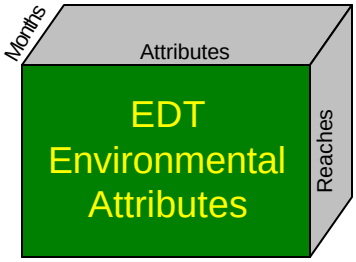
EDT Procedures for Subbasin Planning

The assessment phase of subbasin planning is designed to characterize conditions within the subbasin and to identify natural as well as human controlled constraints on performance of focal species. Existing information on physical and biological aspects of the subbasin are assembled to characterize the status of the aquatic species within the watershed. The assessment also serves to set up the analytical framework that allows planners to develop and compare alternative packages of restoration actions.

To assist this process, the Council will make available to subbasin planners the Ecosystem Diagnosis and Treatment (EDT) model. EDT is an important tool that subbasin planners can use to assemble existing information into a scientific rationale for a subbasin plan. For most subbasins, the Council will also provide an initial EDT dataset that was developed during the Council's Framework project. A first step in subbasin planning is to review and refine this *coarse-screening* dataset using local knowledge of the subbasin. The coarse-screening dataset should provide a useful start to subbasin planning, but it is expected that considerable data refinement will occur.

This document describes the steps required to refine the EDT input data and develop the analysis needed to characterize habitat in the subbasin with respect to the focal fish species.

Input to EDT consists of a set of Environmental Attributes that are arrayed along a string of stream reaches (hydrography) and shaped by monthly patterns,[1] as shown below.



The EDT data input array captures the condition of the watershed for a particular scenario. This is a one-time snapshot that captures the typical or average condition of the watershed. The model then computes indices of the quantity, quality, and diversity of the watershed with

[1] Attributes such as flow and temperature exhibit monthly flow patterns within a year.

respect to the focal species. At another point in time or for another alternative, the typical condition may change, and a new index of habitat quantity, quality, and diversity is calculated so that the two conditions can be compared in terms of the focal species.

The following steps are to be completed by subbasin technical experts under the direction of the subbasin technical coordinator. At each point, participants should emphasize the need to document and archive information sources and underlying observations and data. To avoid confusion and to end up with a documented dataset for a subbasin with a known pedigree and history, changes to the coarse-screening dataset and delivery of the final dataset are the responsibility of the subbasin technical coordinator. Other subbasin team members, however, are free to examine, question, and suggest modification and improvements to the coarse-screening dataset.

I. Subbasin Hydrography

Hydrography refers to how the watershed is constructed with regard to reaches, tributaries, and blockages. The coarse-screening dataset provides a hydrography for each subbasin based on HUC-6 hydrologic units. These are the basic data records in EDT, and they are organized into stream reaches.

A. Construct hydrography

1. Do the HUC-6s and reaches capture the geomorphic structure of the watershed?

   Stream reaches are intended to capture the geomorphic structure of the watershed. They are usually defined relative to confluences, obstructions, or significant changes in gradient, valley form, or geology.

2. What are the appropriate reach groupings to associate with management actions?

   Reaches can be grouped in ways that are meaningful to management, such as the upper, middle, and lower parts of a watershed or smaller tributaries. The analysis can provide results summarized for these reach groupings for strategic level planning.

3. Are reaches correctly ordered?

   The EDT hydrography places stream reaches and EDT segments in the proper order to route fish over their life history trajectories. Each EDT segment is located with reference to the segment above and below and with regard to tributaries, secondary channels, and so on.

B. Identify obstructions

1. Have all obstructions (natural and artificial) been identified and correctly placed in the hydrography?

   Dams, culverts, natural steps, and waterfalls are identified in EDT and should be placed in the hydrography.

2. Have the obstructions been properly rated with regard to their impact on the migration of life stages of the focal species?

   Each obstruction should be rated in terms of its impact on the upstream or downstream migration of the life stages of the focal species. The EDT model contains definitions of these obstruction ratings.

II. Characterize the habitat FOR BOTH CURRENT AND TEMPLATE CONDITIONS

EDT describes a potential condition (the *Template*) as a reference condition to quantify locally normative conditions and, by comparison with current conditions, to identify major problems and highlight areas with significant restoration potential. For some streams this may approximate an historic condition, but in all cases it is a reference condition against which to compare the current condition

Alternatives can be arrayed between the potential and the current condition. The coarse screening dataset describes both the current and template conditions for each watershed. During the assessment phase, planners should review and refine habitat information for both the current and template conditions. All of the steps below are done for both the current and the template conditions so that a data cube is developed for both conditions.

A. Review the habitat attributes

Habitat is characterized in EDT with regard to physical and biological attributes. These include parameters such as flow, temperature, and sediment as well as area of habitat by type (pool, riffle, etc.) Habitat qualities are reduced or *categorized* to five levels, 0 through 4. Each level is carefully defined. Analysts should familiarize themselves with the attribute definitions and levels. Habitat surveys, written or verbal description by individuals familiar with the area, and the personal knowledge of the planner are used to characterize environmental conditions by reach.

B. Is the coarse-screening information consistent with current scientific knowledge of conditions within the watershed?

The coarse-screening information is derived from a variety of regional sources. While generally useful, it needs to be reviewed and, when appropriate, corrected. Local planners and analysts should view the coarse-screening information as a starting point and review it reach-by-reach, making revisions as appropriate.

C. Are there additional documents, reports, or data sources that should be included in the documentation?

An important aspect of EDT is the documentation and level of proof associated with each piece of data. Information used to improve the coarse-screening habitat data should be fully described and documented. This includes sources of expert knowledge as well as published accounts. Basic, underlying data and observations should be collected and archived for future reference. A level of proof rating is also used to characterize the level of confidence that should be associated with each data source.

III. Shape the habitat description within a year.

A. Is the key month correct for shaped variables?

EDT captures information (the data cube described above) that describes the typical condition of a subbasin. For some environmental attributes, the expected values vary seasonally (e.g., flow, temperature, and stream width). Other attributes are assumed to be invariant (e.g., gradient, natural confinement). Each seasonally variable attribute has a *key month* marking an extreme value. For example, the key month for the attribute *maximum water temperature* is typically August or September; the key month for *peak flow* might be a month in winter or early spring, depending on the local hydrological regime. EDT then uses patterns typical of specific hydrological regimes (rain-on-snow transitional, rainfall dominated, etc.) to estimate all monthly attribute values based on the value for the key month.

B. Is the monthly shaping schedule appropriate?

The regime-specific patterns that shape monthly attribute values should be reviewed by the subbasin analysts and revised if appropriate.

IV. Habitat Assessment

The focal species is used as a biological *probe* to gauge the quality and quantity of habitat in a stream. Its biological requirements define the quantity, quality, and diversity of habitat in the subbasin and the impact of actions that change the habitat. As biological indices of these habitat conditions, EDT computes, respectively, the capacity, productivity, and

life history diversity of the focal species as a function of the EDT Habitat Description.

A. Identify focal species

1. Determine a species that is diagnostic of the Vision of the subbasin.

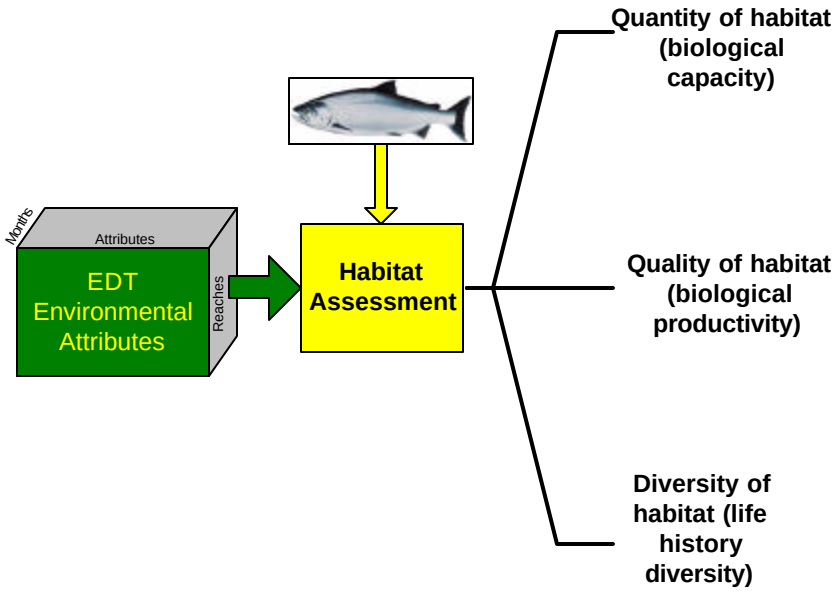
   One attribute of a focal species is that it is a diagnostic of the condition in the Vision; in other words, the presumption is that the vision would be achieved if conditions were good for the focal species.

2. Determine a species that is sensitive to the condition of the environment and to management action.

   A focal species is also used to characterize the impact of actions on the environment. A focal species should be chosen that is sensitive to management actions and changes in watershed condition.

B. Locate species-habitat rules for EDT

Rules in EDT relate habitat characteristics to the capacity, productivity, and life history diversity of the focal species. Rules are global in that they are specific to the species but not to the subbasin.



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