deconstruction.

In looking at our table, we can now fill in the third column.

Deconstructing the Biology - Worksheet

Directions:

1) Define the life stages of the species.
2) Describe the resource needs and requirements/special circumstances needed for INDIVIDUALS to carry out their life cycles.
3) Identify the resource function for each resource or circumstance;
   B – Breeding, **F** – Feeding, **S** – Sheltering, or **M** – Migration for animals
   H – Habitat, **R** – Reproduction, or **N** – Nutrition for plants.

Resources and/or circumstances needed for INDIVIDUALS to complete each life stage	B/F/S/M or H/R/N?
SPECIES: California Red-Legged Frog	
Stage 1 – Eggs	
- Below surface vegetation	S
- Water temperature 6-7 degrees C	S
Stage 2 – Larvae	
- Algae, diatoms, detritus	F
- Natural stream channels	S
Stage 3 – Juveniles	
- Food sources available throughout day and night	F
- Moist and cool vegetated areas	S
Stage 4 - Adults	
- Large rainfall events in late winter/spring	B
- Salinity <4.5 parts/thousand	B
- Aquatic habitat with dense vegetative cover	B/S

DEVELOP THE ENVIRONMENAL BASELINE

What the species currently HAS in the Action Area

This step is a combination of identifying the species status in the Action Area, it's population trends, and habitat conditions (past and present) – what the species HAS – and then relating what the species has today to how it got that way.

THE PROCESS

STEP 2-1: GET YOUR STATUS DATA

The Services need specific, local, and current information showing that the species is present in your Action Area. This information needs to relate to the previous section and identify presence at each life stage. There are three approaches that are typically used.

1. Use data from the research and sources you have already gathered.

2. Conduct protocol level surveys, specific to your proposed Action Area.

3. "Assume presence" and move on.

REGULATORY DEFINITION:

So, what's this thing called "The Environmental Baseline"?

The Environmental Baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the Action Area, the anticipated impact of all proposed Federal projects in the Action Area that have already undergone formal or early Section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process.

SURVEYS – GETTING OUT IN THE FIELD

If you are seriously considering doing a survey, you need to make sure the type of survey you do is appropriate for the analysis at hand. There are two primary types of surveys to consider; 1) habitat surveys and 2) species surveys.

The goal of habitat survey is to determine the use of habitat through nesting, breeding, dispersing, and migration behaviors. Habitat surveys can help determine whether, or how much, suitable habitat is there for individuals of the species (your baseline).

PHOTO: JANICE ENGLE, USFWS

A species survey will help you determine if a species is “reasonably certain to occur during the life of your project.” You need to be able to defend the conclusion of your surveys and you need to know that species surveys may or may not establish presence of a species. Surveys are a “point-in-time” and while they can confirm species presence, they cannot confirm absence. Provide a reasoned benefit of the doubt to the species and create a chain of logic to support your rationale.

Find out if Protocol-level Surveys are required for your listed species. Some species surveys even require biologists with a specific expertise or permit. Check with your local Field Office to ensure you are conducting surveys appropriately.

Here is a sample protocol for the California Red-Legged frog.

<<-- GET THE SAMPLE PROTOCOL -->>

Now take that survey data, write it down, use that as your point-in-time for today, this is your status of the species in the Action Area.

The Recovery Plan for your species should also identify where the species needs to be to persist over the long term. It is helpful to compare where the species is today to where it needs to be and to understand what that relationship means. If you are close to the recovery goals then the species may be able to tolerate short-term negative effects easier than if they are on the brink of extinction.

STEP 2-2: DEVELOP THE TREND

If you're lucky, there is a lot of data on your species in your Action Area. You should use any available historic information to understand how the population trend has changed over time.

If you're having a hard time finding this historic information, look at it this way. You're looking at a species that is/was in decline; you know this because it is listed. You just may not know details of the population in your Action Area. The challenge here is to identify your unknowns and clearly state your assumptions. At least now you will know the status TODAY . . . and effects from your action will be measured against that.

Here are some examples of ways you can discuss the EB trends in terms of Quality/Quantity:

- changes in land use – went from 12,000 acres of grassland to 8,000 acres of vineyard, 2,000 acres of parking lots, and 2,000 acres of grassland
- fire effects – fire burned X acres, converted habitat from oak savanna to grassland.
- flood effects – we had a recent flood here and now the Corps wants to do revetment; half of the habitat is gone now, but will become suitable again in five years
- drought effects – change in forage production and water availability/changes in species composition in the riparian corridor
- species numbers – protocol surveys in 2001 observed 18 adults and 24 juveniles in the stream between Tolley River and the Canfield Creek headwaters. In 2011, those numbers were 28 and 47, respectively.

If possible, find out what are the trends of the listed species population(s) in the project/action area? Is the population stable, increasing, decreasing? With plenty of data, you could create a graph that shows population numbers over time (and you could even add the goal for Recovery on this graph to make it more meaningful).

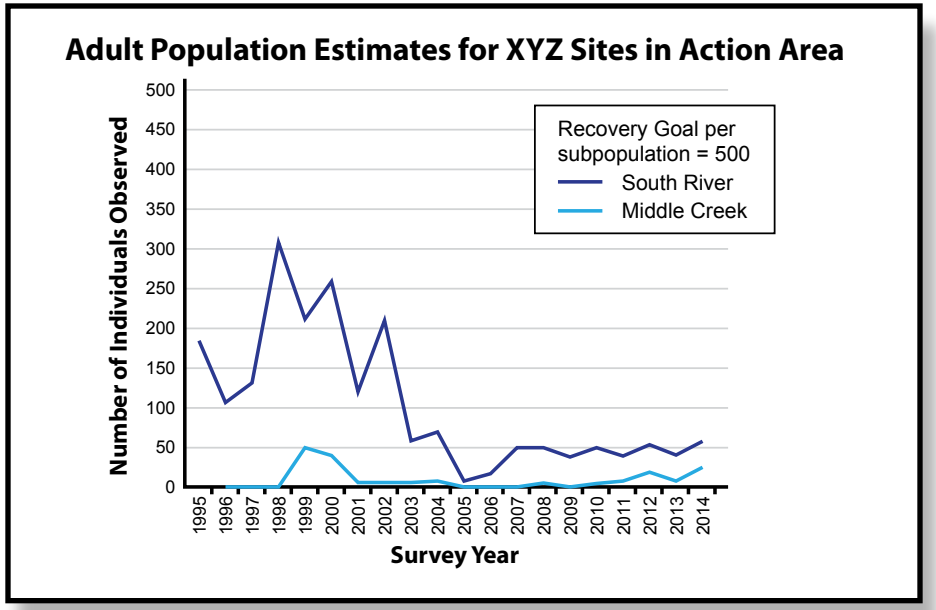


IMAGE: JOHN EMBRY, USFWS

But alas, we usually do not have this level of detail at project-specific sites. That is why it is very important to at least know the status prior to project implementation (we are at X today, and after this action, we anticipate the species being at Y).

Again, the purpose of this information is to create the context for the effects analysis.

To learn more about the Environmental Baseline, click on the image below and watch this short video.

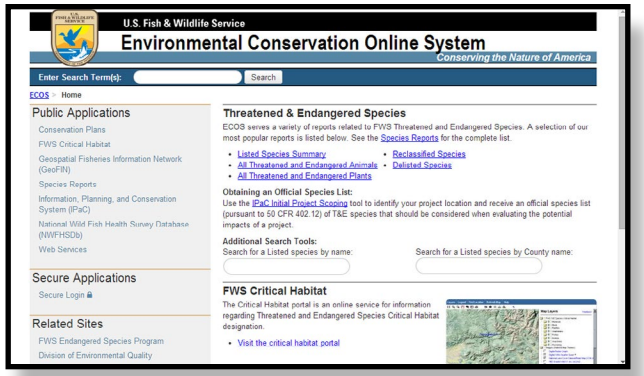
Here is the document the video refers to:

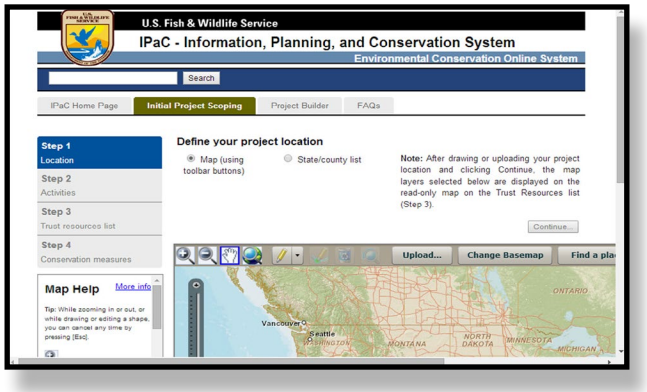
<<-- COMPARISON DOCUMENT -->>

RECOVERY PLAN IMPLEMENTATION

In the discussion of the species baseline, you need to be aware of the status of recovery implementation in the Action Area. Start by determining if a Recovery Plan has been issued for species within your Action Area. If it has, how long has it been implemented, and how is recovery proceeding? What are the recovery goals? How close are the species to meeting the recovery goals? The answers to these questions may not be black and white. This is a good discussion to have with your local field office or Recovery Coordinator. That discussion could even lead to ways that the project at hand can contribute to Recovery.

You want to be careful to NOT spend a lot of time telling the Services what is in their Recovery Plan, but you do need to be very aware of its contents, and maybe how this project can contribute to Recovery. Start by looking in ECOS / TESS or IPaC for this information.





MAPS

Good maps are the BEST way to relate the species data to what is going on in your Action Area. If a picture is worth a thousand words, a good map is worth a million!

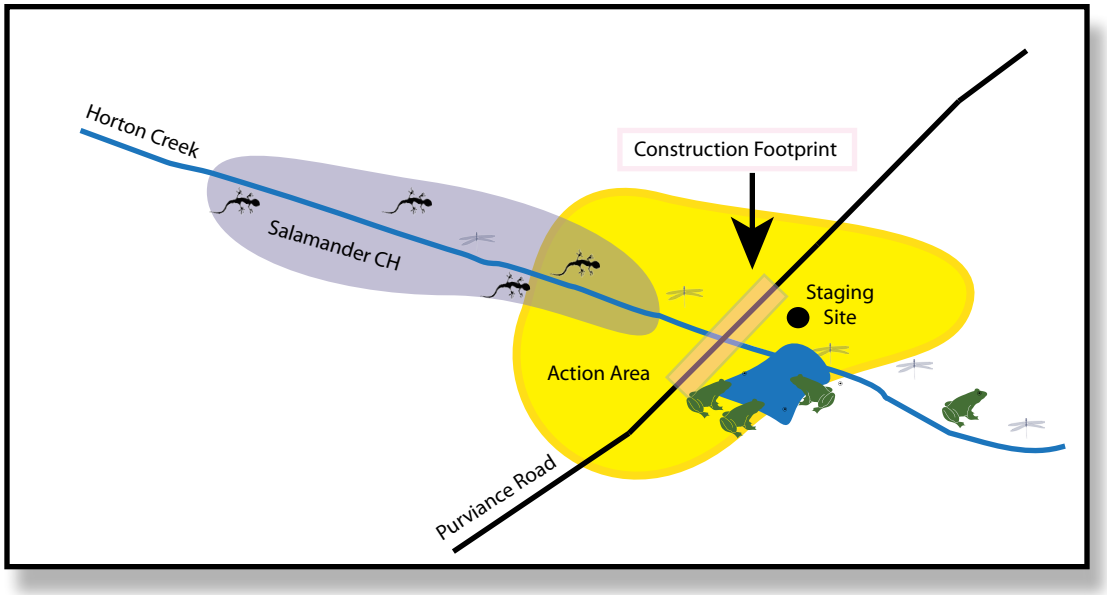
Want to learn more about what a DOQ is – check out the USGS website on Digital Orthophoto Quadrangles

<<-- GO TO WEBSITE -->>

Always ground-truth habitat surveys and maps. You can't rely on topographic maps and Digital Ortho Quads (DOQ's) without ground-truthing.

If you have a good spatial understanding of how the species uses the habitat in your Action Area, then your next step in the Effects Pathway, Exposure, will be very straight forward.

Here is an example of how a map can display the overlap between species habitat use and the project's Action Area. Note that with the map, you can see where the species is found during different stages of its life cycle and which habitat components are necessary to complete seasonal movement. In addition, historical habitat change (i.e., subdivisions, roads, etc.) is easier to understand by seeing existing conditions on a map.



DECONSTRUCT THE CRITICAL HABITAT

Is your action area in (or could it affect) designated Critical Habitat (CH)? Or Proposed Critical Habitat? Remember that you will need to make a separate determination for CH because it is a separate listed (Designated) entity.

If you're looking in the Federal Register (FR) for a designated Critical Habitat, you may not find the term PBF. The important features may be identified as PCEs. List them whether they are identified as PBF or PCE in the FR.

STEP 3-1: LIST THE PBFS

Similar to deconstructing the biology for the species, CH is broken down by the physical and biological features (PBFs) important to the species (previously called the Primary Constituent Elements or PCEs) identified in the final rule.

Go to the Federal Register and find the PBFs (or PCEs) for the CH. Copy and paste each one into the table that is attached.

<<-- DOWNLOAD THE TABLE -->>

STEP 3-2: IDENTIFY IF EACH PBF IS PRESENT IN THE ACTION AREA

After surveying your Action Area, indicate which PBFs are present and absent. Go to the table you started working with in Step 3-1, and just circle Y or N to indicate presence for each.

STEP 3-3: IDENTIFY CURRENT CONDITION OF EACH PBF IN THE ACTION AREA

Now, describe the condition of each present PBF in the table.

Having quantitative measures of the current status of the CH PBFs in the Action Area is like the baseline status you just identified for the species, and similarly, serves as the context from which your effects will be measures.

Here is an example of what is meant by quantifying the current status of a PBF:

For each PBF, describe **baseline conditions** within the Action Area.

Recovery Unit:_____	Present in the Action Area?	Baseline Condition and Quality (expressed relative to the criteria in the PBF)
1. **Aquatic Breeding Habitat**. Standing bodies of fresh water (with salinities less than 7.0 parts per thousand), including: natural and manmade (e.g., stock) ponds, slow-moving streams or pools within streams, and other ephemeral or permanent water bodies that typically become inundated during winter rains and hold water for a minimum of 20 weeks in all but the driest of years.	Yes / No	There are six manmade ponds within one mile of the project site, with salinities of 6.1 6.2, 6.2, 6.0, 6.7, and 6.4. Angie Creek has two off-channel pools 20' and 75' south of the bridge replacement site that could be used for breeding. Three ephemeral pools between Yvonne Road and the Wetlands hold water until August in all but the driest of years. Angie Creek is slow-moving south of the bridge site except during heavy rain events. Suitable breeding pools are found throughout the Laurietor Wetlands, particularly at the Angie Creek confluence.
2. **Non-Breeding Aquatic Habitat**. Freshwater and wetted riparian habitats, as described above, that may not hold water long enough for the subspecies to hatch and complete its aquatic life cycle but that do provide for shelter, foraging, predator avoidance, and aquatic dispersal for juvenile and adult	Yes / No	

Here is a different example of how PBFs can be incorporated into a matrix to make your baseline and effects clear. This one was developed for the Hines Emerald Dragonfly.

Hine's Emerald Dragonfly (HED) Critical Habitat
Physical and Biological Features (PBFs) and Effects

Recovery Unit:_____	Present in the Action Area?	Baseline Condition and Quality	Short-term effect of the action	Long-term effect of the action
HED Larval PBFs				
1. Organic soils (histosols, or with organic surface horizon) overlying calcareous substrate (predominantly dolomite and limestone bedrock).	Yes / No			
2. Calcareous water from intermittent seeps and springs and associated shallow, small, slow flowing streamlet channels, rivulets, and/or sheet flow within fens.	Yes / No			
3. Emergent herbaceous and woody vegetation for emergence facilitation and refugia.	Yes / No			
4. Occupied burrows maintained by crayfish for refugia.	Yes / No			
5. Prey base of aquatic macroinvertebrates, including mayflies, aquatic isopods, caddisflies, midge larvae, and aquatic worms.	Yes / No			
HED Adult PBFs				
6. Natural plant communities near the breeding/larval habitat which may include fen, marsh, sedge meadow, dolomite prairie, and the fringe (up to 328 ft (100m)) of bordering shrubby and forested areas with open corridors for movement and dispersal.	Yes / No			
7. Prey base of small flying insect species (e.g., dipterans).	Yes / No			

<<-- SEE ENTIRE DOCUMENT -->>

WHAT ABOUT UNCERTAINTIES?

You will quickly realize (if you haven't already) that we rarely have all of the information that we need to really understand everything about a species or how our actions affect it. This should not stop you from proceeding; however, it is imperative to make sure that you have done a thorough search for information before declaring unknowns.

Sometimes they may not matter, but when they do, you will need to rely on models or proxies and then state what your assumptions are in this scenario. State why the assumption chosen is the most reasonable one compared to others. What is your level of confidence in this proxy?

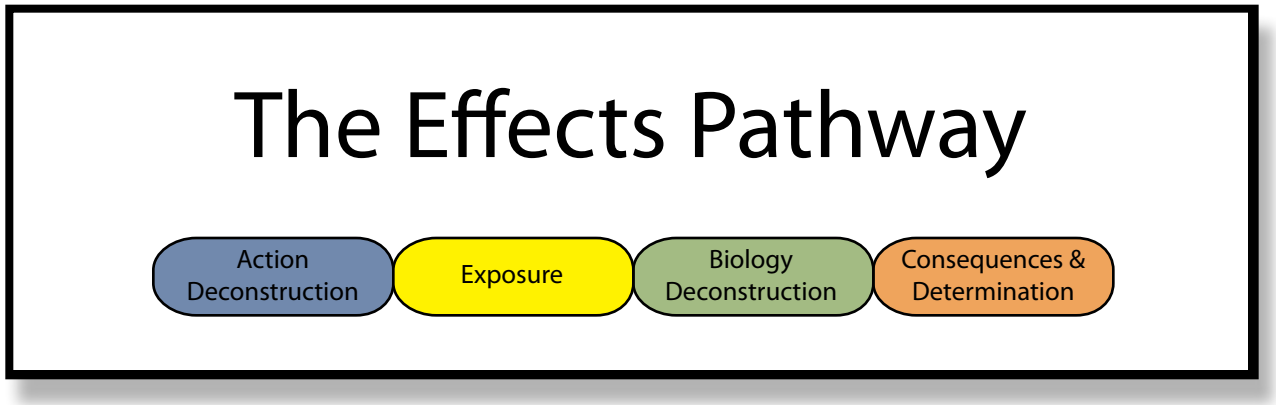
In order to give the benefit of the doubt to the species, a reasonable worst-case scenario would then need to be developed when you write your effects analysis.

SO WHAT HAPPENS NEXT?

Now it's time to take all of that nicely organized biology and turn it into narratives.

After completing the steps described above, you will have the framework to start developing your Description of the Species and Environmental Baseline sections of your BA. The two matrixes that you completed (one for the Species' life stages/resource needs/circumstances/resource functions and one for Critical Habitat) can be inserted directly into your BA to guide your narratives or they can be included in an Appendix and referenced.

PHOTO: COURTESY PIXABAY.COM

At this point, you will need to just sit down and start WRITING!

If you are working your way through the Effects Pathway framework to develop your BA content - the next step will be looking at Exposure.