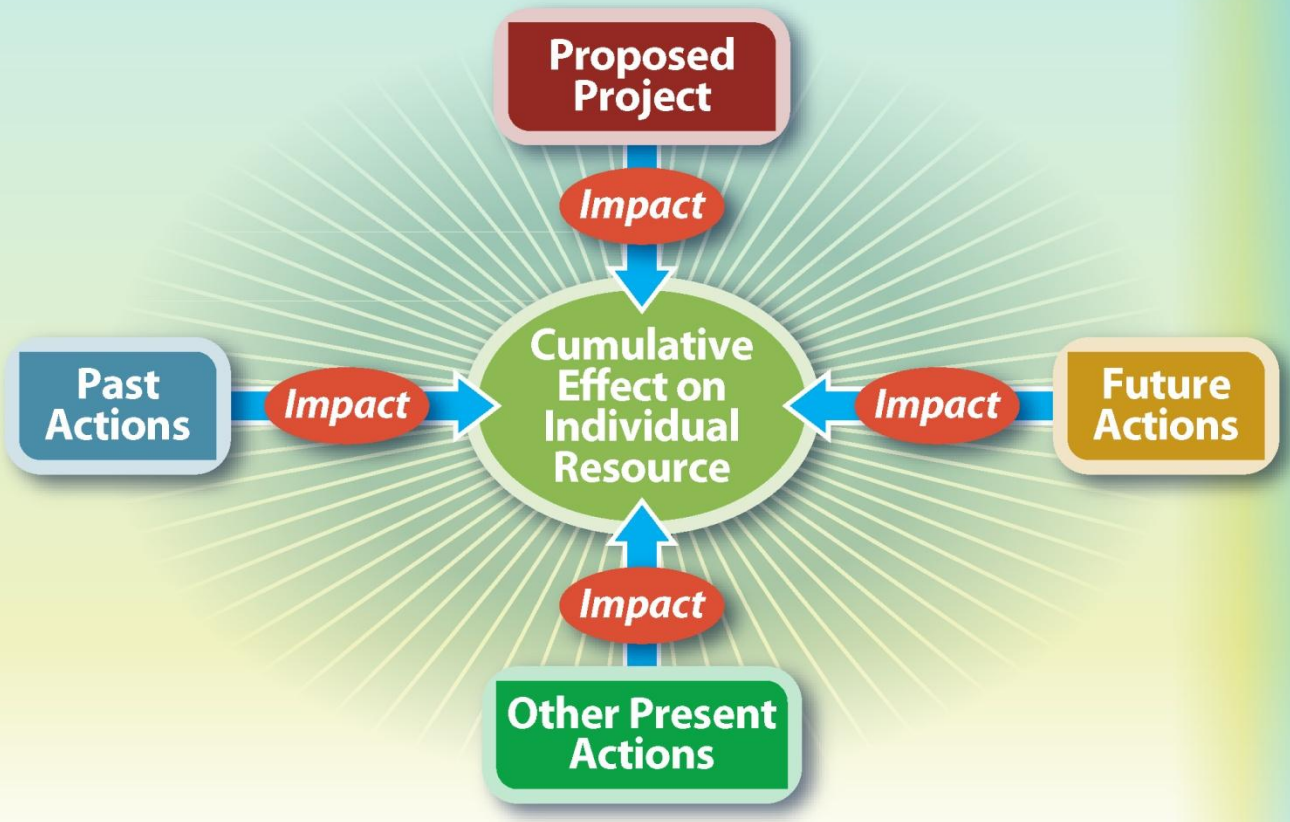
Cumulative Effects Evaluation Handbook



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Section 1 Introduction

1.1 Purpose

This handbook provides guidance for evaluating potential cumulative effects for Florida Department of Transportation (FDOT) projects subject to the National Environmental Policy Act (NEPA). The Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA require that environmental effects be evaluated for proposed federal actions. Many FDOT projects fall into this category because they require federal funding or involvement with an Interstate Highway, Federal Railroad Administration (FRA) facility or Federal Transit Administration (FTA) facility. Cumulative effects evaluations are recommended any time there is a possibility that federal funds could be used on any phase of a project or if Federal Highway Administration (FHWA), FRA or FTA approval is going to be required. They may also be required to process federal permit applications. In these cases, consult with the appropriate federal agency to determine the level of analysis required to avoid potential delays in future phases of project delivery.

Environmental effects evaluated under NEPA include direct, indirect and cumulative effects. According to ***Title 40, Sections 1508.7 and 1508.8, Code of Federal Regulations (CFR)***:

- ***Direct effects***… are caused by the action and occur at the same time and place
- ***Indirect effects***…are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable
- ***Cumulative impact*** is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.[1]

Throughout the United States, federal and state agencies have successfully evaluated and determined potential direct and indirect effects of proposed transportation actions. However, evaluation of cumulative effects has been difficult to accomplish within existing processes. One of the primary reasons is that until recently, there has been no substantive guide to support a consistent approach in cumulative effects evaluation, and hence, the practice is evolving within the NEPA discipline (FHWA, 1992; Indirect and Cumulative Impact [ICI] Work Group, 2005; National Cooperative Highway Research Program [NCHRP], 2006). According to the 2005 Baseline Report (ICI Work Group, 2005), this lack of guidance led to a general state of the practice producing:

- Inadequate consideration of cumulative impacts in environmental documents; and

[1] The terms “effects” and “impacts” are synonymous in these regulations (***40 CFR 1508.8***) and are used interchangeably in this handbook.

- Disagreement between transportation and resource agencies regarding analytical methodologies.

Without adequate guidance, transportation projects fail challenges in the courts on the basis of inadequacy in cumulative effects considerations (NCHRP, 2006). In a study of all court decisions concerning cumulative effects analysis from the Federal Ninth Circuit Court of Appeals for 1995-2004, in 60 percent of the cases (15 out of 25) the cumulative effects evaluations were ruled inadequate (Smith, 2005). The percentage rose to 72 percent within the last three years of the study (Smith, 2005). This high failure rate indicates the need for guidance in conducting cumulative effects evaluations.

In response to these trends, several states, including Florida, initiated programs to improve cumulative effects analyses in their environmental evaluations (American Association of State Highway Transportation Officials [AASHTO], 2008). Subsequently, FDOT developed guidance based on findings of an interagency task group on Indirect and Cumulative Effects, key court cases, recent guidance from other state DOTs, and research papers on best practices. The recommendations are compiled in this ***Cumulative Effects Evaluation (CEE) Handbook*** to support the development and implementation of NEPA studies.

The ***CEE Handbook*** presents one possible approach to carry out the work typically required for a cumulative effects analysis. It is important that all of the identified analytical elements be included in the cumulative effects evaluation. However, the specific steps described in this ***CEE Handbook*** may be modified to address specific project needs. The level of assessment and documentation depends on the nature of the project and the potential for significant impacts. For each individual project, the lead agency will make the final determination regarding the needed level the analysis.

This ***CEE Handbook*** is intended for practitioners who are responsible for completing cumulative effects evaluations, primarily Project Development and Environment (PD&E) professionals and Environmental Technical Advisory Team (ETAT)[2] members. The ***CEE Handbook*** focuses on evaluating cumulative effects for individual projects during PD&E. In addition, ***Section15*** of the ***CEE Handbook*** introduces an approach to begin addressing cumulative effects earlier during the area-wide transportation planning process.

The purpose of this ***CEE Handbook*** is to provide practitioners with:

- Clarification of cumulative effects as defined by CEQ
- Insights and practical approaches to performing a CEE
- Examples of cumulative effects analyses and documentation

[2] ETATs are comprised of government agencies and tribal governments participating in Florida's Efficient Transportation Decision Making (ETDM) Process. For more information, refer to http://www.dot.state.fl.us/emo/ETDM.shtm.

1.2 Background

FDOT assembled an Indirect and Cumulative Effects (ICE) Task Group in 2001 to recommend methods for evaluating indirect and cumulative effects within Florida's Efficient Transportation Decision Making (ETDM) Process. The ICE Task Group included 38 representatives from 11 federal and state agencies; FHWA; Metropolitan Planning Organizations (MPOs); and FDOT Central Office, Districts, legal counsel and consultants; listed in **Table 1-1**.

Table 1-1 Agencies Represented in ICE Task Group

Federal	State	Local
Federal Highway Administration	FDOT District One	Miami-Dade Metropolitan Planning Organization
National Marine Fisheries Service	FDOT District Three	West Florida Regional Planning Council
U.S. Army Corps of Engineers	FDOT District Four	
U.S. Environmental Protection Agency	FDOT District Five	
U.S. Fish and Wildlife Service	FDOT District Six	
	FDOT District Seven	
	FDOT Central Environmental Management Office	
	FDOT Office of General Counsel	
	Florida Department of Economic Opportunity/formerly Department of Community Affairs	
	Florida Department of Environmental Protection	
	Florida Fish and Wildlife Conservation Commission	
	Florida's Turnpike Enterprise	
	Office of the State Historic Preservation Officer	
	St. Johns River Water Management District	
	Suwannee River Water Management District	

Initial recommendations were published and went into effect with the implementation of Florida's ETDM Process (FDOT, 2004). The ICE Task Group re-convened in 2006 to evaluate the performance of the ICE process. The Task Group agreed that the process used for indirect effects works well at the project level, but additional guidance was needed for cumulative effects evaluations. In 2007, the Task Group developed, tested,

and refined new recommendations for evaluating cumulative effects. In 2008, the ICE Task Group completed a White Paper and preliminary ***CEE Handbook*** (FDOT, 2008).

The ICE Task Group recommendations provided the conceptual approach for cumulative effects evaluations. FDOT legal counsel reviewed the recommended approach and accepted it with minor modifications. The recommendations were subsequently used with two Environmental Impact Statement (EIS) projects to develop the technical approach for addressing cumulative effects in those PD&E studies. This led to additional clarification and refinement in the CEE guidance to address questions from these technical teams. Finally, the ***CEE Handbook*** incorporated best practices recently published by the NCHRP, AASHTO, and other state Departments of Transportation (AASHTO, 2011; California Department of Transportation, 2005a and 2005b; NCHRP, 2008; Texas Department of Transportation, 2009).

1.3 Key Principles

The underlying vision of CEQ regulations for evaluating cumulative effects is a desire to maintain a balance between human activities and resource sustainability. As stated by the President's Council on Sustainable Development (CEQ, 1997, p.3):

> *The Council concluded that in order to meet the needs of the present while ensuring that future generations have the same opportunities, the United States must change by … adopting stewardship and individual responsibility as tenets by which to live…that each generation should fulfill its responsibilities as trustee of the environment for succeeding generations. Analyzing for cumulative effects on the full range of resources, ecosystems and human communities under NEPA provides a mechanism for addressing sustainable development [emphasis added].*

The concept of "cumulative effects" is governed by the following principles:

1. *Human activities can affect the environment*, including natural, sociocultural, or cultural resources (CEQ, 1997).
2. *Major development projects can lead to further development* (Canadian Environmental Assessment Agency [CEAA], 2007, p. 8). One project can trigger other activities, compounding impacts to a resource.
3. *History helps us understand the stresses affecting the environment* (CEAA, 2007). Trends are important. The current condition of a resource is the result of effects from previous activities. The manner in which a region has developed creates both opportunities and constraints for future development. Knowing the history of these trends may assist in determining where resources may be close to an irreversible threshold.
4. *Every resource has a limited capacity to sustain effects* (CEQ, 1997). A resource can only absorb so many additional effects before it fails.

Simply put, analyzing cumulative effects addresses the sustainability of a resource. Defining these effects supports the transportation decision making process by:

- Incorporating environmental decisions into the planning process as early as possible
- Considering the full range of consequences of actions on the environment
- Avoiding or minimizing adverse environmental consequences resulting from the combination of individual effects of multiple actions over time.

1.4 Characteristics of Cumulative Effects Evaluation

It should be noted that no preferred methodology for evaluating cumulative effects exists. Specific techniques and levels of analysis depend on the nature of the project and the environmental resources involved. However, the following components of a cumulative effects evaluation have gained general acceptance within the practice and have been upheld in the courts:

- **Early Agency Consideration** – Early consideration of cumulative effects is needed to effectively address potential effects of planned actions. Input from regulatory, permitting and resource agencies is sought as early as possible to adequately characterize the state of the resource, address resource management goals, select appropriate methodologies, and identify actions that may affect the resource.
- **Resource-based Analysis** – Because cumulative effects focus on multiple actions to resources of concern, the evaluation is a resource-based analysis, rather than project specific. The study area boundary is based on the environmental resources selected for the study. Cumulative effects analysis on natural systems uses natural ecological boundaries, such as a watershed basin for a water resource study. Analysis of human communities uses sociological boundaries such as land use or demographic distribution. Furthermore, it is important to focus on meaningful effects. It is not practical or necessary to analyze every effect on every resource. Analysts should narrow the focus of the evaluation to sensitive or vulnerable resources identified through agency and community input.

Court Case Defines Elements of Meaningful CEE

"The analysis sets the geographic and time boundaries of the cumulative impacts assessment. It then summarizes the existing condition of each potentially affected resource. The analysis summarizes the impacts from the Proposed Bridge on each potentially affected resource and identifies other current and reasonably foreseeable future actions and their possible impacts on those resources. Finally, the analysis discusses the potential for cumulative impacts on the resources and mitigation or minimization measures. This approach constitutes a meaningful cumulative impact analysis."

Sierra Club North Star Chapter v. LaHood (2010)

- **Defined Time Horizon** – The time frame of the study is defined with regard to past and future effects. The cumulative effects evaluation should describe effects occurring from the time development began affecting the resource. The future time period is often based on an established planning horizon, such as the horizon year used in an adopted long range transportation plan.
- **Additive Effects of Multiple Actions** – The cumulative effects evaluation identifies past, present, and reasonably foreseeable future actions and their possible impacts on the resources. Actions focus on project types. The project types are not limited to transportation alone but to all types of development (e.g., residential, industrial, mining, commercial, agriculture) that affect the resource of concern.
- **Incremental Project Effects** – The analysis summarizes the direct and indirect impacts from the proposed project on each potentially affected resource. Each project alternative is usually evaluated separately. However, when it can be clearly demonstrated that direct and indirect effects are similar between alternatives, the cumulative effects evaluation may focus on one of these similar alternatives. For an example, see FHWA (2006) which was found to be thorough enough to meet NEPA's hard look requirement in *Sierra Club North Star Chapter v. LaHood, 2010*. When considering these situations, coordinate with the lead agency.
- **Estimate of Combined Effects** – The cumulative effects evaluation draws conclusions about the aggregate impact on each resource as a result of the past, present, and reasonably foreseeable actions of others, plus the incremental direct and indirect impacts of the proposed action. These conclusions should consider the current condition of the resource and any trends. Trends include any adverse effects that have occurred from past development or could occur from planned development, as well as restoration programs that could lead to overall improvements.
- **Minimization and Mitigation Measures** – Minimization and mitigation for the impacts of the proposed project are usually addressed in the direct and indirect effects studies and may be cross-referenced in the cumulative effects section of the environmental document. The discussion of minimization and mitigation in the context of cumulative effects may include measures beyond the control of the lead agency, such as land use planning decisions that could be implemented by the local governments. The discussion should identify the entity that would carry out such measures, as well as the likelihood of those measures actually being implemented.

These elements provide the framework for the guidance detailed in this ***CEE Handbook***. Please note that this list is not necessarily exhaustive. Project-specific issues must also be considered.

Section 2 Definitions

This section introduces key concepts used when analyzing cumulative effects under NEPA. The definitions are grouped according to relationships between terms, and not presented alphabetically.

2.1 Effects

The CEQ's regulations for implementing the procedural provisions of NEPA require that environmental effects be evaluated for proposed transportation and other federal projects. According to Title 40 Code of Federal Regulations (***40 CFR 1508.8***):

> *Effects includes (sic) ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.*

Three types of effects must be considered when evaluating a project:

- **Direct Effects** occur as a direct result of an action and occur at the same time and place as the action.
- **Indirect Effects** are reasonably foreseeable effects that occur as a result of an action but occur later in time or are removed from the action location.
- **Cumulative Effects** result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions.

Simply stated, an "effect" is the result or outcome from change caused by an action. The CEQ's regulations for implementing NEPA require that environmental effects be evaluated for proposed transportation projects receiving federal funding or action.

Sample Effects Evaluation – Apalachicola Bay

Insights regarding different types of effects are reviewed in the following subsections using the Apalachicola Bay example, based on studies by McCarthy (2004) and Harwell et al. (2005).

Apalachicola Bay, located in the Florida Panhandle, is the largest estuary in the contiguous United States (**Figure 2-1**). An estuary is a partially closed coastal area where saltwater meets freshwater. The mixed water conditions present a unique environment where specialized estuarine fauna thrive.

Figure 2-1 Apalachicola Bay, Sikes Cut, Jim Woodruff Dam

Over 50 years ago, construction of the Bob Sikes Cut (Sikes Cut), a navigation channel that incised St. George Island, and construction of the Jim Woodruff Dam at the Apalachicola River near the Florida-Georgia border permanently altered the salinity of Apalachicola Bay. Sikes Cut allowed more saline water to enter the estuary from the Gulf of Mexico. The Jim Woodruff Dam reduced natural freshwater flow into the estuary

from the Apalachicola River. The cumulative effect from these two actions alone contributed to chronic increases in estuarine water salinity over greater areas.

The increased water salinity harmed the oyster habitat in the estuary while promoting marine species and parasites that preyed on them. The degrading oyster habitat stressed the local economy and threatened a historical fishing tradition.

In recent years, urbanization in the coastal areas has been harmful to the estuary, primarily from septic leakage and stormwater runoff. Additionally, competing water use and agricultural, industrial and domestic pollution in the headwater regions of the Apalachicola River further contribute to harmful water quality conditions for the oyster habitat and the industry that depends on it.

Since the early 1990s, public agencies and stakeholders within Florida, Alabama and Georgia have been working towards an equitable water management plan to meet the region's water needs and be protective of Apalachicola Bay. To date, a resolution has not been reached. Based on trends in population growth and regional water use, combined with the lack of a practical water management plan, it is anticipated that sustaining historical conditions for a prolific oyster habitat may be unlikely in the foreseeable future. The primary cause is the diminishing quantity of freshwater inflow into the estuary caused by competing interests for a finite water resource.

2.2 Direct Effects

As provided in ***40 CFR 1508.8***:

> *Direct effects . . . are caused by the action and occur at the same time and place*.

As the name implies, direct effects are those actually caused by project activities. **Figure 2-2** illustrates this cause and effect relationship.

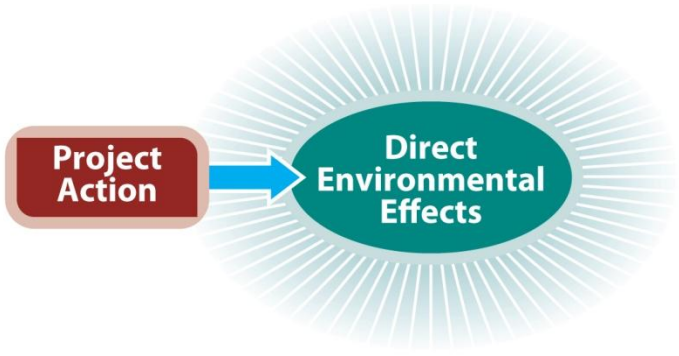

Figure 2-2 Relationship of Direct Effects to a Project Action

In the Apalachicola Bay, the Sikes Cut "action" physically altered St. George Island and brought about an immediate hydrologic change in the estuary (Gulf saltwater intrusion). The Jim Woodruff Dam physically altered the Apalachicola River, which also caused an acute hydrologic change in the river. A reservoir was created upriver of the dam and natural freshwater flow was altered downriver. In both cases, the direct effects occurred at the site location and began immediately after site construction. The major effects were changes made to the landscape and system hydrology in the immediate areas of the project locations.

2.3 Indirect Effects

As defined by ***40 CFR 1508.8***:

> *Indirect effects . . . are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.*

The term "***secondary effects***" is sometimes used as a substitute for "indirect effects." For consistency with the CEQ regulations, this ***CEE Handbook*** uses the term "indirect effects."

Indirect effects are caused by other actions that have an established relationship or connection to the project. These related actions would not or could not occur without the original project. For example, a new bike trail constructed near a sensitive habitat area may not directly affect the area, but may make it easier for people to access areas that would otherwise not have been accessible. These actions are often referred to as "but for" actions and generally occur at a later time or some distance removed from the original action. **Figure 2-3** illustrates this cause and effect relationship.

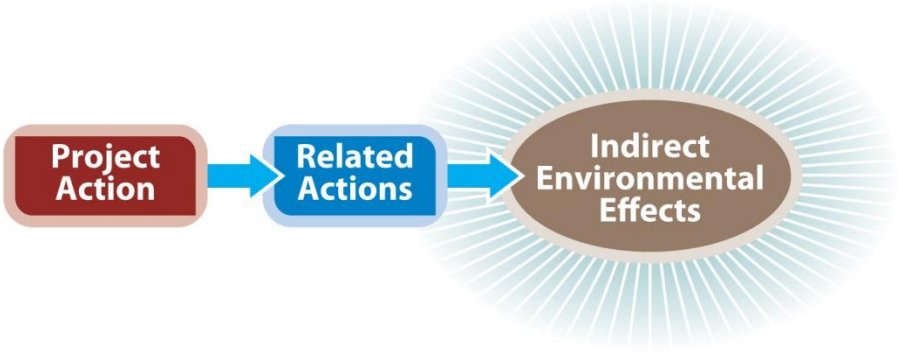

Figure 2-3 Relationship of Indirect Effects to a Project Action

AASHTO (2011) identifies the following two types of indirect effects:

- **Induced-Growth Effects** – Induced-growth effects are changes in the location, magnitude, or pace of future development that result from changes in accessibility caused by the project. An example of an induced-growth effect is commercial development occurring around a new interchange and the environmental impact associated with this development.
- **Encroachment-Alteration Effects** – Encroachment-alteration indirect effects are physical, chemical, or biological changes in the environment that occur as a result of the project but are removed in time or distance from the direct effects. One example of an encroachment-alteration indirect effect is a long-term decline in the viability of a population of a particular species as a result of habitat fragmentation caused by the project. These types of effects are sometimes described as direct effects. The categorization is not important as long as the NEPA document demonstrates that the effects have been considered.

In the Apalachicola Bay example, indirect effects from the Sikes Cut action included saltier estuarine conditions over time contributing to:

- Degraded oyster habitat
- Diminished economic productivity
- Stresses to the local community and the shellfish industry

In this case, a single action caused a cascade of sequential effects. Additionally, the buildup of the reservoir behind the Jim Woodruff Dam, which led to reduced downriver flow, also contributed to increasing estuarine salinity over time. The principal difference is that the Jim Woodruff Dam is located approximately 70 miles away from the estuary. However, the Jim Woodruff Dam contributes to similar environmental effects as the Sikes Cut, which is located at the estuary. These environmental effects are considered to be "indirect effects" because they occurred later in time regardless of site location and triggered additional effects that would not have been caused without the actions.

2.4 Cumulative Effects

As explained in ***40 CFR 1508.7***:

> *"Cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.*

Cumulative effects are the combined effects of direct and indirect effects over time. Therefore, **cumulative effects are not a different kind of environmental effect; they are the summation of direct and indirect impacts to a resource that have occurred over time or will occur in the foreseeable future.** Cumulative effects can be described as the relationship illustrated by the flow chart in **Figure 2-4** and by the following equation:

Cumulative Effects = (Direct Effects + Indirect Effects) of Many Actions

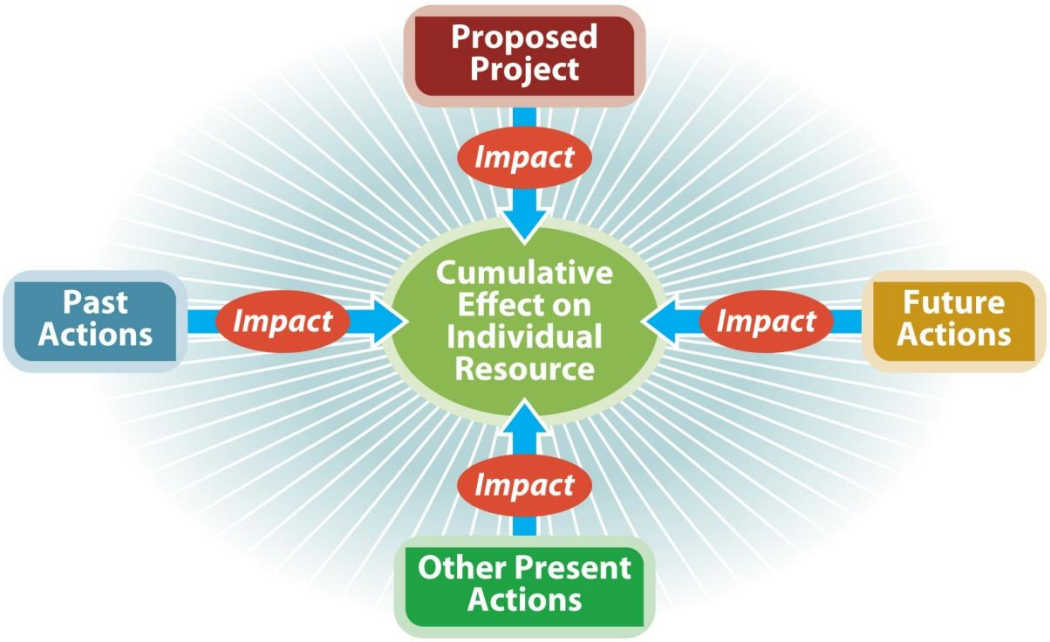

Figure 2-4 Relationship of Cumulative Effects to Project Actions

For instance, the indirect effects of the Sikes Cut and Jim Woodruff Dam to the oyster habitat in Apalachicola Bay are similar. Both actions affected water salinity. The cumulative effects of the two actions exacerbated the water quality condition by increasing the areas as well as the frequency of higher salinity. The actions that occurred over time but were collectively significant include:

- Construction of Sikes Cut in St. George Island (past action)
- Construction of Jim Woodruff Dam in the Apalachicola River (past action)
- Coastal urbanization surrounding Apalachicola Bay (past, current and reasonably foreseeable future action)

- Inland development in the headwater regions of the Apalachicola River (past, current and reasonably foreseeable future actions)

These actions contribute to the cumulative effects to:

- Water salinity and pollution – Water quality effect
- Oyster and other marine habitats – Ecological effect
- Shellfish industry and lifestyle – Sociocultural effect

A new project impacting these resources would add its incremental effects to those already established.

Other Definitions of Cumulative Effects

This ***CEE Handbook*** focuses on evaluating cumulative effects under NEPA. The distinction between NEPA and other definitions should also be taken into account when preparing cumulative impacts analyses that are intended to serve multiple purposes because some resource agencies define these terms differently. In these cases, coordinate with the appropriate federal agency to determine the appropriate scope and approach for the CEE.

Examples of other laws requiring consideration of cumulative effects include:

- **The Endangered Species Act (ESA)** requires consideration of cumulative impacts as part of the Section 7 consultation process, but the ESA Section 7 regulations define this term differently. Under the ESA, cumulative impacts "are those effects of future State or private activities, *not involving Federal activities*, that are reasonably certain to occur with the action area of the Federal action subject to consultation." (***50 CFR 402.02***). This definition differs from NEPA in two key ways: (1) only "future State or private activities" are considered, and (2) the impacts must be "reasonably certain" to occur, not just reasonably foreseeable.
- **Section 106 of the National Historic Preservation Act (NHPA)** requires federal agencies to take into account the effects of their undertakings on historic properties. According to the definition used in NHPA Section 106, cumulative effects are included as part of the definition of adverse effects and are described as follows: "Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative." (***36 CFR 800.5***).
- **Clean Water Act Section 404 Permits** guidelines focus on the discharge of dredge or fill materials and the related effects on the aquatic ecosystem. When reviewing permit applications, the U.S. Army Corps of Engineers (USACOE) pays attention to cumulative effects of numerous piecemeal changes to wetlands that can result in major impairment of wetland resources, and to changes in floodplain values and functions that may result in significant degradation of the floodplain and increased potential for harm to upstream and downstream activities (***33 CFR 320***).

- **The Florida Water Resources Act** requires that the Florida Department of Environmental Protection (FDEP) consider the cumulative impacts of an activity on surface waters and wetlands within a drainage basin (Section 373.414(8), Florida Statutes [F.S.]).The definition the FDEP Environmental Resource Permit (ERP) Program uses for cumulative effects is “residual adverse impacts to wetlands and other surface waters in the same drainage basin that have or are likely to result from similar activities (to that under review) that have been built in the past, that are under current review, or that can reasonably be expected to be located in the same drainage basin as the activity under review. Mitigation that fully offsets impacts within the drainage basin where the project impacts occur is assumed to not have any adverse cumulative impacts.” This definition *assumes mitigated impacts do not contribute to cumulative effects*. NEPA on the other hand, does not make this assumption.

For additional guidance about the requirements for cumulative effects evaluation under other laws and regulations, see NCHRP (2006).

It is important to note that compliance with these laws does not ensure compliance with NEPA.

2.5 Reasonably Foreseeable

Cumulative effects must be considered if they are reasonably foreseeable. Impacts that are possible, or that are considered “speculative,” are not reasonably foreseeable. Courts have defined “reasonably foreseeable” to mean “sufficiently likely to occur that a person of ordinary prudence would take into account in making a decision” *(Sierra Club v. Marsh, 1992).*

The CEQ (1981) provides a similar interpretation, requiring agencies to consider “uncertain, but probable” indirect effects of their actions:

> *The EIS must identify all the indirect effects that are known, and make a good faith effort to explain the effects that are not known but are "reasonably foreseeable." Section 1508.8(b). In the example, if there is total uncertainty about the identity of future land owners or the nature of future land uses, then of course, the agency is not required to engage in speculation or contemplation about their future plans. But, in the ordinary course of business, people do make judgments based upon reasonably foreseeable occurrences. It will often be possible to consider the likely purchasers and the development trends in that area or similar areas in recent years; or the likelihood that the land will be used for an energy project, shopping center, subdivision, farm or factory. The agency has the responsibility to make an informed judgment, and to estimate future impacts on that basis, especially if trends are ascertainable or potential purchasers have made themselves known. The agency cannot ignore these uncertain, but probable, effects of its decisions.*

Reasonably foreseeable effects, although uncertain, must be probable, not just possible. Factors that indicate whether an action is "reasonably foreseeable" for the purpose of cumulative effects evaluation include: 1) whether the project has been federally approved; 2) whether there is funding pending before any agency for the project; and 3) whether there is evidence of active preparation to make a decision on alternatives to the project *(Clairton Sportsmen's Club v. Pennsylvania Turnpike Commission, 1995)*.

Additionally, the courts have recognized that "an environmental impact is considered 'too speculative' for inclusion in an EIS if it cannot be described at the time the EIS is drafted with sufficient specificity to make its consideration useful to a reasonable decision-maker" (*Dubois v. U.S. Department of Agriculture, 1996).*

2.6 Substantial

"Substantial" means "of considerable importance, size, or worth." Substantial impacts are those that potentially affect unique or sensitive resources, or alter the environmental conditions to an extent greater than changes caused by current land uses in the area. Avoidance, minimization or mitigation options for these effects may be difficult to identify. Context and intensity play a role in determining which impacts are substantial. For example, potential impacts to a common animal are not likely to be substantial, but those to a rare or endangered animal probably are. Substantial impacts are noteworthy, but may not be significant.

2.7 Significant

The term "significance" carries special weight in NEPA because it is used to determine the level of environmental documentation required for a project based on its impacts.

According to the CEQ regulations (***40 CFR 1508.27***), the determination of a significant impact is a function of both *context* and *intensity, as* defined below:

> ***(a) Context*** *means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.*
>
> ***(b) Intensity*** *refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity:*
>
> 1. *Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.*

2. *The degree to which the proposed action affects public health or safety.*
3. *Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.*
4. *The degree to which the effects on the quality of the human environment are likely to be highly controversial.*
5. *The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.*
6. *The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.*
7. *Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.*
8. *The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.*
9. *The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.*
10. *Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.*

To determine significance, examine the severity of the impact in terms of:

- Type, quality and sensitivity of the resource involved
- Location of the proposed project
- Duration of the effect (short-term or long-term)
- Other context-specific considerations

Significance of the impact will vary with the setting of the proposed action and the surrounding area (including residential, industrial, commercial, and natural sites).

2.8 Summary

The key points explained in this section include:

- **Effects** are the outcome of a change caused by an action to the environment. Environmental effects may be physical, chemical, biological (ecological), cultural and sociocultural. An action may cause an immediate effect (direct effect) or related effects occurring later in time and distance (indirect effect).
- **Cumulative Effects** are the impacts on the environment resulting from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions.
- **Cumulative Effects** are not a separate kind of change to the environment.

Table 2-1 (below) compares characteristics of direct, indirect and cumulative effects.

Table 2-1 Comparison of Impact Types

Type	Nature of Effect	Cause of Effect	Time Frame	Focus/Emphasis	Study Area
Direct Impacts	• Predictable • Inevitable • Typical	Caused by the project activities	Present	Project activities	Within and adjacent to the project limits.
Indirect Impacts	• Reasonably Foreseeable • Probable	Caused by the project activities but later in time or farther away from the project	Present and future	Project activities	Within and near the project limits. Usually an area larger than the area represented for the direct impacts. The geographic area where impacts are caused from the project.
Cumulative Impacts	• Reasonably Foreseeable • Probable	Caused by the project activities, plus pre-existing conditions, plus other actions	Past, present and future	Resource condition	Includes multiple study areas. Each specific resource has its own study area that reflects the health and condition of that resource. Boundaries are not influenced by the project, but by existing boundaries (e.g., habitat, watershed and community).

Section 3 When to Evaluate for Cumulative Effects

3.1 Level of Analysis by Class of Action

CEQ regulations require all federal agencies to consider the cumulative effects of all proposed agency actions. Cumulative effects may also be considered for state projects in order to expedite project delivery. (See previous discussion of other laws and regulations in ***Section 2.4*** to consider other perspectives.) The level of analysis and documentation will vary based on the context and severity of the effects.

It is important to document the consideration of cumulative effects and the rationale for determining the level of analysis. The Class of Action will help determine the level of consideration and documentation:

- **Type 1 Categorical Exclusion (CE) and Programmatic CE –** CEs are types of actions which, based on prior experience with similar projects, do not individually or cumulatively have significant environmental impacts ***(40 CFR 1508.4 and 23 CFR 771.117(a))***. FHWA regulations ***(23 CFR 771.117)*** specifically identify certain types of actions that meet these criteria and normally do not require any further NEPA documentation or approvals. These are the Type 1 CEs. Likewise, Programmatic CEs meet the conditions stipulated and have been identified through agreement between FDOT and FHWA Florida Division. See ***PD&E Manual, Part 1, Chapter 2, Environmental Class of Action Determination*** for the Type 1 and Programmatic CE listings. These projects are by definition minor and do not contribute to cumulative effects. Cumulative effects evaluations are considered when determining the Class of Action. See ***Section 3.2*** below and use your knowledge of the project context to consider the potential for cumulative effects.
- **Type 2 CE –**This classification applies to project types that do not appear on the standard lists for Type 1 or Programmatic CEs, but where impacts, including the cumulative impacts, are not significant. Pursuant to ***23 CFR 771.117(d),*** these projects require appropriate analysis, documentation, and approval by FHWA Florida Division to demonstrate that the project is correctly categorized as a CE. Use the information in ***Section 3.2*** and knowledge of the project context to consider cumulative effects and to decide whether additional analysis is needed. Address findings under the topical categories on the ***Summary of Environmental Impacts Checklist for Type 2 Categorical Exclusions***. You can find the checklist and more details in ***PD&E Manual, Part 1, Chapter 5, Type 2 Categorical Exclusions***.
- **Environmental Assessment (EA) –** These projects have environmental impacts, but the significance of the environmental impacts is not clearly established. The CEE needs to address those resources or features that have the likelihood to be significantly impacted. The CEE should be concise, providing sufficient information for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI).

- **Environmental Impact Statement (EIS) –** Because actions requiring an EIS will have significant environmental impacts, a CEE is required for resources determined to be important based on coordination and context. The CEE should describe the context and intensity of the impacts (see the definition of "Significant" provided in ***Section 2.7***).
- **State Environmental Impact Report –** A CEE is a federal requirement that is not typically required for a state project. However, if a federal action (such as a permit) will be required in a later project phase, then a CEE may be needed to prevent future delays in the project schedule. For example, a CEE is recommended when a permitting agency needs information about cumulative effects to complete its review of the permit application. In these cases, coordinate with the regulatory agency to identify their requirements. A CEE is also recommended any time there is a possibility in which federal funds could be used on any phase of a project, or if FHWA, FRA or FTA approval is going to be required. In these cases, early coordination with the federal agency is recommended to determine the appropriate scope and approach for the CEE.

3.2 Considering Cumulative Effects

Consider the nature of the project and potentially affected resources to decide if further evaluation is needed. If the project is unlikely to contribute to cumulative effects, further study should not be necessary. In some cases, a focused technical study may be needed to verify that there are no significant cumulative effects. If so, consult with the lead federal agency to determine the appropriate level of analysis.

The following guidance addresses examples of circumstances where a cumulative effects evaluation may be appropriate. You can find information to help with these considerations in the ***Final Programming Screen Summary Report*** for the project, off-line documents, and through consultation with ETAT members and FDOT District environmental staff.

1. **The project is a new facility or one requiring substantial right-of-way.**

   Consider new facilities or those requiring substantial right-of-way acquisitions. Also, review potential stormwater pond locations.

2. **The project may result in substantial direct or indirect impacts on environmental resources**

   Consider the context and intensity or degree to which the action or project may affect a resource. If mitigation is used to reduce substantial impacts, consider whether the project will contribute to cumulative effects when combined with the effects of other actions.

3. **The project may cause direct or indirect impacts on resources that:**

   (a) Have protected status; or

   (b) Are in poor or declining health

   Evaluate the health and protection status of each resource based on information provided by the ETAT or preliminary environmental assessments. For resources at risk, even minimal impacts may lead to cumulative effects. If information gathered

about the status of the resources in the project area indicates that any of them are in poor or declining health, consider whether these impacts contribute to cumulative effects on the resource of concern.

4. **The project increases access to areas suitable for development**

   Identify undeveloped land on the local government Future Land Use Maps (FLUMs). Also review comments provided by the ETAT. If there is undeveloped land in the project area, consider the following to determine if it is likely to be developed:

   - Existing vacant buildings are for sale or lease in the area.
   - Vacant or agricultural lands in the area.
   - The project is within or near special FLUM and Comprehensive Plan overlay area for which redevelopment is ongoing or planned.
   - Future land use designations are consistent with development or re-development land use trends in the project area.
   - The project is adjacent to or within an area experiencing population/economic growth.

   Also consider if a community has a steady and/or growing population and/or employment. If the population is growing, the area has new or expanding businesses, and opportunities for development or redevelopment exist, consider whether cumulative effects would be likely.

5. **Other actions are planned that may impact resources affected by the project.**

   "Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time" (***40 CFR 1508.7***). Consider any resource potentially impacted by the project, even if those impacts are minor. Conduct a preliminary assessment to determine if other actions are planned within the resource boundaries. If there are other reasonably foreseeable activities that will potentially affect the resource, consider whether the combined effects require further study.

When cumulative effects are unlikely and no further evaluation is required for a Type 2 CE, document the consideration of cumulative effects in the project file.

When further analysis is needed to address concerns about cumulative effects, the CEE should focus on specific resources and issues of concern. Consult with the lead federal agency to determine the appropriate level of analysis. The scope and extent of the cumulative effects evaluation depends on the nature of the project and potentially affected resources. The methods and extent of the analysis will vary based on the size and type of the proposed project, its location, potential to affect environmental resources, the health of any potentially affected resource, and the level of controversy related to the resource.

If significant impacts seem likely, a higher level of documentation may be warranted. The initial Class of Action may have been based on project type, but if the analysis results in identification of significant cumulative effects and the project is not an EIS, a higher classification will be needed. In these cases, coordination with the Central

Environmental Management Office (CEMO) and the lead federal agency is recommended to determine the appropriate document classification.

Section 4 What is the Cumulative Effects Evaluation Process?

The FDOT CEE Process provides a framework to assist practitioners in assessing cumulative impacts under NEPA. The process is based on recommendations from the ICE Task Group; feedback from FDOT legal counsel, management, and practitioners; and an extensive literature review of case law and best practices.

No single formula exists to determine cumulative effects. However, case law provides some guidance on the standards that must be met. One important case, *Sierra Club North Star Chapter v. LaHood* (2010), identifies the following elements found in a meaningful cumulative effects analysis:

- Sets geographic boundaries
- Establishes time boundaries
- Summarizes existing condition of each potentially affected resource
- Reviews impacts from the proposed project on each potentially affected resource
- Identifies other current and reasonably foreseeable future actions and their impacts on the potentially affected resources
- Discusses the potential for cumulative impacts on the resources
- Addresses mitigation or minimization measures

The following 10 steps serve as guidelines to address these standards:

Step 1 Initiate the Cumulative Effects Evaluation

Step 2 Identify Resources of Concern

Step 3 Define the Study Time Frame

Step 4 Determine the Potentially Affected Resource Area (PARA)

Step 5 Evaluate Past and Present Impacts on the Resource

Step 6 Evaluate Effects of Reasonably Foreseeable Future Actions

Step 7 Add Direct and Indirect Effects of Build Alternatives

Step 8 Assess the Potential for Cumulative Effects

Step 9 Identify Potential Mitigation Measures

Step 10 Document Results

It is important to include all of the identified analytical elements in the cumulative effects evaluation. However, these steps may be modified to meet the needs of the project. The level of assessment and documentation depends on the nature of the project, the severity of impacts, and the potential for controversy.

Analyze cumulative effects for all build alternatives addressed in the environmental document, using these steps. Because the evaluation considers the effects of multiple actions, a cumulative effects evaluation is resourced-based, focusing on potentially affected resources. Therefore, Steps 3 -10 will be repeated for each resource identified in Step 2.

Typically, the cumulative effects evaluation occurs during PD&E with early consideration in the Planning and Programming Screens. ***Sections 5 -14*** of this ***CEE Handbook*** provide details about each step of the CEE Process when conducted during PD&E.

In certain cases, the FDOT District may choose to conduct an area-wide planning study to support the cumulative effects evaluation when FDOT identifies multiple projects having resources in common. For example, these studies may be helpful where new developments are being proposed and the need for new transportation facilities has increased. The analysis would encompass Steps 1-6 in the FDOT CEE Process, providing a baseline for trends and conditions of sensitive resources in an area. This foundation would subsequently be used by multiple projects as they move into PD&E. At that time, the direct and indirect effects of project alternatives would be addressed using Steps 7-10 of the FDOT CEE Process. For information about these area-wide planning studies, refer to ***Section 15*** of this ***CEE Handbook***.

Section 5 Initiate the Cumulative Effects Evaluation (Step 1)

A cumulative effects evaluation uses information from the direct and indirect impacts analyses. This makes it tempting to postpone the cumulative impact analysis until the direct and indirect impact analyses are well under way. However, CEQ recommends early consideration of potential cumulative effects, preferably during scoping. Such early consideration helps to focus the studies on resources of concern and may influence the design of alternatives to avoid or minimize impacts. Furthermore, the first six steps in the CEE Process can be conducted concurrently with the analysis of direct and indirect effects. You can expedite project delivery by starting the cumulative effects evaluation early.

5.1 Early Consideration of Cumulative Effects

In the ETDM Process, consideration of cumulative effects begins during the Planning and Programming Screens. Comments provided by the ETAT and other stakeholders will help the lead agency decide on the level of evaluation needed in the environmental document. When concerned about cumulative effects, ETAT members consider the following:

Scoping

An early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action. ***(40 CFR 1501.7)***

- **What resources in the area are at risk?**

  Recommend environmental resources that may need to be evaluated for cumulative effects during PD&E. Focus on priority resources in poor or declining condition that may be directly or indirectly affected by the project.

- **What are the logical, resource-based boundaries for these resources, and how might the project effects travel within those boundaries?**

  Identify considerations to help define the geographic study area for a cumulative effects evaluation of the resources. The challenge is defining it large enough to understand the trends affecting the resource and yet small enough to provide practical consideration of the project's contribution to the cumulative effects. The boundary is usually resource based, accounting for localized effects. The key is to encompass the resources affected by the project, to the extent where it contributes to the cumulative effects on the resource.

- **What future management plans has your agency developed for these resources, if any?**

  Summarize any regulatory or conservation programs that have been implemented or are planned to protect or restore the resources. Note the effectiveness of these

programs in reducing impacts on the resources and indicate where we might find more information.

- **What additional foreseeable activities is your agency aware of that could affect the resource? For example, is your agency reviewing any permit applications that could contribute to cumulative effects?**

  Identify any reasonably foreseeable actions within the potentially affected resource area to include in a cumulative effects evaluation. Focus on activities that FDOT may not be aware of. For example, there is no need for the ETAT members to identify transportation projects listed on the State Transportation Improvement Plan as these will be included by FDOT.

- **In regards to other actions, what avoidance, minimization, or mitigation opportunities can you recommend for cumulative effects?**

  Recommend options which address effects of the other reasonably foreseeable activities mentioned above. Include options, even though implementing the mitigation may not be in the control of the lead agency responsible for this ETDM project. These opportunities would be in addition to those available for potential direct and indirect effects identified for the ETDM project being reviewed.

These comments will help the lead agency determine if a cumulative effects evaluation is required (see ***Section 3*** of this ***CEE Handbook*** for additional guidance). When a CEE is needed, the comments will focus the analysis on key resources of concern and provide other considerations for defining the scope of the evaluation.

5.2 Engage ETAT Members during PD&E

Early and continuous coordination with resource agencies during the CEE Process can help avoid disagreements about assessment methodologies and results, and reduce litigation risk (NCHRP, 2008). Several FDOT Districts have engaged resource agencies in cumulative effects evaluations by forming ETAT subgroups. The ETAT subgroup provides the framework for coordination of information needed to scope and develop the CEE document. To determine which ETAT members should be in the subgroup, review comments provided during the Programming Screen, and then invite those members who expressed concerns about cumulative effects for resources under their agency jurisdiction. Other agencies with jurisdiction over the resources of concern may also be invited to participate in the subgroup. Typical activities of the ETAT subgroup include:

- Identify resources of concern
- Establish geographic boundaries for the study area
- Identify data gaps
- Review and comment on methodologies selected for the study
- Review and comment on study results

5.3 Plan for Community Outreach

Seek feedback and address concerns of the community at various stages in the development of the CEE. Include community outreach opportunities in the project's Public Involvement Program (see ***PD&E Manual, Part 1, Chapter 11, Public Involvement***).

One method for handling community issues or a potential for controversy about cumulative effects is to seek volunteers from citizen groups to participate in a CEE stakeholders group. This group may meet jointly with the ETAT subgroup or separately. The community representatives may assist with tasks such as:

- Verifying resources of concern
- Defining the geographic boundaries for these resources
- Agreeing on an appropriate time frame for study

Refer to the ***Public Involvement Handbook*** for additional techniques for community outreach.

5.4 Summary

- Begin scoping activities early to identify key project issues. For ETDM projects, scoping begins with the Programming Screen.
- Review comments provided during the Programming Screen and considerations in ***Section 3*** of this ***CEE Handbook*** to determine if a CEE is required.
- If a CEE is not required for Type 2 CEs, document the finding using the **Cumulative Effects Determination Evaluation Checklist** found in ***Section 3*** of this ***CEE Handbook***.
- When a CEE is required, form an ETAT subgroup. Given that the courts look to resource agencies as subject matter experts, the ETAT subgroup members should be involved throughout the CEE Process.
- Provide opportunities for community engagement at various stages in the development of the CEE. Address community concerns in the environmental document. Refer to ***PD&E Manual, Part 1, Chapter 11*** and the ***Public Involvement Handbook*** for more information about public involvement.

Section 6 Identify Resources of Concern (Step 2)

Early in the CEE Process, identify specific elements of the natural and human environment to study and explain how these resources were selected. The cumulative effects evaluation usually studies a subset of resources considered in the direct and indirect effects analyses. It focuses on priority resources in poor or declining condition that may be substantially affected by the project or other activities in the area.

6.1 Identify Priority Resources

CEQ recommends focusing on key resource issues of national, regional or local significance (i.e. “count what counts”) (CEQ, 1997, p. 12). To identify potential issues, consider whether the resource is:

- Protected by legislation or resource management plans
- Ecologically important
- Culturally important
- Economically important
- Important to the well-being of a human community

Also consider whether the project might involve issues that could affect long-term quality of life or resource sustainability. CEQ offers the following list of potential issues addressing a broad range of types of actions (1997, p. 13):

- Long-range transport of air pollutants resulting in ecosystem acidification or eutrophication [depletion of oxygen in water]
- Air emissions resulting in degradation of regional air quality
- Release of greenhouse gases resulting in climate modification
- Loading large waterbodies with discharges of sediment, thermal, and toxic pollutants
- Reduction or contamination of groundwater supplies
- Changes in hydrological regimes of major rivers and estuaries
- Long-term containment and disposal of hazardous wastes
- Mobilization of hazardous substances which may persist or gradually accumulate through the food chain
- Decreases in the quantity and quality of soils
- Loss of natural habitats or historic character through residential, commercial, and industrial development
- Social, economic, or cultural effects on low-income or minority communities resulting from ongoing development

- Habitat fragmentation from infrastructure construction or changes in land use
- Habitat degradation
- Disruption of migrating fish and wildlife populations
- Loss of biological diversity

6.2 Evaluate the Condition of the Resources

Focus the CEE on priority resources in poor or declining condition. Once you have identified priority resources, consider the sustainability of the resource. Consider concerns of agencies managing and regulating those resources, the regional history of resource degradation, and the presence of other proposals that would produce future degradation (CEQ, 1997, p. 12).

Conduct a preliminary data review to determine whether the resources are in poor or declining condition. Also identify resource conservation and protection activities in place to prevent future decline. This will be a high-level, desk-top evaluation using information such as:

- Comments received from the ETAT during the Planning and Programming Screens
- Resource data available in the ETDM Environmental Screening Tool (EST)
- Results from other scientific literature, such as studies about resource trends and conditions in the area
- Findings from recent or ongoing NEPA studies of nearby actions (for example, cell towers and utility projects)
- Planning documents, such as:
  - Local Government Comprehensive Plans
  - Urban Service Area boundaries in the Local Government Future Land Use Map (FLUM)
  - MPO Long Range Transportation Plans (LRTPs), or similar transportation plans
- Local knowledge of the resources and observations from recent windshield surveys

Consult with the ETAT subgroup and the community for more information and to confirm results.

6.3 Consider Potential Effects

The final consideration in identifying resources of concern is to determine if this or other activities will substantially affect the priority resources. Consider resources most likely to be substantially affected.

Use information from the ***Final Programming Screen Summary Report*** and Preliminary Environmental Discussions (PEDs) to identify potentially substantial direct

or indirect effects that might be caused by the project. Look for potential effects to unique or sensitive resources, or those altering conditions to a great extent (see previous discussion in ***Section 2.6 Substantial***). If the project effects are minor, look for other activities (government or private) in the region that may affect the resource. The key factor is whether there are substantial impacts on the resource, not whose actions are causing the impacts.

If the project does not directly or indirectly affect a resource, it will not contribute to the cumulative effects. Therefore, the resource does not need to be studied in the CEE. If a protected resource is not studied for this reason, a determination that the project will not have direct or indirect effects must be thoroughly substantiated in the environmental document.

6.4 Confirm the Selection of the Resources

Once you have identified the resources for analysis, document the reasons for selecting these resources. Consult with the ETAT subgroup and community stakeholders to confirm that the selection of resources for the CEE is reasonable.

Best Practice

"The best way to confirm that the agency's selection of resources for the cumulative impact analysis is reasonable is to obtain public and agency feedback through a workshop or similar venue." (NCHRP, 2008, p. 58)

6.5 Summary

- Focus the CEE on resources that:
  - Are in poor or declining condition
  - May be substantially affected by the project or other actions (government or private)
- A CEE is not needed for resources not directly or indirectly affected by the project because it will not contribute to cumulative effects
- Consult with agencies and the community stakeholders to help identify resources of concern
- Document the rationale for selecting the resources of concern

Section 7 Define the Study Time Frame (Step 3)

After identifying the resources of concern, select a study time frame. This establishes the time horizon for identifying past and future effects. The time frame will be used in subsequent steps to identify effects of past, present, and reasonably foreseeable future actions. The time frame may be defined differently for each resource of concern. Document the time frame(s) in the CEE report and explain how and why those outer years were selected.

7.1 Define the Time Frame for Past Effects

A formal historical time frame is not strictly necessary based on case law, as long as the discussion summarizes past effects on the health of the resource (NCHRP, 2008, p. 58). The historical time frame depends on the project context and the availability of information. The discussion of past effects should begin with early development events in the study area – as far back as feasibly possible, but certainly no less than 10 years in the past (AASHTO, 2011). Examples of actions that mark major turning points or shifts in land use causing impacts to resources include:

- Construction of a major transportation facility
- Opening of a regional employer
- Development of a new residential or commercial area
- Conversion of land to agriculture or forestry

The availability of Geographic Information System (GIS) data should not be the basis for the historical time frame. If quantitative data are not available, a qualitative assessment may be used to describe historical trends during the early years.

CEQ Guidance

"The availability of data often determines how far back past effects are examined. Although certain types of data (e.g., forest cover) may be available for extensive periods in the past (i.e., several decades), other data (e.g., water quality data) may be available only for much shorter periods. Because the data describing past conditions are usually scarce, the analysis of past effects is often qualitative." (CEQ, 1997, pp. 17-19)

7.2 Establish the Time Frame for Future Effects

The future year used in the study should have a logical basis, such as the horizon for the Long Range Transportation Plan (LRTP), or the local government Comprehensive Plan and Future Land Use Map (FLUM). For consistency, the future year for the CEE may be the same as that used for the indirect effects assessment. However, a longer time period may be appropriate in some cases.

7.3 Verify and Document the CEE Time Frame

Consult with the ETAT subgroup and the community stakeholders to confirm that the time frame(s) for the study is reasonable. Document how the time frame was established and the reasons for selecting those particular years.

7.4 Summary

- Define the study time horizons with regard to past and future effects
- The time frame may vary for each resource of concern based on the scope of each issue and its applicability to the study
- Describe the historical time frame in terms of early development events in the study area
- Establish the future time frame based on a logical basis such as the time horizon of an adopted plan
- Obtain ETAT and community feedback to verify the CEE time frame
- Identify the time frame(s) in the CEE document and explain how and why it was selected (see example below)

Example Documentation of CEE Time Frame

Excerpt from the *St. Croix River Crossing Project Supplemental Final EIS* (FHWA, 2006)

Many of the potential impacts considered in this analysis are related to direct or indirect effects of changes to, and intensification of, land use and associated infrastructure. Cumulative impacts analysis suggests considering past conditions and activities, current day actions as well as reasonably foreseeable future change. Therefore, an approximate twenty-year past and future time frame (1980 and 2025) was defined. Many historic data sources back to 1980 were accessible for purposes of this analysis. For future activity, demographic forecasts available in both Wisconsin and Minnesota and the time horizon of most local jurisdictions' comprehensive plans were between 2020 and 2025. This represented the furthest extent of transportation and land use planning efforts reasonably available for use in the analysis.

Section 8 Determine the Potentially Affected Resource Area (Step 4)

The Potentially Affected Resource Area (PARA) is the geographic study area used in the CEE. The CEE document should explicitly identify the PARA boundary for each resource addressed in the study. It should also explain the reason for selecting the PARA and respond to any substantive objections raised about the selection.

The PARA boundary is usually resource based, to the extent in which the project contributes to the cumulative effects. This differs from the study area used in the analysis of direct and indirect effects in that it expands to include effects from other actions. For example, the study area for direct effects may be based on a distance from the project (such as one-quarter mile). The PARA, on the other hand, is usually based on the geographic distribution of the resource and how far effects may travel within that resource boundary. The PARA may also vary for each resource evaluated in the CEE. For example, the evaluation of cumulative effects on water quality may select a watershed boundary, while the boundary used for wildlife may be contiguous habitat areas.

Exercise care in selecting a suitable size for the PARA, making it meaningful to the analysis. Evaluation results will be more efficient and effective when an appropriate PARA size is used. The challenge is defining it large enough to understand the trends affecting the health of the resource and yet small enough to provide practical consideration of the project's contribution to the cumulative effects. The PARA size should account for localized effects, and not be solely reliant on natural boundaries. For example, the St. Johns River Basin extends across at least a dozen counties from central to northeast Florida. The cumulative effects on wetlands in the headwater regions near Brevard and Orange Counties may be quite different from those at the river terminus in Duval County. For this example, it may be appropriate to limit the PARA to sub-regions within the basin. When sizing the PARA, the ETAT subgroup and community stakeholders can provide valuable input. Resource experts on the project team, in the FDOT District, and in CEMO can also assist in establishing the PARA boundaries based on their working knowledge of the resources and regulatory mandates. For federal projects, also consult with the lead agency.

Many approaches are available to define the appropriate study area. The key is to encompass the resources affected by the project, to the extent where it contributes to the cumulative effects on the resources. Consider the strategies below when selecting the PARA.

8.1 What is the Geographic Distribution of the Resource?

For each resource addressed in the CEE, determine the geographic area occupied by the resource. Generally, the adoption of natural boundaries as the PARA boundaries

facilitates the technical analyses of the cumulative effects evaluation. In this perspective, the PARA is the scientific investigative area for the evaluation.

Recommendations from the ICE Task Group include the following:

Natural Resources

- For water resources and wetlands, the PARA may be based on hydrologic basin boundaries (also "watershed" or "water basin"). In most cases, the hydrologic basin boundaries in the state are natural boundaries. In some cases, such as in central and south Florida, basins are artificially bounded by a system of drainage canals.
- For wildlife resources, the PARA may be based on management areas and species habitats that are considered relatively natural. For instance, the U.S. Fish and Wildlife Service (USFWS) provided an example of how a PARA could be generated using consultation areas based on species habitat defined in the Florida Land Use, Cover, and Forms Characteristics System (FLUCCS) data. The Florida Fish and Wildlife Conservation Commission (FFWCC) proposed a PARA based on the results of the Integrated Wildlife Habitat Ranking System (IWHRS). The IWHRS defines, ranks, and maps habitat areas for a broad array of wildlife species.

Sociocultural Resources

- Consider the general planning areas or units used by local government for future land use planning. The focus for cumulative effects is on large planning areas rather than at the neighborhood level. In certain cases, such as when considering environmental justice issues, a community-level boundary may be more appropriate.
- In many urban settings where planning areas exist, the PARA can be further refined by close coordination between FDOT District and local agency representatives to incorporate local data and review.
- In some communities where planning areas are not available, the project team can work with local government planners in developing PARAs. In this case, one approach is to use parcel data or census block data as the beginning point for development of the PARA.

Cultural Resources

- Begin with one-quarter mile buffered areas of documented cultural resources (such as the Florida Master Site File). Determine the geographic context for the type of resource being affected. Also consider the rarity of the potentially affected resource. The PARA may need to be extended for extremely rare resources. For example, if the project affects one of three remaining unique bridges located in different parts of the state, all three of the bridges would need to be considered.

8.2 How Far can an Effect Travel?

When the natural boundary of the resource is too large for practical data collection and analysis, it is useful to think about the distance an effect can travel (CEQ, 1997). For

example, the range of the Florida Panther extends throughout much of South Florida. To provide a meaningful analysis of cumulative effects, the PARA for the Florida Panther may need to be limited to the range and suitable habitat within a certain distance from the project. The distance should encompass the direct and indirect effects of the alternatives, as well as those of other actions in the area. Use input from the ETAT subgroup and resource experts to establish the appropriate distance for the project.

8.3 What Resource Areas are used by Other Agencies?

Often a regulatory or resource management agency may have a boundary already defined for the resource that may be useful for the CEE. Previous studies may have been conducted for those areas that can provide a foundation for the historical trends and conditions of the resource. For example, a species recovery plan may have identified regions of species range that may be appropriate for the PARA.

8.4 Summary

- Establish a PARA for each resource of concern.
- The PARA boundary is resource-based, i.e., determined by the geographic distribution of the resource.
- The PARA should encompass the resources affected by the project, to the extent in which its alternatives contribute to the cumulative effects on the resources.
- Consult with the ETAT subgroup and community representatives to verify the PARA boundaries selected for the study.
- The CEE documentation should:
  - Clearly define the selected boundaries
  - Clearly explain the boundary selection process
  - Provide the rationale for selecting the boundaries
  - Respond to substantive objections to the PARA selection
- **Table 8-1** provides suggestions for possible geographic boundaries for different resources. The information is adapted from CEQ (1997, Table 2-2, p. 15), California Department of Transportation (2005b, Table 1) and Texas Department of Transportation (2009, pp. 59-60). This list is not all-inclusive. The applicable PARA boundary needs to be defined on a case-by-case basis.

Table 8-1 Suggestions for Defining PARAs

Resource	Resource Area	Discussion
Land Use	Community, metropolitan area, county, planning units	Consult city and county planning agencies, MPOs, and regional planning councils for assistance in establishing land use boundaries and the affected community.
Air Quality	Metropolitan area, air basin	Consult with FDEP and U.S. Environmental Protection Agency (USEPA) to identify appropriate boundaries.
Wetlands and Water Quality	Stream, watershed, river basin, estuary, aquifer, wetlands complexes, or parts thereof	Identify drainage basins or sub-basins in which the project is located. Consult the U.S. Army Corps of Engineers (USACOE), Water Management Districts, National Marine Fisheries Service (NMFS), and FDEP for assistance in delineating wetlands and/or water quality boundaries.
Plant Species	Watershed, forest, range, or ecosystem	Ask botanists specializing in particular species for assistance in defining reasonable PARAs. Consult with USFWS and FFWCC.
Animal Species (Resident Wildlife)	Species habitat or ecosystem, subpopulation boundaries	Ask biologists specializing in particular species for assistance in defining reasonable PARAs. Critical habitat designations under the Endangered Species Act and information provided by the ETAT subgroup will indicate the range of individual species and populations, and provide a general study area. Consult with USFWS and FFWCC.
Fish/Marine Life	Stream, river basin, estuary, or parts thereof; spawning areas and migration routes	Ask biologists specializing in particular species for assistance in defining reasonable PARAs. Consult with NMFS regarding Essential Fish Habitat (EFH), the range of individual species and populations, and to provide a general study area.
Cultural Resources	Existing and potential historic districts, traditional cultural properties and known sacred sites, ethnographic and present tribal territory	Project-specific historic and archaeological resource analyses typically define the geographic context for historic resources, which are typically beyond the boundaries of the project footprint. Consult with the State Historic Preservation Officer (SHPO) or designee, local historical societies, tribal governments, and cultural resource professionals for assistance in establishing boundaries for cultural resources.
Community	Community, metropolitan area, county, multi-county area, neighborhood, distribution of low-income or minority populations, census tract or sub-tract	Consult city and county planning agencies and community-based organizations. Analyze U.S. Census data for the distribution of environmental justice populations.

Section 9 Evaluate Past and Present Impacts on the Resource (Step 5)

Evaluate impacts of past and present actions on each resource of concern by summarizing the resource condition and trends (NCHRP, 2008). A listing of individual past actions is not required (CEQ, 2005). The CEE should include an analysis of effects, not just a listing of actions. Describe the current condition of each resource, how it got to its current state, and major trends affecting the health of the resource. The analysis should also discuss resource management initiatives and thresholds or carrying capacity for each resource, if applicable. Also describe any regulation or conservation programs that have been implemented to protect or restore the resource(s), and note the effectiveness of these programs in reducing the impact on the resource(s).

Summarizing the resource conditions and trends for the CEE is very similar to describing the affected environment in the project-specific analyses of direct and indirect effects. However, rather than using the project study area, use the PARA identified in Step 4 of the CEE Process (described in ***Section 8*** of this ***CEE Handbook***). Use the following steps to evaluate past and present impacts:

1. Describe the health and status of the resource, including its response to change and capacity to withstand stress
2. Identify stresses affecting the resource and their relation to regulatory thresholds (if applicable)
3. Document the baseline condition for the resource

These steps are described in more detail below.

9.1 Describe the Health and Status of the Resource

Characterize the condition of the resource by describing its current health or status and explaining the actions that led to its current condition. Describe the current condition in the context of past actions that have had an impact on the resource and other present actions that may impact the resource. Discuss recent trends indicating whether the health of the resource is improving, stable, or declining.

When describing the current condition of the resource, the time period of interest is the “present day.” This time frame is relative and does not mean today’s date. Rather, “present” conditions may range a number of years back depending on the resource being evaluated, available data, and the scope of the issue. For instance, a sociocultural resource evaluation may base the demographic characterization for the “present” time frame on the 2010 census data, because it is the best available data.

There are a variety of ways to determine the current resource condition. In practice, limitations in data availability and data details will constrain the level of analysis that is possible for each resource of concern, as well as region. Also, due to inherent

differences among natural, sociocultural, and cultural resources, the methodology used to characterize each resource will vary. For instance, the study of effects from land use development will be different for sensitive animal habitats (natural resource) than for a historic bridge (cultural resource). Anticipate that the technical content of each CEE will differ by resource and region. What is important is that the practitioner endeavors to address fundamental characteristics of cumulative effects in a well-reasoned manner based upon accurate factual documentation. Fundamental characteristics for evaluating past and present impacts on a resource include the following:

- **Resource threshold(s)** – A resource threshold is the capacity of the resource within the PARA to accommodate further effects from human development. In this regard, a resource threshold is an important metric with which to conduct comparative analysis for past effects as well as foreseeable future effects. Thresholds are usually established by regulation or resource management goals. If there are no thresholds established for a resource, focus the evaluation on identifying resources that are potentially in peril.
- **Historical and current effects** – Because the present phenomenon is the result of past actions, the current state of a resource is essentially the cumulative effects to date. Providing insight about historical actions contributes to the characterization by identifying the governing causes and trends.

9.1.1 Data Sources

To describe the current condition of the resource, first review and analyze the data within the PARA. CEQ recommends including four types of information for this evaluation (CEQ, 1997, p. 24):

- Data about the status of the resource
- Data characterizing important stress factors
- Descriptions of pertinent regulations, administrative standards, and development plans
- Data on environmental and socioeconomic trends

Some of this information may already be available from ETAT agencies in certain regions of the state and for some resources of concern. Regulatory, permitting, and other resource agencies are aware of the public's sentiments and sensitivities regarding the past development, current status, and future trends of the protected resource because such knowledge guides policy and forms the basis for program funding. Many federal, state, and local agencies already characterize the health and trends of the resources they manage.

An example of such available information is illustrated by **Figure 9-1** (Projected Water Demand by Water Use) and **Figure 9-2** (Public Supply Projections) published by the Northwest Florida Water Management District (NWFWMD, 2006). This document is a regional water supply plan developed pursuant to the requirements of Chapter 373, Florida Statutes (FS), to recommend a strategy to meet the water needs of Santa Rosa, Okaloosa and Walton Counties and to protect the region's water resources and related

natural systems. The plan is updated every five years. The document is the culmination of many types of technical analyses, drawing on efforts and expertise from multiple programs within the agency.

Both figures (**Figures 9-1** and **9-2**) are end products of the technical analyses and share the major characteristics required in evaluating for cumulative effects. **Figure 9-1** presents past, present and projected water demand from 1995 to 2025. The water demand is categorized by different types of water use (similar to action type but not project specific). The various types of water use include Public Supply Systems (SS), Commercial-Industrial SS, Recreational Irrigation, Domestic SS/Small Public SS, and Agricultural Irrigation. As shown on **Figure 9-1**, the public supply demand (the significant action type) far exceeds other water uses in the region. **Figure 9-2** then focuses on the projected water demand of the significant action only (public supply), but categorizes it by areas of land development (coastal or inland development) and their total demand (result of all actions).

According to NWFWMD (2006), numerical modeling results predict that the sustainable yield (resource threshold) in the region is approximately 30 million gallons per day (Mgal/d) to prevent saltwater intrusion from contaminating the freshwater resource. It is easily seen in both figures that the public supply demand has exceeded the threshold since 1995, and this trend will continue into the foreseeable future unless alternative sources of water are found (which becomes the basis for mitigation initiatives and program funding).

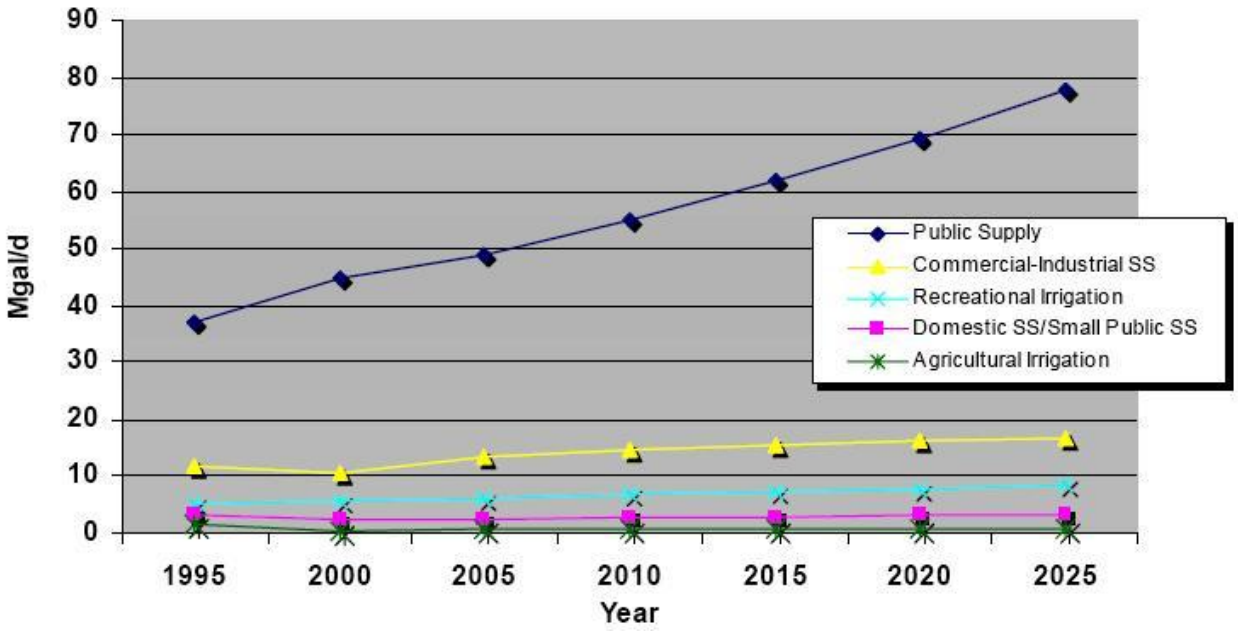

Figure 9-1 Projected Water Demand by Water Use (NWFWMD, 2006)

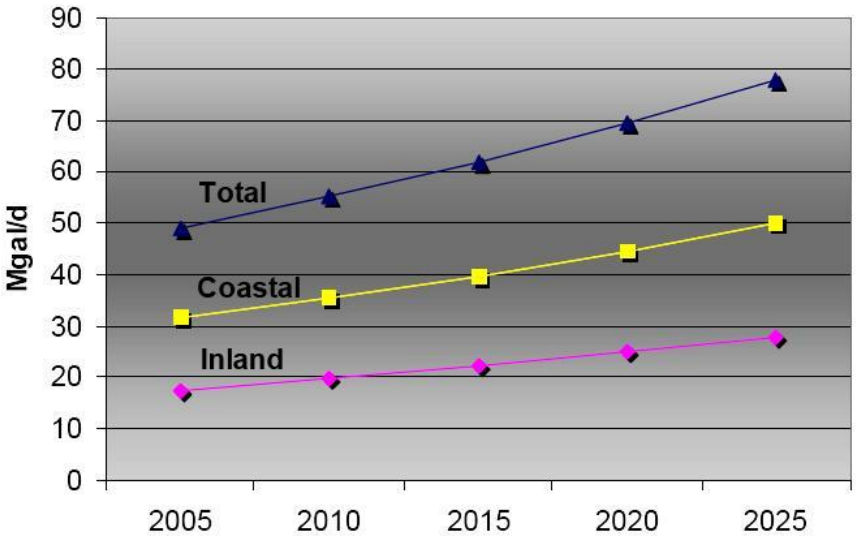

Figure 9-2 Public Supply Projections (NWFWMD, 2006)

The point is that resource-based documents similar to the example discussed here may be available from many regulatory or resource agencies. Such documents draw on the interdisciplinary expertise of the agency, which provides insights about the resources of concern and environmental effects. Therefore, you should research previously conducted studies before starting the current technical analysis. The ETAT subgroup can be a valuable source of information about previous studies conducted within the PARA.

Other data sources identified by the ICE Task Group include:

- Existing Geographic Information System (GIS) data from many government and private sources compiled for FDOT by the Florida Geographic Data Library (FGDL) at the University of Florida GeoPlan Center. The information is available for download to use with desktop GIS software. Authorized FDOT staff and consultants can also access the FGDL data through the ETDM Environmental Screening Tool (EST). On the EST, you may enter the PARA as a study area polygon and evaluate the data through online maps and data reports.

  The EST Map Viewer is a valuable tool for visualizing the PARA, identifying resources of concern, gathering descriptive information, and creating figures for the evaluation. Standard GIS Analyses available on the EST provide quantitative information about resources located within the study area. For more information about the EST, refer to the ***EST Handbook*** or contact the ETDM Help Desk at help@fla-etat.org.

- Previous environmental studies conducted for other actions within the PARA.
- Additional information for natural resources include sources such as:

- Uniform Mitigation Assessment Methodology (UMAM) for wetlands
- Protected Species Resource Recovery Plans – when available
- Section 305(b) report required under the Clean Water Act
- Section 303(d) lists of impaired waters reported under the Clean Water Act
- USEPA STOrage and RETrieval (STORET) database, which stores water quality sample data
- Statewide coverage of Permit Application (PA) Tracking System for Environmental Resource Permits (ERPs)
- Total Maximum Daily Load (TMDL) from the FDEP Basin Assessment Reports

- Additional information for sociocultural resources include sources such as:
  - Local Government Comprehensive Plans
  - Revitalization plans
  - Local community information
  - Public input
  - Long Range Transportation Plans (LRTPs)
- Additional information for cultural resources include sources such as:
  - Locally designated properties
  - Published local histories
  - Communication with local historical societies and local historians
  - Windshield surveys to identify potential undocumented resources. Several indicators of potential archaeological resources include topographic elevation, well-drained soils, and access to freshwater.

9.1.2 Examples of Data Analyses

In addition to the standard GIS analyses available through the EST, the ICE Task Group identified examples of GIS analyses that can be used to support the evaluation of resource conditions and trends. These can be conducted using FGDL data with standard desktop GIS software.

Cultural Resources

Use data from the Florida Master Site File, the State of Florida's official inventory of historical cultural resources. This data is available for FDOT use in the EST, or may be requested from the Division of Historical Resources. Within each PARA that intersects the project, perform the following two-step analysis:

1. Count the number of Resource Types, as follows:
    - Archeological or Historic Sites summarized by Structures or Features, Function, and Historic Contexts
    - Historical Structures summarized by Style and Structural Systems (or Building Materials)
    - Historical Bridges summarized by Overall Bridge Design, Year Built, and Designers/Engineers (or Builders/Contractors)
    - Historical Cemeteries summarized by Type, Ethnic Groups, and Range of Death Dates (Earliest to Most Recent)
    - Resource Groups summarized by Resource Group Description
2. Provide a Cultural Resource Distribution Matrix – The matrix and the distances were developed by the Cultural Resources Subgroup of the ICE Task Group. For each Resource Type identified in the previous analysis, count the number of resources of the same type found in proximity to the project, as follows:
    - Archeological or Historic Sites – within 10 kilometers (km)
    - Historical Structures – within the County
    - Historical Bridges – within the State
    - Historical Cemeteries – within 1 km
    - Resource Groups – within the County

Natural Resources

- Florida Land Use, Cover and Forms Characteristics System (FLUCCS) change detection – Compare the difference between historical and recent FLUCCS data by FLUCCS code.
- Analysis of habitat types – Calculate acreage within the PARA of compatible habitat types for specific wildlife species.

Sociocultural Effects

- Land use impacts on PARA – Compare the differences between historical and recent land use data by calculating the total acreage of land use classifications within the PARA for various time periods.
- Population density estimations using census block and block group data in the PARA.

These are just several examples of analyses that may help in the CEE. Specific analytical methods will vary according to the scope and context of the project. CEQ discusses additional methodologies in Chapter 5 and Appendix A of their guidebook, ***Considering Cumulative Effects Under the National Environmental Policy Act*** (CEQ, 1997).

9.2 Identify Stresses Affecting the Resource

Describe factors that cause stress on the resource to help determine whether the resource is approaching a critical point where additional stress will lead to cumulative effects (CEQ, 1997). Describe the key historical patterns or activities that have influenced how the resource has changed over time. These will usually be notable land use or demographic patterns. The discussion does not need to address individual actions that affected the resource; rather it should provide an overview of types of activities that have resulted in the current condition of the resource. For example, if wetlands are the resource of concern, the discussion might explain the role of certain land use changes (agricultural, residential and commercial development, etc.) in causing the loss of wetlands.

This evaluation provides the historical context, explaining the actions that led to the current condition of the resource. Information used to describe this historical context may be qualitative or quantitative. The goal is to tell the story about the resource.

In many cases, the direct and indirect effects evaluation will include information about the historical context. This information will need to be expanded to cover the CEE time frame and geographic boundary (i.e., PARA).

9.3 Document the Baseline Condition for the Resource

The data gathered to describe the health and historical trends of the resource establishes the baseline for the affected environment. This baseline is critical for predicting future cumulative effects in subsequent steps of the CEE Process.

The baseline condition is comprised of the existing conditions of the resource, the past actions that have had an impact on the resource, and other present actions that have potential impact on the resource. Recommended documentation includes the following:

- Describe the current health of each resource.
- Describe how each resource got to its current state. Include impacts from all types (not just transportation related) of past actions, both private and public.
- Describe any major trends that affect the resource's health.
- Describe any regulation or conservation programs that have been implemented to protect or restore the resource(s), and note the effectiveness of these programs in reducing the impact on the resource(s).
- Define data sources.
- Explain analysis methodology.

9.4 Summary

Evaluate the impacts of past and present actions by describing the resource conditions and trends. This description helps the decision maker understand the status of the

resource and the factors that may influence its future health. Key activities in this step include:

- Describe the current health and status of each resource of concern.
- Identify stress indicators and factors that have typically caused the resource to decline.
- Describe governmental regulations, plans and standards that may constrain the cumulative effects.
- Define a baseline condition for the resource using historical trends.

An example description of current conditions for a resource is provided below.

Example – St. Croix Supplemental Final Environmental Impact Statement

The following excerpt describes the current conditions for one of the resources evaluated in the St. Croix River Crossing Project Supplemental Final Environmental Impact Statement (FHWA, 2006, *p.14-9 – 14-10*).

Prime Agricultural Land

Agriculture continues to play a large role in each of the counties within the study area despite increasing development pressure from the Twin Cities region. In Washington County, about 72 percent of the total county area was agricultural or vacant as of 1990. The Washington County Comprehensive Plan, however, suggests a substantial decrease in the amount of land dedicated to long-term agricultural use by 2015, focusing agricultural use in the southern third of the county. To the north, Chisago County's 2010 Land Use Plan maintains an agricultural focus, recommending agricultural use throughout a majority of the county.

Similar to Chisago County, the Wisconsin portion of the study area plans to maintain a high percentage of land dedicated to agricultural use. Approximately 72 percent of St. Croix County's land was in agricultural use as of 1993. The county's Development Management Plan recommends that the majority of that land, particularly in the eastern two-thirds of the county, remain in agricultural use. Soils in the western portion of the county are of poorer quality, and are not identified as prime agricultural land. Agricultural land use in Polk County, primarily concentrated along the southern and western towns, declined from 48 percent in 1973 to 43 percent in 1997. A current draft of a revised county plan includes preservation of valuable, productive farmland as a goal. To the south, Pierce County's farm acreage has decreased from 92 percent in 1954 to 71 percent in 1990. Prime farmland is located within the northern tier of towns. The 1996 Pierce County Land Use Plan preserves a large portion of the county for agricultural use.

Section 10 Evaluate Effects of Reasonably Foreseeable Future Actions (Step 6)

Next, identify reasonably foreseeable future actions that may affect the resources of concern. Include all types of planned actions, not just transportation projects. Assess the impacts of those actions on each resource. Where supporting data and models are available, conduct a quantitative analysis (such as a trends analysis); otherwise, describe the results qualitatively.

10.1 List Reasonably Foreseeable Actions

First, identify future actions within each PARA to consider in the CEE. The analysis must include the full range of other actions, not just transportation projects. Types of projects to look for include:

- **Major Transportation Projects** – the assessment does not need to include minor projects, but should focus on projects with a potential to impact the environment (for example new roadways, large roadway widening projects, and new rail alignments).
- **Other Major Developments** – consider future developments such as residential subdivisions, office parks and commercial centers. Demonstrate a good faith effort to obtain information on major planned development by reviewing plans and minutes of local planning meetings on the review of proposed developments, and by interviewing private developers.
- **Future Population and Growth Forecasts** – account for future growth that may act as a catalyst for environmental impacts. Use forecasts from sources such as those providing input to traffic models in the transportation plans. Assess the forecasts to determine if they are up to date and were conducted using a reasonable methodology.

Sources of future actions may include:

- Projects included in the MPO's Long Range Transportation Plan (LRTP) identified as cost feasible, the subject of multiple planning studies, or within other local government planning documents
- Projects included within the Capital Improvements Element of the local government's Comprehensive Plan, such as utilities and drainage improvements in the Five Year Schedule of Capital Improvements
- Permits for public and private projects
- Developments of Regional Impact (DRIs)
- Local Government Future Land Use Plans, such as those included in local Comprehensive Plans
- Planned development within Urban Service Area boundaries

- Transportation capacity improvements included in FDOT's Five-Year Work Program and Cost-Feasible Strategic Intermodal System (SIS) Plan, and Local Government Capital Improvement Programs

This list is not exhaustive. It is important to include all types of projects that may influence decision making, not just transportation projects.

Next, evaluate whether each action identified is probable enough to be evaluated or too speculative. Consider "reasonably foreseeable" projects as defined by NEPA case law (refer to ***Section 2.5*** of this ***CEE Handbook***). Focus on activities "that are likely or probable, rather than merely possible" (FHWA, 2003). Possible, but not likely, actions (such as plans that have been "tabled") usually are not considered to be reasonably foreseeable. Projects that are permitted are generally considered probable, as are those that are programmed, funded, or scheduled. Also consider projects in early planning that may be reasonable even though they are not yet funded.

It may be necessary to consult with other sources and experts within the planning organizations to determine which future actions are reasonably foreseeable within the defined study time frame. Local agencies and land use experts can help determine if future actions are likely to be constructed. For Developments of Regional Impact (DRIs), a good starting point may be the Florida Department of Economic Opportunity (FDEO) planner assigned to the region. They can provide regional background information and information regarding political issues that may be influencing the constructability or development of actions crossing multiple regional jurisdictions.

In the environmental document, include a list of the reasonably foreseeable actions considered in the evaluation. These are typically listed by name in a table. Actions that are difficult to identify may be described as a group (for example, where residential development is anticipated, but a new subdivision has yet to be platted).

10.2 Assess Impacts of Reasonably Foreseeable Actions

It is not enough to simply list these actions. The CEE must also evaluate the direct and indirect effects of the reasonably foreseeable actions. However, the impacts do not need to be described in the same level of detail as the impacts of the proposed project. Environmental effects from other reasonably foreseeable actions may be estimated; exact calculations of impacted areas are not necessary (NCHRP, 2008).

One best practice for doing this is to include the reasonably foreseeable actions in the No Build Alternative developed for the direct, indirect and cumulative effects evaluations (NCHRP, 2008). Examples of recommended methods for assessing these effects include the following (NCHRP, 2008):

- For projects where detailed environmental studies were conducted, summarize the results.
- For transportation projects, discuss probable impacts based on a GIS overlay analysis of the general alignment and resources.

- For future population and employment growth, examine the density of past development on a Traffic Analysis Zone (TAZ) or town level. Assuming future development occurs at the same density, calculate how much land will be converted to developed land uses based on the population and employment forecasts.

These are just examples. Other predictive models and methodologies may also be used. Qualitative evaluations are also acceptable, but use quantitative methods when possible (AASHTO, 2011). Input from the ETAT subgroup may also help identify appropriate methodologies. Early and continuous coordination with the ETAT subgroup can help avoid disagreements about methodologies and results, decreasing litigation risk (NCHRP, 2008).

When preparing an EIS, if information relevant to reasonably foreseeable significant adverse impacts cannot be obtained, include the following within the EIS (***40 CFR 1502.22***):

1. The following statement: *Information relevant to reasonably foreseeable significant adverse impacts is incomplete or unavailable.*
2. A description of the relevance of the missing data on evaluating adverse impacts.
3. A summary of existing credible scientific evidence relevant to evaluating the reasonably foreseeable significant adverse impacts.
4. An evaluation of reasonably foreseeable impacts based on theoretical approaches or research methods generally accepted in the scientific community.

When dealing with incomplete or unavailable information, see CEQ requirements in ***40 CFR 1052.22*** for more information.

10.3 Summary

- List reasonably foreseeable actions.
- Assess potential effects of these actions on natural, physical, and community resources.
- Document the methodologies used to assess reasonably foreseeable effects, and the rationale for selecting these methodologies.
- If data is not available, follow requirements in ***40 CFR 1502.22.***

Section 11 Add Direct and Indirect Effects of Build Alternatives (Step 7)

The previous two sections of this ***CEE Handbook*** addressed impacts resulting from past, present, and reasonably foreseeable actions as required by the CEQ definition of cumulative effects. Now, you will address the "incremental impact" of the proposed project by summarizing the direct and indirect effects of the project alternatives (NCHRP, 2008).

Transportation projects may have a wide range of effects on the natural, physical, and human environments. Some are directly caused by the project's design or function. For example, a road widening may require additional Right of Way (ROW). The purchase of this ROW would be a direct effect to the property owners.

40 CFR 1508.7 and 1508.8

Direct effects…are caused by the action and occur at the same time and place.

Indirect effects…are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.

Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.

Other effects may be less direct, but still caused by the project. These indirect effects may be less apparent because they occur farther from the proposed project in time or distance. For example, commercial development occurring around a new interchange and the environmental impacts associated with that development could be indirect effects of the interchange. Sometimes it is difficult to determine if an effect is a direct or indirect result of the proposed project. The classification of the type of effect is not important as long as the effect is studied and described in the environmental document (AASHTO, 2011).

The direct and indirect effects of the project alternatives are studied separately from the cumulative effects. Procedures for evaluation of these effects vary by resource and are available in the ***PD&E Manual*** and supporting guidance. Use the findings from these studies in the CEE and summarize them in the CEE section of the environmental document. The CEE does not usually include all of the effects considered in the direct and indirect effects evaluations. Focus on those effects relevant to the resources of concern selected for the CEE (AASHTO, 2011).

It is important to evaluate each alternative separately. The information may be presented in a table, referencing the detailed discussion provided elsewhere in the EA or EIS. The level of detail will depend on the complexity of the effects being described.

The following example is taken from the Cumulative Effects section of a Supplemental Final Environmental Impact Statement (SFEIS) prepared by FHWA, Minnesota

Department of Transportation, and Wisconsin Department of Transportation for the St. Croix River Crossing Project (FHWA, 2006). The court found that the approach used for this project "constitutes a meaningful cumulative impact analysis" (*Sierra Club North Star Chapter v. LaHood*, 2010). The example is an excerpt illustrating how the project effects for one resource are summarized in the cumulative effects section for one alternative. Note the reference to the appropriate section of the SFEIS for more details about the project effects.

Example – St. Croix Supplemental Final Environmental Impact Statement

The following excerpt summarizes the effects of the preferred alternative on Archaeological and Historical Resources (FHWA, 2006, pp. 14-28 – 14-29):

> The effects to historic properties resulting from the Preferred Alternative are identified [in the table below]. A more complete discussion of each property listed on or determined eligible for the National Register of Historic Places (NRHP) and the assessment of effects on each property and mitigation measures are provided in Chapter 11 of this SFEIS. Adverse effects have been identified for seven properties. Mitigation measures are documented in the Amended Section 106 Memorandum of Agreement (MOA) (see Appendix G in this SFEIS).

NRHP-Listed and Determined Eligible Properties
Summary of Eligibility and Effects

Property Name	NRHP Criterion	SHPO Number	Eligibility Status	Effects from Preferred Alternative
Log Cabin Restaurant (Club Tara)	A	WA-OHC-019	Determined Eligible	Adverse Effect
Bergstein Shoddy Mill and Warehouse	A	WA-OHC-001	Determined Eligible	Adverse Effect
Stillwater State Prison Historic District	C	WA-BPC-007	NRHP Listed; 22 contributing properties, 8 non-contributing	No Adverse Effect
St. Croix Overlook-South	A & C	WA-OHC-005	Determined Eligible	Adverse Effect
William N. Danforth House	C	WA-SWC-1067	Determined Eligible	No Effect
Fairview Cemetery	C	WA-SWC-1486	Determined Eligible	No Effect
Stillwater South Main Street Archaeological District (Hersey and Bean Sawmill and Planing Mill Site; Slab Alley)	A & D	21WA91 21WA92 21WA100	Determined Eligible as contributing to Cultural Landscape District and to archaeological district	Adverse Effect (Hersey and Bean Site) No Effect (Slab Alley)
Stillwater & St. Paul Railroad	A	WA-SWC-1503	Determined Eligible	No Effect
St. Croix Boom Site	A	WA-SWT-004	National Historic Landmark	No Effect
Stillwater Lift Bridge	C	WA-SWC-322	NRHP Listed; contributing to Stillwater Cultural Landscape Dist.	Adverse Effect
Stillwater Commercial Historic District	A & C	Multiple numbers	NRHP-Listed; 82 properties; Lift Bridge not included	Adverse Effect
Nicholas Thelen Farmstead	C		Determined Eligible	Conditional No Adverse Effect
St. Croix Hilltop Drive-In Theatre	C	AHI-129594	Determined Eligible	No Effect
Kriesel Farmstead	C	AHI-129596	Determined Eligible	Conditional No Adverse Effect

[Note: This example is for illustrational purposes only and includes a subset of records from the original table found in the source document.]

Section 12 Assess the Potential for Cumulative Effects (Step 8)

Sections 9-11 of this ***CEE Handbook*** provide guidance for identifying the effects of past actions, present actions, reasonable project alternatives, and other future actions. Now, you will pull that information together to address potential cumulative effects on each of the resources of concern.

In its simplest form, the cumulative effect is the summation of direct and indirect effects of past actions, present actions, reasonable project alternatives, and other future actions. However, a cumulative effect is sometimes greater or less than the sum of the individual effects (CEQ, 1997). For example, there may be special designations or ongoing regulations protecting the affected resources that would limit the effects. On the other hand, some resources may be more sensitive to change and experience greater adverse effects when faced with multiple stresses. Consider these interactions by examining the cause-and-effect relationships between the stresses and the resources. Use the baseline, trends, and potential effects identified in the previous steps to consider how a particular resource responds to change, and estimate the combined effects on each resource of concern. Evaluate each project alternative separately. Then, draw conclusions about the cumulative effects. Base these conclusions on facts, not speculation (AASHTO, 2011).

The remainder of this section provides guidance for three basic steps for assessing the potential for cumulative effects:

- Select appropriate methodologies.
- Estimate the cumulative effects on each resource of concern.
- Draw conclusions about the importance of these effects relative to the health and viability of the resources.

12.1 Select Assessment Methodologies

The specific methodology used for a project assessment will depend on the nature and scope of the project, the health and viability of the resource being analyzed, and the availability of information. More than one methodology may be used for a resource. Different methodologies may be appropriate for different resources of concern.

The level of assessment will vary based on the project's Class of Action:

- **Type 2 CE** – Demonstrate there are no significant impacts. Refer to the checklist in ***Section 3.2*** of this ***CEE Handbook***, comments from the ETAT, and input from the lead agency to focus the assessment appropriately. (If a significant impact is found, consult with CEMO and the lead agency immediately.)
- **EA** – Provide sufficient information to make a decision about whether or not there are significant impacts.

- **EIS** – Describe the context and intensity of impacts. Provide sufficient information to compare the alternatives.

Input from the ETAT subgroup, community representatives, and resource experts may assist in selecting the appropriate methodologies. **Table 12-1** (adapted from CEQ, 1997, pp. 56-57) summarizes several methods to analyze and document cumulative effects. **Appendix A** of CEQ's *Considering Cumulative Effects* handbook (CEQ, 1997) describes these in more detail.

Table 12-1 Cumulative Effects Analysis Methods

Method	Description	Strengths	Weaknesses
Questionnaires, Interviews and Workshops	Used to gather a range of information from the ETAT subgroup, the public, stakeholders, and citizen advisory committees.	• Qualitative or quantitative data analysis • Flexible	• Can be difficult to quantify subjective data • Alternative comparisons can be subjective
Checklists	Help identify common or like effects and provide a process to facilitate comparison of multiple actions and resources.	• Systematic • Concise • Definitive	• Can be inflexible • Do not provide a means to convey additional qualitative information • May not address cause-and-effect relationships
Tables/Matrices	Provide a means to compare organized data and evaluate multiple actions on specific resources, communities and ecosystems.	• Comprehensive data presentation • Alternative comparison • Action Comparison • Qualitative or quantitative data	• Do not address temporal or spatial relationships • Do not address cause-and-effect relationships
Systematic and Network Diagrams	Provide a method to define the cause-and-effect relationships resulting in cumulative effects.	• Provide a visual means of understanding cause-and-effect concepts • Address cause-and-effect relationships • Quantitative data analysis	• Do not address temporal or spatial relationships
Modeling	Quantifies cause-and-effect relationships. Also, you can use equations to describe cumulative processes or compute effects of various scenarios based on a system of logical decisions.	• Addresses cause and effect relationships • Allows for analysis of various project alternatives and scenarios • Addresses temporal and spatial relationships • Provides clear results	• Requires sizeable amounts of data • May be expensive • Accuracy of the results is dependent upon the data quality and well-developed assumptions • Inflexible with multiple steps

Table 12–1 Cumulative Effects Analysis Methods (continued)

Method	*Description*	*Strengths*	*Weaknesses*
Trends Analysis	Assesses the status of a resource, ecosystem, and human community over time and typically provides a graphic projection of past or future conditions. Changes in the frequency and intensity of stressors over a specified time period can be estimated.	• Good for Public Involvement graphics • Addresses accumulation over time • Problem Identification • Baseline determination	• Requires a sizeable data sampling • Extrapolation and interpretation of system thresholds can be subjective
GIS, Remote Sensing, FLUM Analysis	Use the EST or desktop GIS programs to help establish PARA boundaries, the occurrence of stressors, and identify areas where effects may be greatest. GIS data layers can be based on information such as the accumulation of stressors, location of resources, and specific land use designations.	• Addresses spatial patterns, spatial relationships and proximity of effects • Effective visual for Public Involvement meetings, stakeholder meetings and public hearings • Useful for compiling many different data types • GIS software is readily available	• Limited to effects based on location • Potentially time consuming • Data to establish temporal trends can be limited or unavailable • The magnitude of effects can be difficult to address
Carrying Capacity Analysis	Identifies stress thresholds and provides mechanisms to monitor incremental use of unused capacity. Can be used in different contexts to examine effects on different resources: • Applied to land use, this analysis can be used to project developable land and development. • For ecological resources, carrying capacity is an ecosystem's stress threshold below which its functions can be sustained. • In the social context, the carrying capacity of a region is measured by the level of services desired by the population.	• True measure of cumulative effects against a threshold • Addresses effects in a system context • Addresses time factors	• Rarely measures capacity directly • There may be multiple thresholds • Necessary regional data is often absent

Table 12–1 Cumulative Effects Analysis Methods (continued)

Method	*Description*	*Strengths*	*Weaknesses*
Ecosystem Analysis	Ecosystem analysis explicitly addresses biodiversity and ecosystem sustainability. It also uses natural boundaries and applies new ecological indicators. It includes the application of a comprehensive regional perspective necessary for a successful CEE.	• Uses regional scale and a full range of components and interactions • Addresses spatial and temporal relationships. • Addresses ecosystem sustainability	• Limited to natural systems • Often requires species surrogates for system • Requires large amounts of data
Economic Impact Analysis	Involves three steps: 1. Establishing the region of influence 2. Modeling economic effects 3. Determining the severity of effects	• Addresses economic issues • Models provide definitive quantified results	• Use and accuracy of results is dependent on data quality and model assumptions • Usually does not address non-market values • May be difficult to explain to the public
Social Impact Analysis	Social impact analysis addresses cumulative effects related to the sustainability of human communities by: (1) Focusing on key social variables such as: population characteristics, community, institutional structures, political and social resources, individual and family changes, and community resources; and (2) Projecting future effects using social analysis techniques such as linear trend projections, population multiplier methods, scenarios, expert testimony and simulation modeling.	• Addresses social issues • Models provide definitive, quantified results	• Utility and accuracy of results dependent on data quality and model assumptions • Social values are highly variable

Develop a study approach that passes the NEPA “Hard Look” requirement. Courts use this standard to determine whether an agency applied adequate scientific rigor to the evaluation of environmental effects (*Kleppe v. Sierra Club*, 1976). The CEE should provide a reasonably thorough assessment of important and probable environmental effects, sufficient for informed agency decision making and public participation (NCHRP, 2008). Examples of activities that support the “Hard Look” standard include: obtaining

opinions from experts outside the agency, giving careful scientific scrutiny to the issues, and responding to legitimate concerns raised (NCHRP, 2008).

Proper documentation about the study approach will support the NEPA "Hard Look" requirement if the CEE is challenged in court. The criteria, extrapolated from Solomon et al. (2005), include:

- **Assumptions are spelled out** – Assumptions made in the technical approach, data used, and basis for evaluations should be stated. This is also important if results from previous research are used that relied on important assumptions.
- **Inconsistencies are explained** – Evidence presented in one part of the document that is relied upon and appears contradictory to other evidence or conclusions should be explained (e.g., different data sources used, resolution of maps).
- **Methodologies disclosed** – The primary study approach should be summarized. When using results or interpretations from other studies, the methodologies used in those studies should also be described.
- **Contradictory evidence rebutted** – When applicable, evidence in the scientific literature that is contradictory to evidence used in your evaluation should be explained. If you do not use this contradictory evidence, provide a rationale for not doing so.
- **Records referenced solidly grounded in science** – References relied upon should be from published sources or derived from accepted scientific and administrative methodologies.
- **Guesswork eliminated** – Professional judgment is appropriate when supported by logic and rational thinking that a person can reasonably follow. Guesswork results from estimates lacking supporting evidence or logic.
- **Conclusions supported in a manner capable of judicial understanding** – Can a judge (or layperson), not educated in the specific fields of analysis, understand what is written?

12.2 Estimate Combined Effects

Next, use the selected methodologies to estimate the cumulative effects for each resource of concern. A good quality CEE will include an analysis of effects, not just a listing or presentation of effects. It will compare the cumulative effects of each project alternative. The analysis should take into account the health of the resource (the result of past and present actions) as well as trends that could lead to changes in the resource (NCHRP, 2008). Trends could include actions that may adversely affect the resource, as well as restoration plans that could lead to improvements in the resource (AASHTO, 2011).

How the cumulative effects are estimated depends on the methodologies selected for the study. The study should be conducted by personnel knowledgeable about both the

resource under investigation and the methodology being used. Typically, a complex CEE, such as one conducted for an EIS, will use an interdisciplinary team.

After the analysis is complete, review the results to verify overall quality and accuracy. Most of those analyses involve one or more of the following: calculations, computer modeling, application of professional judgment and problem-solving, and preparation of a technical report. Someone other than the originator of the product should review calculations and other work products for accuracy and validity. The reviewer should also evaluate the approach and results to verify that they meet professional standards of care. Assess the results for reasonableness in one or more ways, for example (AASHTO, 2011, p. 16):

- ***Use multiple analysis methods****, e.g., a mix of qualitative and quantitative techniques. If the methods point to a similar result, then there should be a fairly high degree of confidence in the results. If they are conflicting, then the underlying assumptions of the individual methods should be checked for consistency and appropriateness.*
- ***Conduct sensitivity analyses to evaluate the impact of changing key assumptions****. For example, consider different assumptions about growth rates, to determine how those assumptions affect conclusions about the future conditions of a resource.*
- ***Seek input from specialists and stakeholders****. Local officials, developers, community groups, and regulatory agencies can be asked to provide their assessment of what is reasonable given the variety of factors that can influence development and resource conditions.*
- ***Look for counter-intuitive results****. Results that seem counter-intuitive or internally inconsistent often indicate a need for further investigation. The inconsistency may indicate an underlying error in the analysis, or it may simply indicate a need to provide a better explanation of complex factors that help to differentiate two seemingly similar situations.*
- ***Compare future projections to past experience****. Historical trends do not necessarily provide an accurate prediction of future events, but they can provide a useful basis for assessing the reasonableness of forecasts. For example, if an analysis assumes that land use controls will be rigidly enforced in the future, but land use controls have been routinely loosened or changed in the past, it is prudent to explain why the future projection diverges from the past practice.*

12.3 Draw Conclusions

After analyzing the effects and verifying the results, explain what the results of the analysis mean (NCHRP, 2008). First, indicate whether or not the project alternatives

contribute to cumulative effects. Then, describe the consequences of these effects on the resource.

Draw conclusions by applying professional judgment to the results and coordinating with technical experts as needed. For additional support, seek input from the ETAT subgroup about the conclusions and addressing resource agency concerns (NCHRP, 2008).

To draw conclusions about cumulative effects, describe the severity of the effect. CEQ (1997) suggests defining the intensity of effects based on the following factors:

- Magnitude – size or severity of effect
- Geographic extent – how widespread the effect may be
- Duration and frequency – whether the effect is a one-time event, intermittent, or chronic

When characterizing the severity of the effect, consider the project context. The severity of the effect may vary according to the setting, or context, of the project.

Present the results in such a way that the reader can meaningfully compare the differences between each alternative. Also, separate the effects according to those caused by the proposed project versus those caused by other actions. This assists the decision maker in identifying the incremental contribution of each alternative (CEQ, 1997). Results can be presented quantitatively or qualitatively, depending on the resource and the methods used for the analysis. **Tables 12-2, 12-3,** and **12-4** (from CEQ, 1997) provide examples of how to display the results from different methods. In an actual environmental document, these would be repeated for each alternative being considered. Describe the data presented, especially to explain apparent inconsistencies, such as the data in **Table 12-2** showing cumulative effects that are not strictly additive.

Table 12-2 Example Using Quantitative Description of Effects

Resource	Past Actions	Present Actions	Proposed Action	Future Actions	Cumulative Effect
Air Quality	No effect on SO_2	20% increase in SO_2	10% increase in SO_2	10% increase in SO_2	35% increase in SO_2
Fish	50% of 1950 fish population lost	2% of fish population lost	5% increase in fish population	1% of fish population lost	48% of 1950 fish population lost
Wetlands	78% of pre-settlement wetlands lost	1% of existing wetlands lost annually for 5 years	0.5% of existing wetlands lost	1.5% of existing wetlands lost annually for 10 years	95% of pre-settlement wetlands lost in 10 years

Source: CEQ, 1997, p. 43

Table 12-3 Example Using Qualitative Description of Effects, with Impact Ranks Assigned a Value from 1 to 5 (least to greatest)

Resource	Past Actions	Present Actions	Proposed Action	Future Actions	Cumulative Effect
Air Quality	1	2	1	1	2
Fish	3	2	1	1	4
Wetlands	4	1	1	1	4

Source: CEQ, 1997, p. 44

Table 12-4 Example Using Narrative Description of Effects

Resource	Past Actions	Present Actions	Proposed Action	Future Actions	Cumulative Effect
Air Quality	Impacts dissipated	Noticeable deterioration in visibility during summer, but standards met	Visibility affected during operations, but standards met	Increase in auto emissions expected	Standards possibly violated
Fish	Decrease in numbers and species diversity	Occasional documented fish kills	Increase in number of fish kills	Loss of cold-water species due to change in temperature	Significant decline in numbers and species diversity
Wetlands	Large reduction in acreage of wetlands	Loss of small amount of wetlands annually	Disturbance of a 5-acre wetland	Continual loss of wetlands	Significant cumulative loss of wetlands

Source: CEQ, 1997, p. 44

12.4 Summary

- Assess the cumulative effects using a methodology appropriate for the nature and scope of the project, resources of concern, and availability of data.
- When applicable, use tables to assist the reader in comparing the effects of the proposed action and those of other actions.
- Review results to verify the validity and accuracy of the findings.
- Draw conclusions about the cumulative effects by considering the context and severity of the impact.

An example discussion of potential cumulative effects to historic properties is provided on the next page.

Example Discussion of Potential Cumulative Effects to Historic Properties
Extracted from St. Croix River Crossing Project SFEIS (FHWA, 2006, p 14-30)

Cumulative effects to historic properties are identified in conjunction with the criteria of adverse effect in 36 CFR 800.5 (a) (1), noting that adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.

Increasing development pressures in the five-county area could encourage the demolition of vacant or under-utilized historic buildings and farmsteads if reuse of such properties is not found to be economically viable. Changes in land-use patterns associated with development would alter the setting of some historic properties. Development of parcels surrounding historic farmsteads could make it more difficult for farmers to continue active agriculture in close proximity to urban residential and commercial development. Further development of previously undeveloped lands may also disturb existing archaeological sites, both in rural areas and the historic archaeology in urbanized areas.

At the same time, increased access could result in higher property values that bring prosperity to residents in the St. Croix Crossing area. The potential for development may provide financial gain on properties that have languished or been unproductive. Increasing property values and desirability of the area could also provide economic incentives and market support for the rehabilitation and reuse of historic buildings.

Potential cumulative effects on historic properties may include the following:

- *Demolition or modification of a historic property as a result of development pressure.*
- *Land use changes occurring as a result of enhanced transportation accessibility.*
- *Land use changes occurring because accessibility was lost as a result of a project.*
- *Impacts to the setting and views of a historic property due to changed transportation patterns that result from new infrastructure.*
- *Changes to the uses of a historic property (and/or district) as the result of new infrastructure, changing transportation patterns, and altered settings.*
- *Because of the size and encompassing nature of the Stillwater Cultural Landscape District, it may experience cumulative impacts from a variety of activities in the surrounding area, including impacts to the natural and cultural landscape and the river.*

Section 13 Identify Potential Mitigation Measures (Step 9)

Mitigation strategies recommend ways to avoid, lessen, remedy, or compensate for adverse effects (see excerpt from ***40 CFR 1508.20*** in text box). NEPA requires that appropriate mitigation measures be considered and discussed for all adverse effects, including direct, indirect and cumulative (CEQ, 1981).

Cumulative effects include the effects of the proposed project, plus the effects of other actions. The sponsoring agency may be required to mitigate for the direct or indirect effects caused by the proposed project, in coordination with the resource regulators or agencies with jurisdiction. However, the sponsoring agency is not required to implement mitigation measures for effects caused by others (NCHRP, 2006). Nonetheless, all relevant, reasonable mitigation measures must be identified, even if they are outside the jurisdiction of the agency, or unlikely to be implemented (FHWA, 2003).

> ***Mitigation*** *includes:*
>
> *(a) Avoiding the impact altogether by not taking a certain action or parts of an action.*
>
> *(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.*
>
> *(c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.*
>
> *(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.*
>
> *(e) Compensating for the impact by replacing or providing substitute resources or environments.*
>
> (***40 CFR 1508.20***)

Mitigation measures identified to address the proposed project's direct and indirect effects will also minimize, rectify, or compensate for negative cumulative effects. These measures are typically considered in the evaluation of direct and indirect effects and included in those sections of the environmental document. Simply summarize and cross-reference these measures in the CEE section of the environmental document.

For impacts of other actions, identify potential mitigation measures that could be adopted by the sponsors of these actions, whether private or public. Indicate the entity that would carry out the mitigation measures as well as the probability of the mitigation measures being implemented (NCHRP, 2006). Consider potential actions by agencies that:

- Implement other state or federal laws
- Implement city, county and regional planning decisions
- Obtain state and local government legislative approvals
- Modify future development density at the city, county or regional level

Coordinate with the agencies having jurisdiction when identifying potential mitigation measures. If it is not possible to identify mitigation measures, provide a table listing agencies with authority over the impacted resources and recommended actions needed to sustain the health of the resource. By discussing these alternative actions, the need for mitigation is publicly disclosed despite any lack of jurisdiction by FDOT, the lead agency or other cooperating agencies. This information can be used in the future to identify opportunities for avoidance and minimization during the development of other projects.

Example Discussion of Potential Mitigation Measures for Impacts to Historic Properties from Other Actions

"… the negative impacts resulting from intensification of land use can be controlled through local comprehensive planning and zoning controls. Local communities can also enact further controls to protect historic properties. Designation of historic properties by local governments can provide some protection for their historic characteristics of properties. Changes to National Register-listed or eligible properties will be reviewed under the Section 106 process if federal funds, permits or licenses are required as part of an undertaking. National Register listing, however, does not prevent demolitions or other negative effects on properties if federal funds, licenses or permits are not required. Privately funded development related to historic properties is not regulated under federal regulations and would only be reviewed if located in a local historic district, or applied to a locally designated property." (FHWA, 2006, pp. 14-29 – 14-30)

Section 14 Document Results (Step 10)

The final step of the CEE Process (Step 10) is to complete the environmental document. Using the level of detail appropriate for the Class of Action, provide the results of the CEE in the environmental document in a separate section from direct and indirect effects. The CEE can be presented as a separate chapter or as a separate section within the same chapter as direct and indirect effects (AASHTO, 2011).

In general, adequate documentation explains the process and methodology. The CEE should explain what the effects are, how they were analyzed, why the analysis methodologies are reasonable, and what the results of the analysis mean. The process, methodology and conclusions should be understandable by all readers of the document, and the CEE findings should be reported in plain language (i.e., in a manner a layperson or court judge who is not educated in the specific fields of analysis could understand).

According to Solomon et al. (2005), it is poor documentation rather than poor analysis that most often leads to court losses when a CEE is challenged. Regardless of the resource type, review of recent case law indicates that it is important to cite sources, describe methodologies used, and include the rationale for conclusions (Smith, 2005). Research conducted by NCHRP (2008) indicates that the legally sufficient cumulative impact analysis:

- **Explains Definitions** – The CEE should explain and reference CEQ's definition of cumulative effects and note how the analysis meets the definition.
- **Identifies Resources for Analysis** – There are many elements of the natural and human environment that could be considered for a CEE. Rather than analyzing all, tailor the CEE analysis to key resource issues – those resources that could be affected by the project in combination with other past, present and future actions, or those in declining health. The CEE should identify those specific elements that are the focus of the analysis and explain why these elements were chosen. Confirmation with agencies and public input that the chosen key resource issues are reasonable is important.
- **Identifies Study Area Boundaries and Time Frame** – The CEE should identify the study area boundaries and an analysis time frame, and explain how and why they were selected. Generally the study area boundaries are resource based. As a practical matter, the CEE boundary must be at least as large as the direct and indirect effects study area since both types of effects are components of cumulative effects.
- **Provides a Logical Basis for the Time Frame** – The time frame for past actions should be at least 10 years and be based on a development event that was important in shaping the current land use of the study area. Examples include opening of a major transportation project, opening of a regional employer, new housing and/or commercial development, and other major turning points. For clarity, the future year should be the same as that for the indirect effects assessment. It too should have a logical basis, such

as the year used for a future regional transportation plan, or other future planning document.

- **Identifies Resource Condition and Trends (Impacts of Past and Present Actions)** – Describe the current health of each resource, the actions that led to its current state, and any major trends that affect its health. The analysis should include effects from all types (not just transportation related) of past actions, both private and public. The analysis should also describe any regulation or conservation programs that have been implemented to protect or restore the resource(s), and note the effectiveness of these programs in reducing the impact on the resource(s).
- **Identifies Impacts of Other Reasonably Foreseeable Future Actions** – The CEE must identify any other reasonably foreseeable future actions that will impact the resource(s) of concern. One best practice is to include all reasonably foreseeable future actions in the No Build scenario. It is not enough to just list other nearby projects that may occur – instead the probable effect of those projects must be considered. Nearby projects are considered reasonably foreseeable even if they are yet to be funded or do not have a final design. Three main types of actions need to be included in the evaluation: transportation projects, other major non-transportation development proposals, and population and employment growth forecasts. If using growth forecasts from other studies, determine if the proposed project was, or was not, already factored into these predictions. If it was included, an estimate without the project must be developed.
- **Summarizes Total Incremental Effect of Build Alternatives (Direct plus Indirect)** – The direct and indirect project effects are included in other sections of the environmental document, but these effects should be summarized in the CEE section to clarify the total impact of the project in context of all other actions.
- **Describes Cumulative Impacts** – The CEE must draw conclusions about the total impact on each resource as a result of all other past, present and future actions, plus the direct and indirect effects of the proposed project. The current health of each resource and any programs or regulations that could improve the health of the resource should be identified. If appropriate, include quantitative information about the total effects anticipated for each resource.
- **Includes Agency Coordination and Public Involvement** – Ensure agency and public involvement occur a number of times during the assessment process to allow for comment and input on all elements of the CEE (resources, data sources, analysis methodology and conclusions).
- **Discusses Mitigation** – Mitigation must be discussed even though implementing the mitigation may be in the control of others. All that is required in an environmental document is that mitigation be discussed in sufficient detail to ensure that environmental consequences have been fairly evaluated. “Worst-case” analyses or complete mitigation plans are not required for the CEE.

Section 15 Evaluations Initiated in Area-wide Planning

Sections 5 -14 of this ***CEE Handbook*** focus on evaluating cumulative effects on a project-by-project basis during the PD&E Phase, with early consideration in the Planning and Programming Screens.

There may be times when an FDOT District can save time and money by conducting a resource-based planning study that could be applied to multiple projects as they move forward in the project development process. This study would begin early in planning, prior to considering a specific project (known in the transportation process as "area-wide" planning). Conducting these early studies may be especially desirable when multiple projects are planned in areas where there is a concern about the future health and viability of the natural or community resources.

When begun as an area-wide planning study, the CEE Process is completed in three phases:

Phase 1 – Scoping the area-wide planning study

Step 1 Initiate the Cumulative Effects Evaluation

Step 2 Identify Resources of Concern

Step 3 Define the Study Time Frame

Step 4 Determine the Potentially Affected Resource Area (PARA)

Phase 2 – Establishing resource conditions and trends

Step 5 Evaluate Past and Present Impacts on the Resource

Step 6 Evaluate Effects of Reasonably Foreseeable Future Actions

Phase 3 – Considering the incremental project effects

Step 7 Add Direct and Indirect Effects of Build Alternatives

Step 8 Assess the Potential for Cumulative Effects

Step 9 Identify Potential Mitigation Measures

Step 10 Document Results

The first two phases would begin during area-wide planning. For example, the FDOT District may choose to begin this study prior to the adoption of an LRTP, or other system-wide transportation plan. They may choose to do it for an area where new developments are being proposed and the need for new transportation facilities has increased. The analysis would be conducted for Steps 1-6 of the CEE Process. This essentially provides the basis for the No Build scenario, evaluating the cumulative effects of past, present, and future actions – without an emphasis on any specific project. It focuses on resources of concern and provides the foundation for multiple projects. Once these steps are completed, this resource-based analysis may be used on any project proposed in the area.

The last four steps of the process (Phase 3) would be done during the project-specific Planning Screen, Programming Screen, and PD&E Phase to identify the incremental effects of a single project. At that time, the direct and indirect effects of the project would be evaluated and incorporated into the study. At the end, the environmental document would include the total effects from both the area-wide and project-specific studies, resulting in conclusions about cumulative effects.

While the scope and timing of a CEE begun as an area-wide study may differ from that conducted in PD&E, many of the tasks involved are similar. The remainder of this section highlights the differences and provides references to the appropriate sections of this ***CEE Handbook*** for more information.

15.1 Scoping the Area-wide Planning Study

As with the PD&E Study, begin scoping and agency coordination as early as possible. Agency input helps to adequately characterize the state of the resource, address resource management goals, and consider actions affecting the resource. Courts often look to resource agencies as subject matter experts (NCHRP, 2008). Early and continual involvement with the agencies can help avoid interagency disagreement and minimize litigation risk.

The FDOT District initiates the area-wide CEE by establishing priority areas for evaluation to focus resources where they would prove to be most beneficial. Cumulative effects evaluations may be conducted in areas where any of the following conditions apply:

- There have been projects/actions in the project area that have negatively affected natural, sociocultural, or historical resources (effects from past actions).
- There is more than one project/action currently being implemented in the resource area (effects from present actions).
- There are other major actions or projects that are currently planned or programmed in the resource area (potential effects from reasonably foreseeable future actions).

However, the FDOT District should designate priority areas where clusters of projects are proposed in a transportation plan (such as an LRTP) and where concerns about resources may require closer examination. This would be especially beneficial if a transportation plan includes multiple projects that are likely to be classified as an EA or EIS.

Once an area has been selected, the ETDM Coordinator organizes a series of workshops with participating ETAT and community representatives to identify the resources of concern, establish the time frame, and determine the PARA boundaries. The PARA boundaries for an area-wide planning CEE will likely extend further than those used in a project-specific study. In order to be used for multiple projects, the study area will follow the resource boundaries more closely and not be constrained by project-specific effects.

As with the PD&E Study, the PARA usually varies for each resource evaluated in the CEE. For example, the PARA used to study black bear habitat may be different from the PARA for a water quality evaluation. On the other hand, the resource agencies, FDOT, and the lead agency should agree on the PARA for a specific resource. This may take additional coordination when resource agencies use different resource boundaries within their respective agencies. For example, in cases where USACOE delineates a watershed boundary differently from the boundary used by a Water Management District, participants in the ETAT subgroup should agree on a single PARA to be used in the cumulative effects evaluation of the watershed. If agreement cannot be reached, the project team will make a recommendation and provide a rationale to the lead agency. Ultimately, the lead agency makes the decision about which PARA boundaries to use in the study. When the PARA boundaries are identified, the FDOT District enters them into the EST.

More details about these activities are provided in previous sections of this ***CEE Handbook,*** as noted below:

- Initiate the Cumulative Effects Evaluation (***Section 5***)
- Identify Resources of Concern (***Section 6***)
- Define the Study Time Frame (***Section 7***)
- Determine the Potentially Affected Resource Area (***Section 8***)

15.2 Establishing Resource Condition and Trends

Next, the ETAT evaluates the effects of past, present and reasonably foreseeable actions. This evaluation establishes the current health and trends for each resource of concern. As in the PD&E Study, describe the current condition of each resource, to the actions that led to the current state of the resource, and major trends affecting the health of the resource. The analysis should also discuss resource management initiatives and thresholds or carrying capacity for each resource, if applicable. Also consider any regulation or conservation programs that have been implemented to protect or restore the resource(s), and note the effectiveness of these programs in reducing the impact on the resource(s). In essence, this is a planning study conducted for each resource of concern and is best conducted by the agencies responsible for the resource. Therefore, the ICE Task Group suggested the following protocol for this phase of cumulative effects evaluations:

- Resource-based CEEs for natural resources and cultural resources are conducted by each participating ETAT agency with jurisdiction over the resource.
- Resource-based CEEs for sociocultural resources are conducted by the appropriate MPO and FDOT District.

More details about these activities are provided in previous sections of this ***CEE Handbook***, as noted below:

- Evaluate Past and Present Impacts on the Resource (***Section 9***)
- Evaluate Effects of Reasonably Foreseeable Future Actions (***Section 10***)

At the end of this phase, the area-wide planning study of the CEE is complete. The ETAT member documents results and provides them to the District ETDM Coordinator.

Documentation should include the following:

- **Methodology** – Document the data used in the evaluation. This includes EST GIS data sets, standard analysis results, and off-line data sources. The documentation should specify which data represented past, present and foreseeable future time periods. Document the general approach to the analysis (How was the data used?), including data limitations and assumptions.
- **Description of PARA** – Identify where the PARA is located and what affected resource has been delineated.
- **Assessment Area Rationale** – This is basically the rationale for the PARA. Since the assessment area bounds the study, it is important to document the basis for the PARA extent.
- **Current State of Resource** – The current state of the resource comprises the results of Step 5 – Evaluate Past and Present Impacts on the Resource (***Section 9***). It describes the resource in the present-day time frame, focusing on characteristics that will also be evaluated for past and foreseeable future time periods. If applicable, include information about the resource carrying capacity. Carrying capacity and threshold are viewed synonymously in this guidance. A resource threshold is the capacity of the resource within the PARA to accommodate further effects from human development. In this regard, a resource threshold is an important *metric* with which to conduct comparative analysis for past effects as well as foreseeable future effects. For instance, for biological/ecological resources, indices of biological integrity *(i.e., How much of a loss can be sustained by the resource?)* are one metric for insights concerning carrying capacity. Thresholds will be determined by the agencies with jurisdiction. If an agency is unable to establish thresholds, then they may focus the evaluation on identifying resources that are potentially in peril.
- **Potential Future Trends** – This section documents the results of Step 6 – Evaluate Effects of Reasonably Foreseeable Future Actions (***Section 10***). Include a list of the reasonably foreseeable future actions considered in the evaluation. Summarize the potential direct and indirect effects of these actions on the resource of concern.
- **Findings and Recommendations** – Complete the evaluation with conclusions and recommendations (if applicable). In the area-wide evaluation, the conclusions are specific to the PARA resource affected by past, present and foreseeable future actions, not by a particular proposed project. Actions are based on project types. The project types are not limited to transportation alone but to all types of development (e.g.,

residential, industrial, mining, commercial, agriculture) that affect the resource of concern.

The resource agency and FDOT District work together to clarify findings or resolve any issues. When the evaluation and coordination are complete, the FDOT District attaches the report to the appropriate PARA boundary on the EST and makes it available for use with all ETDM projects that intersect the resource area. The evaluation results should also be distributed to local planners for their consideration during land use and transportation planning.

15.3 Considering the Incremental Project Effects

The first six steps of the CEE Process provide a resource-based baseline that can be applied to projects planned within the area. When a project enters the ETDM Process, the incremental effects of that specific project begin to be addressed. Results from the resource-based baseline are linked to the proposed project and reported in the EST for ETAT review. When ETDM projects intersect a PARA boundary, the findings are updated to analyze the incremental effects of the project on the resource. This effort builds upon the previous resource-based analysis, linking the project-specific effects (direct/indirect effects) to the cumulative effects evaluation. The following paragraphs discuss the CEE tasks completed during the Planning Screen, Programming Screen and PD&E Phase.

Planning Screen

The ETAT member reviews the resource-based cumulative effects evaluation results, evaluates how the direct and indirect effects of the proposed project add to the cumulative effects on the resource, and provides additional comments, if concerned about cumulative effects. See the considerations listed in ***Section 5.1*** of this ***CEE Handbook*** and identify any updates needed to previous evaluations, if warranted. When the review period ends, the appropriate FDOT District or MPO ETDM Coordinator reviews and summarizes recommendations, coordinating with the ETAT as needed. The Planning Summary Report includes cumulative effects evaluation results and recommendations available for resources that intersect the project alternatives.

Programming Screen

ETAT members comment on potential direct and indirect effects of the project and make recommendations for the scope of the PD&E Study. Again, see the considerations listed in ***Section 5.1*** of this ***CEE Handbook*** and identify any updates needed to previous evaluations, if warranted. The District ETDM Coordinator reviews the ETAT comments to recommend the Class of Action for the project and develop the scope of work for the PD&E Study. The scope of the PD&E Study reflects the degree of potential direct and indirect effects and whether or not previous resource-level evaluations need to be updated.

PD&E Phase

During the PD&E Phase, input will be gathered from the agencies as part of scoping, but the ETAT will not be expected to perform the evaluation. The level of analysis and documentation required for the PD&E Study is primarily dependent on the potential for the project to cause adverse environmental effects and will vary by Class of Action.

The cumulative effects evaluation that was performed during Planning is an important baseline. The baseline links the effects of past, present, and reasonably foreseeable actions on the resources of concern. It provides the basis for comparing effects of the No Build scenario with those of the proposed Build alternatives. During the PD&E Phase, the cumulative effects evaluation is updated to include any additional actions identified since the completion of the original evaluation. Conditions that may warrant updating include significant planned changes in an area, such as increases in population projections, new or amended Developments of Regional Impact (DRIs), rescinded DRIs, updates to Long Range Transportation Plans (LRTPs), and new projects planned in the area. Any new findings are incorporated into the existing cumulative effects evaluation. For example, a DRI that was previously proposed may have been approved or rescinded.

Next, the cumulative effects evaluation results are updated to reflect the findings of the direct and indirect effects evaluation in the PD&E Study. These are the incremental effects of the proposed project. Evaluate each project alternative separately. If the proposed project was not included as a reasonably foreseeable future project in the original analysis, add the direct and indirect effects of the Build alternative to the previously calculated cumulative effects. If the proposed project was included in the original analysis, update the results to reflect the current findings from the PD&E Study on the direct and indirect effects. The evaluation rationale and analysis should be conducted within the context of how the project's direct and indirect effects add to the cumulative effects of the resources of concern.

More details about completing the final steps in the CEE Process (Steps 7-10) are provided in previous sections of this ***CEE Handbook***, as noted below:

- Add Direct and Indirect Effects of Build Alternatives (***Section 11***)
- Assess the Potential for Cumulative Effects (***Section 12***)
- Identify Potential Mitigation Measures (***Section 13***)
- Document Results (***Section 14***)

Section 16 Summary

This ***CEE Handbook*** provides FDOT guidance for considering cumulative effects within the transportation decision making process. The rationale for FDOT's approach is based on the NEPA regulation, ***40 CFR 1508.7***, defining cumulative impacts as resulting from the incremental effects of a project when added to other past, present, and reasonably foreseeable future actions. These effects may individually be minor, but collectively significant over time. CEQ regulations require all federal agencies to consider the cumulative effects of all proposed agency actions. Many FDOT projects fall into this category because they require federal funding or other federal action. Cumulative effects may also be considered for state projects in order to expedite project delivery when future federal action may be required. The level of analysis and documentation will vary based on the context and severity of the effects.

FDOT recommendations for evaluating cumulative effects have been developed through a collaborative process with input from FDOT personnel and resource agency partners. Initial recommendations from the ICE Task Group provided the conceptual approach for cumulative effects evaluations. FDOT legal counsel reviewed the recommended approach and accepted it with minor modifications. The recommendations were subsequently used with two Environmental Impact Statement (EIS) projects to develop the technical approach for addressing cumulative effects in that type of PD&E Study. This led to additional clarification and refinement in the CEE guidance to address questions from the technical teams for these projects. Finally, the ***CEE Handbook*** incorporated best practices from recently published research, guidance from other state Departments of Transportation, and results of an extensive review of applicable case law.

The guidelines incorporated into the ***CEE Handbook*** were developed with the following goals in mind:

- Provide legally sufficient evaluations
- Enable project time and cost savings through an efficient, standardized approach
- Reduce sources of disagreement over methodologies
- Identify potentially controversial projects early in project development
- Reduce costs by using area-wide evaluations for multiple projects

FDOT's approach to CEE follows a 10-step process, allowing for flexibility to address project-specific circumstances:

Step 1 Initiate the Cumulative Effects Evaluation

Step 2 Identify Resources of Concern

Step 3 Define the Study Time Frame

Step 4 Determine the Potentially Affected Resource Area (PARA)

Step 5 Evaluate Past and Present Impacts on the Resource

Step 6 Evaluate Effects of Reasonably Foreseeable Future Actions

Step 7 Add Direct and Indirect Effects of Build Alternatives

Step 8 Assess the Potential for Cumulative Effects

Step 9 Identify Potential Mitigation Measures

Step 10 Document Results

These steps are typically addressed during the PD&E Phase of project development, with early consideration during the Planning and Programming Screens. Alternatively, the evaluation may be initiated as an area-wide planning study before project-specific environmental analysis begins. In those cases, the evaluation provides invaluable insights into the planning of proposed projects, especially in high-growth regions. It considers the collective effects on the environment based on the effects from many actions over time. This is a planning-level evaluation focused on the environmental resource rather than a single project. The evaluation identifies past, present, and future actions; establishes baselines for the resources; and assesses trends in the condition of the resources. This planning-level study subsequently builds the foundation for all projects needing further study within a resource area.

This ***CEE Handbook*** provides step-by-step guidance for conducting cumulative effects evaluations. ***Table 16-1*** highlights several resources that may also be helpful when conducting a CEE.

Table 16-1 Supporting Resources

Title	Description
AASHTO Center for Environmental Excellence website	Provides links to a number of national and state research and guidance documents. Located at: http://environment.transportation.org/environmental_issues/indirect_effects/recent_dev.aspx
AASHTO Practitioner's Handbook – Assessing Indirect Effects and Cumulative Impacts Under NEPA (AASHTO, 2011)	A primary source for FDOT guidance, this document provides a concise overview of legal requirements for both indirect and cumulative effects evaluations.
Considering Cumulative Effects under the National Environmental Policy Act: Council on Environmental Quality (CEQ, 1997)	Includes step-by-step guidance by CEQ for evaluating cumulative effects. Appendix A provides detailed descriptions of selected methodologies.
FHWA Interim Guidance: Questions and Answers Regarding Indirect and Cumulative Impact Considerations in the NEPA Process (FHWA, 2003)	In this paper, FHWA answers some common questions about the agency's regulations for considering cumulative effects.
NCHRP Project 25-25, Task 43, Legal Sufficiency Criteria for Adequate Indirect Effects and Cumulative Impacts Analysis as Related to NEPA Documents. (NCHRP, 2008)	One of the primary sources for FDOT's approach, this research project reviewed case law related to indirect and cumulative effects evaluations and recommends considerations for legal sufficiency.
TXDOT Guidance on Preparing Indirect and Cumulative Impact Analyses. (TXDOT, 2009)	Another primary source for the FDOT guidance, the TXDOT approach has been recommended by FHWA for projects in states that do not have an adopted CEE approach. The approach has been upheld in court when a project-specific CEE was challenged.

Section 17 of this ***CEE Handbook*** lists additional resources used to develop the FDOT guidance.

The CEE sections in two representative EISs were successfully defended in recent court cases. They provide useful examples when writing the CEE section of an environmental document. The findings of the courts are summarized here, but the actual CEE sections may be found in each of the referenced EISs (FHWA, 2006 and FHWA, 2007).

- **St. Croix River Crossing Project Supplemental Final Environmental Impact Statement (FHWA, 2006)**.

  Case Summary: The plaintiffs argued that the CEE was inadequate because it "lacked any quantified or detailed information." The court noted that the document provided more detailed information for some resources than others, but held that the cumulative impacts analysis was adequate. "The analysis sets the geographic and time boundaries of the cumulative impacts assessment. It then summarizes the existing condition of each potentially affected resource. The analysis summarizes the impacts from the Proposed Bridge on each potentially affected resource and identifies other current and reasonably foreseeable future actions and their possible impacts on those resources. Finally, the analysis discusses the potential for cumulative impacts on the resources and mitigation or minimization measures. This approach constitutes a 'meaningful cumulative impact analysis.'" (*Sierra Club North Star Chapter v. LaHood*, 2010)

- **Grand Parkway (State Highway 99) Segment E Final Environmental Impact Statement (FHWA, 2007).**

  Case Summary: The plaintiffs alleged that the defendants violated NEPA by failing to consider cumulative effects. The court ruled in favor of FHWA and TXDOT, concluding that "the defendants have taken a hard look at the possible indirect and cumulative effects of the construction project." (*Sierra Club v. FHWA*, 2010)

These cases have provided a basis for the guidance offered in this FDOT ***CEE Handbook***, in the hope that should a NEPA document prepared for a FDOT project be challenged in court, it too will be found to contain a "*meaningful cumulative impact analysis*."

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